

BÖLÜM CHAPTER

1

TARİHSEL NOT / HISTORICAL NOTE

Johann Heinrich Lambert [1728 – 1777]

Johann Lambert, ilk defa π nin bir irrasyonel sayı olduğunu kesin olarak ispatlayan ünlü Fransız matematikçisidir.

Johann Lambert, famous french mathematician, was the first to provide a rigorous proof that π is irrational.

SAYILAR / NUMBERS

Bu bölüm 352 test sorusu, 16 YÖS sorusu içermektedir.

This chapter includes 352 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 1

SAYILAR / NUMBERS

- Sayılar / Numbers 1 - 48

1. $\left. \begin{array}{l} A + 5B = 30 \\ 5A + B = 6 \end{array} \right\} \Rightarrow A + B = ?$

- A) 4 B) 6 C) 8 D) 10 E) 12

2. $\left. \begin{array}{l} 2A + 3B = 18 \\ 2B + 3A = 22 \end{array} \right\} \Rightarrow A + B = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

3. $\left. \begin{array}{l} (ab) \in \mathbb{N}, \\ a \cdot k = 12 \\ b \cdot k = 27 \end{array} \right\} \Rightarrow k \cdot (ab) = ?$

- A) 127 B) 133 C) 140 D) 144 E) 147

4. $\left. \begin{array}{l} (AB), (CD) \in \mathbb{N}, \\ A \cdot (CD) = 56 \\ B \cdot (CD) = 42 \end{array} \right\} \Rightarrow CD \cdot AB = ?$

- A) 602 B) 603 C) 604
D) 605 E) 606

5. x, y, z birer rakam olmak üzere
Provided that x, y and z are digits

$x \neq y \neq z$

$2x + 3y + 5z = 62 \Rightarrow \max(z) = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

6. $A, B, D, C, F \in \mathbb{N}$
 $(A + B) \cdot (D - C) = 42$

$$\frac{A}{B} = \frac{D}{2F} \Rightarrow B + F = ?$$

- A) 7 B) 8 C) 9 D) 10 E) 12

7. $x, y \in \mathbb{Z}^+$,
 $x + y = 15 \Rightarrow \min\left(\frac{x \cdot y}{7}\right) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $x, y \in \mathbb{Z}^+$,
 $x + y = 16 \Rightarrow \max\left(\frac{x \cdot y}{16}\right) = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

9. $A, B \in \mathbb{N}^+$,
 $A + B = 18 \Rightarrow \max(A \cdot B) + \min(A \cdot B) = ?$
 A) 101 B) 100 C) 99 D) 98 E) 97

10. $A, B \in \mathbb{N}^+$,
 $A \cdot B = 36 \Rightarrow \max(A + B) + \min(A + B) = ?$
 A) 45 B) 48 C) 49 D) 52 E) 56

11. $A, B \in \mathbb{N}$, $A \neq B$
 $A + B = 42 \Rightarrow \max(A \cdot B) + \min(A \cdot B) = ?$
 A) 440 B) 452 C) 462 D) 481 E) 484

12. $A, B \in \mathbb{N}^+$,
 $A + B = 16 \Rightarrow \max(A \cdot B) - \min(A \cdot B) = ?$
 A) 49 B) 50 C) 51 D) 52 E) 53

13. $A, B \in \mathbb{N}^+$,
 $A \cdot B = 57 \Rightarrow \max(A + B) + \min(A + B) = ?$
 A) 50 B) 60 C) 70 D) 80 E) 90

14. $a, b, c \in \mathbb{Z}^+$,
 $a + b + c = 17 \Rightarrow \min(a \cdot b \cdot c) = ?$
 A) 15 B) 17 C) 20 D) 24 E) 28

15. $a, b, c \in \mathbb{N}^+$,
 $a + b + c = 68 \Rightarrow \min(a \cdot b \cdot c) = ?$
 A) 56 B) 60 C) 64 D) 66 E) 68

16. $x, y, z \in \mathbb{Z}^+$,
 $x \cdot y + y \cdot z = 28$
 $\Rightarrow \max(x \cdot y \cdot z) = ?$
 A) 144 B) 156 C) 168 D) 196 E) 198



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1	2	3	4	5	6	7	8
B	C	E	A	E	B	B	A
9	10	11	12	13	14	15	16
D	C	A	A	D	A	D	D

1. $[12 \cdot (5 - 3)] - [12 : 2 + 1] = ?$

- A) 19 B) 18 C) 17 D) 16 E) 15

2. $20 - [(22 + 8) : 3] = ?$

- A) 8 B) 9 C) 10 D) 11 E) 12

3. $[24 : (-3) - (-5) \cdot (-2)] : [20 - 4 \cdot 3 + 1] = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

4. $(135 : 5 - 9 \cdot 3 + 1) \cdot (144 : 12 - 2 \cdot 5) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

5. $\frac{(-5) \cdot (5) - 3 \cdot 3 + 4}{3 \cdot 5 - 5 \cdot 8 - 5} = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

6. $18 - 2 \cdot 4 + 5 \cdot 4 - 10 = ?$

- A) 74 B) 60 C) 48 D) 24 E) 20

7. $12 : 3 - \{[(-1) - (-2) - (-3)] - 2\} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $5 + 3 \cdot 4 - 18 : 6 + [2(7 + 8 : 4)] = ?$

- A) 22 B) 24 C) 26 D) 28 E) 32

9. $-3 + 2 - 4 \cdot (6 : 3 - 7 + 12) = ?$
 A) -29 B) -27 C) -25 D) -23 E) -21

13. $[44 : 11 - 18 : 6 - 1] \cdot [654 : 2 - 91 \cdot 5] = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

10. $[8 : 4 - (6 : 3) + 12 \cdot 3] + (30 : 6) \cdot 4 = ?$
 A) 2 B) 18 C) 36 D) 41 E) 56

14. $[24 - 4(11 - 27 : 9) - (-7)] - 3 \cdot 2 = ?$
 A) -1 B) -3 C) -5 D) -7 E) -9

11. $[16 : 4 - 4 \cdot 3 + 20] - 20 : 4 = ?$
 A) 1 B) 3 C) 7 D) 9 E) 13

15. $16 - (8 : 2) + 12 : (-2) + 20 : 4 - 5 = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

12. $10 - 4 : 2 - (3 + 2 \cdot 6) = ?$
 A) -3 B) -4 C) -5 D) -6 E) -7

16. $[[14 : 2 - 5] + [6 + 4 : 2] - 3] \cdot 2 = ?$
 A) 11 B) 12 C) 13 D) 14 E) 15

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1	2	3	4	5	6	7	8
C	C	A	B	D	E	B	E
9	10	11	12	13	14	15	16
A	E	C	E	C	D	E	D

1. $5 - (8 : 4 + 4) + 8 : 2 + 3 = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

5. $1.3 + (12 - 8 : 4) : 5 = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

2. $1 - [18 - 18 : 2 + 3 - (6 - 4) : 2] = ?$

- A) -10 B) -8 C) 0 D) 8 E) 10

6. $[9 : 3 - (6 : 2) + 10 \cdot 2] + (25 : 5) \cdot 3 = ?$

- A) 15 B) 20 C) 22 D) 30 E) 35

3. $88 : (8 + 3) + 6 - 2 \cdot 2 = ?$

- A) 6 B) 8 C) 10 D) 12 E) 14

7. $[25 : 5 - 5 \cdot 2 + 15] - 12 : 3 = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

4. $(2^3 \cdot 3 - 8 : 4) : (10 + 1) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $[55 : 11 - 21 : 7 - 2] \cdot [792 : 2 - 3 \cdot 51] = ?$

- A) -7 B) -6 C) 0 D) 6 E) 7

9. $-[-9 + (-3) : 3 - (-2 + 5)] = ?$

- A) 10 B) 13 C) 15 D) 17 E) 19

13. $2 + 3 \cdot (4 + 5) \cdot (3 + 4 \cdot 5) = ?$

- A) 600 B) 610 C) 623 D) 625 E) 621

10. $a = 2$

$b = 5$

$\Rightarrow (a \cdot b - 3a + 2b) \cdot 4 = ?$

- A) 56 B) 55 C) 54 D) 32 E) 16

14. $6 - 3 \cdot (15 : 5 - 3 : 3 + 4 \cdot 6) = ?$

- A) -24 B) -36 C) -72 D) -96 E) -108

11. $a = -3$

$b = 2$

$\Rightarrow (-a \cdot b - 4b + 5a) = ?$

- A) -13 B) -17 C) -18 D) -19 E) -20

15. $7 + 2 \cdot (2 - 3 \cdot 4 + 4 - 3 \cdot 5) = ?$

- A) -19 B) -35 C) -25 D) -55 E) -75

12. $a = -2$

$b = -4$

$\Rightarrow [(-a) + 2b] : [-(-b) : a + 1] = ?$

- A) -2 B) -3 C) -4 D) -5 E) -6

16. $75 - 3 \cdot 2 \cdot (42 : 2 - 7 \cdot 3) - 4 \cdot (5 \cdot 3 - 8) = ?$

- A) 40 B) 42 C) 45 D) 46 E) 47

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1	2	3	4	5	6	7	8
B	A	C	B	D	E	E	C
9	10	11	12	13	14	15	16
B	A	B	A	C	C	B	E

1. $(AB), (BA) \in \mathbb{N}$,
 $AB + BA = 77 \Rightarrow A + B = ?$
A) 3 B) 5 C) 7 D) 9 E) 11
2. $(AB), (BA) \in \mathbb{N}$,
 $AB - BA = 54 \Rightarrow A - B = ?$
A) 2 B) 4 C) 6 D) 7 E) 8
3. $(AB), (BA), (BB) \in \mathbb{N}$,
 $AB + BA - BB = 44 \Rightarrow A = ?$
A) 1 B) 2 C) 3 D) 4 E) 5
4. $(AB), (BA), (AA) \in \mathbb{N}$,
 $AB + BA - AA = 33 \Rightarrow B = ?$
A) 1 B) 2 C) 3 -D) 4 E) 5
5. $aa \in \mathbb{N}$,
 $(aa) \cdot a = 99 \Rightarrow a = ?$
A) 1 B) 2 C) 3 D) 4 E) 5
6. $ABC, BCA, CAB \in \mathbb{N}$
 $A + B + C = 7$
 $\Rightarrow ABC + BCA + CAB = ?$
A) 777 B) 666 C) 444 D) 333 E) 555
7. $(ABC), (BCA), (CAB) \in \mathbb{N}$,
 $A + B + C = 5 \Rightarrow ABC + BCA + CAB = ?$
A) 444 B) 445 C) 525 D) 545 E) 555
8. $(A0B), (BA0) \in \mathbb{N}$,
 $A0B + BA0 = 211 \Rightarrow AB = ?$
A) 10 B) 11 C) 12 D) 13 E) 14

9. $(3ab), (abc) \in \mathbb{N}$,
 $3ab - abc = 145$
 $\Rightarrow a + b + c = ?$
 A) 8 B) 10 C) 12 D) 14 E) 16

10. $(AB), (BA) \in \mathbb{N}$,
 $AB - BA = 45 \Rightarrow \min(A) = ?$
 A) 5 B) 6 C) 7 D) 8 E) 9

11. $AB + BA = 110 \Rightarrow \max(AB) = ?$
 A) 91 B) 82 C) 73 D) 64 E) 55

12. $(ab), (ba) \in \mathbb{N}$,
 $ab + ba = 5(a + b) + 72$
 $\Rightarrow a + b = ?$
 A) 12 B) 14 C) 16 D) 18 E) 20

13. $(AB), (BA), (CC) \in \mathbb{N}$,
 $AB + BA + CC = 121 \Rightarrow \max(ABC) = ?$
 A) 821 B) 831 C) 841 D) 911 E) 921

14. $(AB), (BA) \in \mathbb{N}$,
 $AB + BA = 77$,
 $AB - BA = 45 \Rightarrow A \cdot B = ?$
 A) 4 B) 5 C) 6 D) 7 E) 8

15. $(AB), (BA) \in \mathbb{N}$,
 $AB + BA = 99$, $\frac{AB}{BA} = \frac{7}{4} \Rightarrow A \cdot B = ?$
 A) 14 B) 16 C) 18 D) 20 E) 24

16. $(ab), (ba) \in \mathbb{N}$,
 $\frac{ab + ba}{ab - ba} = \frac{11}{5} \Rightarrow a - b = ?$
 A) 4 B) 5 C) 6 D) 7 E) 8


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1	2	3	4	5	6	7	8
C	C	D	C	C	A	E	B
9	10	11	12	13	14	15	16
B	B	A	A	D	C	C	B

1. $(ABA), (BAB) \in \mathbb{N}$,
 $ABA + BAB = 1221 \Rightarrow \max(A) + \min(A) = ?$
 A) 12 B) 11 C) 10 D) 9 E) 8
2. $A \neq B \neq C, (ABA), (BAB) \in \mathbb{N}$,
 $ABA + BAB = 1221 \Rightarrow \max(ABC) = ?$
 A) 998 B) 988 C) 928
 D) 987 E) 897
3. $(ABC), (CBA) \in \mathbb{N}$,
 $ABC - CBA = 495 \Rightarrow \max(ABC) = ?$
 A) 994 B) 984 C) 895
 D) 498 E) 495
4. $ABC, CBA \in \mathbb{N}$
 $ABC - CBA = 396$
 $\Rightarrow \max(A + B + C) = ?$
 A) 15 B) 17 C) 18
 D) 21 E) 23
5. $a \neq b, (abc), (cba) \in \mathbb{N}$,
 $abc - cba = 396 \Rightarrow \max(a + b + c) = ?$
 A) 18 B) 20 C) 22 D) 24 E) 26
6. $(ab), (cd) \in \mathbb{N}$,
 $(ab) \cdot d = 185$
 $(ab) \cdot c = 111$
 $\Rightarrow (ab) \cdot (cd) = ?$
 A) 1165 B) 1185 C) 1265 D) 1295 E) 1315
7. $ABC, CBA \in \mathbb{N}$
 $ABC = CBA + 693 \Rightarrow A - C = ?$
 A) 5 B) 7 C) 9 D) 11 E) 13
8. $(ABAB), (AB) \in \mathbb{N}$
 $\Rightarrow \frac{ABAB + AB}{3 \cdot (AB)} = ?$
 A) 32 B) 34 C) 36 D) 40 E) 44

9. $(AB), (BA) \in \mathbb{N}$,

$$AB = BA + 27 \Rightarrow \min(AB) = ?$$

- A) 30 B) 41 C) 52 D) 63 E) 74

10. $(AB), (BA) \in \mathbb{N}$,

$$AB + BA = 7(A + B) + 32 \Rightarrow \max(AB) = ?$$

- A) 92 B) 80 C) 71 D) 62 E) 53

11. $(AB), (BA) \in \mathbb{N}$,

$$AB + BA = 3(AA) \Rightarrow \sum A = ?$$

- A) 6 B) 7 C) 8 D) 9 E) 10

12. $(AB), (BA) \in \mathbb{N}$,

$$AB + 37 = 3(BA) \Rightarrow A + B = ?$$

- A) 4 B) 5 C) 6 D) 7 E) 8

13. $(AB) \in \mathbb{N}$,

$$8(A + B) = AB \Rightarrow A \cdot B = ?$$

- A) 10 B) 12 C) 14 D) 18 E) 24

14. $(AB), (BA) \in \mathbb{N}$,

$$AB + BA = 99$$

$$\frac{AB}{BA} = \frac{6}{5} \Rightarrow A \cdot B = ?$$

- A) 18 B) 19 C) 20 D) 21 E) 22

15. $(AB), (BA), (BB) \in \mathbb{N}$,

$$\frac{AB+BA}{BB} = 3 \Rightarrow \max(A - B) = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

16. $a \neq b$, aba ve bab üç basamaklı doğal sayılardır.

$aba + bab = 1665$ olduğuna göre, $a \cdot b$ çarpımının **en büyük değeri kaçtır?**

$a \neq b$, aba and bab are three-digit natural numbers. If the sum $aba + bab = 1665$, what is the **largest value** of the product $a \cdot b$?

- A) 36 B) 42 C) 49 D) 56 E) 63



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1	2	3	4	5	6	7	8
B	C	A	E	C	D	B	B
9	10	11	12	13	14	15	16
B	C	E	B	C	C	D	D

1. $(324)_5 = (x)_{10} \Rightarrow x = ?$
A) 89 B) 79 C) 69 D) 59 E) 49
2. $(234)_6 = (x)_{10} \Rightarrow x = ?$
A) 92 B) 94 C) 96 D) 98 E) 100
3. $(1203)_4 = (x)_{10} \Rightarrow x = ?$
A) 79 B) 83 C) 89 D) 96 E) 99
4. $(1023)_4 = (x)_{10} \Rightarrow x = ?$
A) 74 B) 75 C) 76 D) 77 E) 78
5. $(24)_5 + (41)_6 = (x)_{10} \Rightarrow x = ?$
A) 36 B) 37 C) 38 D) 39 E) 40
6. $(101)_2 + (201)_3 + (111)_4 = (x)_{10} \Rightarrow x = ?$
A) 36 B) 41 C) 45 D) 49 E) 54
7. $(142)_6 + (214)_5 + (113)_4 = (x)_{10} \Rightarrow x = ?$
A) 144 B) 128 C) 124 D) 121 E) 71
8. $(102)_3 + (203)_4 = (x)_{10} \Rightarrow x = ?$
A) 45 B) 46 C) 47 D) 48 E) 49

9. $(1231)_4 + (1011)_2 = (4a0)_5 \Rightarrow a = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

13. $(15a)_6 = (241)_a \Rightarrow a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

10. $(54)_x = (A)_{10} \Rightarrow \min(A) = ?$

- A) 30 B) 31 C) 32 D) 33 E) 34

14. $(3a4)_6 + (114)_a = (x)_{10} \Rightarrow x = ?$

- A) 170 B) 174 C) 176
D) 180 E) 182

15. $(x43)_6 + (432)_x = (A)_{10} \Rightarrow A = ?$

- A) 322 B) 323 C) 324
D) 325 E) 326

11. $(46)_x = (A)_{10} \Rightarrow \min(A) = ?$

- A) 30 B) 31 C) 32 D) 33 E) 34

16. $(1b14)_5 = (b53)_7 \Rightarrow b = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

12. $x \in \mathbb{Z}$,

$(111)_3 \leq (x)_{10} < (122)_3 \Rightarrow \sum x = ?$

- A) 50 B) 54 C) 56 D) 58 E) 60


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1	2	3	4	5	6	7	8
A	B	E	B	D	C	A	B
9	10	11	12	13	14	15	16
E	E	E	D	E	C	C	E

1. $(2a5)_7 = (131)_{10} \Rightarrow a = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

2. $(2n5)_6 = (83)_{10} \Rightarrow n = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

3. $(a4a)_5 = (200)_6 \Rightarrow a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

4. $\sqrt{(144)_a} = (14)_5 \Rightarrow a = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

5. $(235)_7 = (a4a)_5 \Rightarrow a = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

6. $(4ab)_6 = 162 \Rightarrow a + b = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

7. $(134)_n = 58 \Rightarrow n = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

8. $(abb)_5 = (bba)_6 \Rightarrow a \cdot b = ?$

- A) 6 B) 10 C) 12 D) 15 E) 16

9. $(21,5)_6 = (x)_{10} \Rightarrow x = ?$

- A)
- $\frac{40}{3}$
- B)
- $\frac{27}{2}$
- C)
- $\frac{41}{3}$
- D)
- $\frac{83}{6}$
- E) 14

13. $(14)_x + (25)_x = (41)_x \Rightarrow x = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

10. $(a3)_{a+1} = 5 \cdot a \Rightarrow a = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

14. $(ab)_6 + (ba)_7 = (1ab)_6 \Rightarrow a + b = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

15. $(10,11)_3 = (A)_{10} \Rightarrow A = ?$

- A)
- $\frac{29}{9}$
- B)
- $\frac{10}{3}$
- C)
- $\frac{31}{9}$
- D)
- $\frac{32}{9}$
- E)
- $\frac{11}{3}$

11. $(1a)_5 + (31)_{a+2} = (A)_{10} \Rightarrow \max(A) = ?$

- A) 26 B) 28 C) 30 D) 32 E) 34

16. $(1,41)_5 = (x)_{10} \Rightarrow x = ?$

- A)
- $\frac{21}{25}$
- B)
- $\frac{1}{25}$
- C)
- $\frac{9}{5}$
- D)
- $\frac{46}{25}$
- E)
- $\frac{47}{8}$

12. $\left. \begin{array}{l} x = (54)_a \\ x = (47)_{a+1} \end{array} \right\} \Rightarrow x = ?$

- A) 32 B) 36 C) 39 D) 40 E) 44



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1	2	3	4	5	6	7	8
C	A	B	C	E	A	B	A
9	10	11	12	13	14	15	16
D	A	B	C	C	A	C	D

1. $(56)_{10} = (x)_5 \Rightarrow x = ?$
A) 209 B) 210 C) 211 D) 212 E) 213
2. $(94)_{10} = (x)_5 \Rightarrow x = ?$
A) 334 B) 343 C) 321 D) 304 E) 244
3. $(46)_{10} = (x)_4 \Rightarrow x = ?$
A) 233 B) 232 C) 230 D) 133 E) 132
4. $(49)_{10} = (x)_6 \Rightarrow x = ?$
A) 102 B) 100 C) 101 D) 121 E) 210
5. $(108)_{10} = (x)_7 \Rightarrow x = ?$
A) 102 B) 100 C) 101 D) 121 E) 213
6. $(111)_{10} = (x)_5 \Rightarrow x = ?$
A) 331 B) 342 C) 343 D) 411 E) 421
7. $(86)_9 = (x)_7 \Rightarrow x = ?$
A) 126 B) 134 C) 141 D) 146 E) 151
8. $(68)_9 = (x)_5 \Rightarrow x = ?$
A) 224 B) 223 C) 222 D) 221 E) 220

9. $(77)_8 = (x)_6 \Rightarrow x = ?$

- A) 140 B) 141 C) 142 D) 143 E) 144

13. $A = 4 \cdot 6^5 + 2 \cdot 6^4 + 3 \cdot 6^3 + 2 \cdot 6^2 + 6 + 4 \Rightarrow (A)_6 = ?$

- A) 432214 B) 42324 C) 423241
-
- D) 423214 E) 43214

10. $9^3 + 2 \cdot 9 + 8 = (A)_9 \Rightarrow A = ?$

- A) 1028 B) 1208 C) 1008
-
- D) 1080 E) 1128

14. $4^4 = (A)_4 \Rightarrow A = ?$

- A) 1000 B) 10000 C) 100000
-
- D) 3333 E) 33333

15. $9^3 + 1 = (x)_9 \Rightarrow x = ?$

- A) 1010 B) 1000 C) 1110
-
- D) 1001 E) 1111

11. $2^5 + 2^3 + 3 = (A)_4 \Rightarrow A = ?$

- A) 220 B) 221 C) 203 D) 223 E) 232

16. $2^{10} = (x)_4 \Rightarrow x = ?$

- A) 100 B) 1000 C) 10000
-
- D) 100000 E) 1000000

12. $A = 4^2 + 4 + 1 \Rightarrow (A)_2 = ?$

- A) 111 B) 1011 C) 1010
-
- D) 10101 E) 11010

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1	2	3	4	5	6	7	8
C	A	B	D	E	E	C	C
9	10	11	12	13	14	15	16
D	A	D	D	D	B	D	D

1. $4^2 + 4 + 3 = (A)_2 \Rightarrow A = ?$

- A) 10111 B) 11011 C) 11101
D) 11110 E) 11111

2. $x \in \mathbb{N}^+$,

$2x^3 + x + 1 = (A)_x \Rightarrow A = ?$

- A) 1010 B) 2010 C) 2011
D) 2101 E) 211

3. $x^3 + 3x^2 + 3x + 2 = (A)_{x+1} \Rightarrow A = ?$

- A) 100 B) 101 C) 102
D) 1001 E) 1002

4. $a > 4$,

$(4a^2 + a)_{10} = (x)_a \Rightarrow x = ?$

- A) 321 B) 334 C) 242 D) 410 E) 411

5. $\frac{33}{2} = (A)_6 \Rightarrow A = ?$

- A) 24,3 B) 23,4 C) 21,4
D) 24,4 E) 24,9

6. $(47)_8 + (36)_8 + (24)_8 = (x)_8 \Rightarrow x = ?$

- A) 123 B) 131 C) 137 D) 141 E) 146

7. $(1023)_6 - (515)_6 = (x)_6 \Rightarrow x = ?$

- A) 104 B) 204 C) 210 D) 230 E) 240

8. $(44)_5 + (32)_5 + (14)_5 = (x)_5 \Rightarrow x = ?$

- A) 134 B) 144 C) 200 D) 234 E) 244

9. $(36)_8 + (42)_8 = (x)_8 \Rightarrow x = ?$
 A) 77 B) 100 C) 117 D) 127 E) 137

13. $\frac{(xx)_5 + (yy)_5 + (zz)_5}{x+y+z} = ?$
 A) 4 B) 6 C) 8 D) 10 E) 12

10. $(426)_8 - (137)_8 = (x)_8 \Rightarrow x = ?$
 A) 267 B) 266 C) 265 D) 264 E) 263

14. $(25)_7 \cdot (16)_7 = (x)_7 \Rightarrow x = ?$
 A) 401 B) 431 C) 440
 D) 456 E) 502

15. $(35)_7 \cdot (42)_7 = (A)_7 \Rightarrow A = ?$
 A) 2166 B) 2163 C) 2056
 D) 2053 E) 2050

11. $(12)_3 + (20)_3 + (22)_3 = (x)_3 \Rightarrow x = ?$
 A) 102 B) 200 C) 201 D) 202 E) 221

16. $(34)_5 \cdot (33)_5 = (A)_5 \Rightarrow A = ?$
 A) 2332 B) 2232 C) 2132
 D) 2333 E) 3232

12. $(478)_9 - (288)_9 = (A)_9 \Rightarrow A = ?$
 A) 180 B) 181 C) 182 D) 183 E) 184

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YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	C	D	D	A	B	A	C
9	10	11	12	13	14	15	16
B	A	C	A	B	E	B	A

1. $1 + 2 + 3 + 4 + \dots + 25 = ?$

- A) 320 B) 325 C) 330 D) 335 E) 340

2. $1 + 2 + 3 + \dots + 26 = ?$

- A) 321 B) 335 C) 341 D) 345 E) 351

3. $2 + 4 + 6 + \dots + 38 = ?$

- A) 190 B) 230 C) 300 D) 380 E) 400

4. $2 + 4 + 6 + \dots + 28 = ?$

- A) 200 B) 206 C) 210 D) 214 E) 218

5. $2 + 4 + 6 + \dots + 44 = ?$

- A) 502 B) 504 C) 506 D) 508 E) 510

6. $2 + 4 + 6 + \dots + 30 = ?$

- A) 220 B) 230 C) 240 D) 250 E) 260

7. $1 + 3 + 5 + \dots + 23 = ?$

- A) 100 B) 121 C) 144 D) 169 E) 225

8. $1 + 3 + 5 + 7 + \dots + 47 = ?$

- A) 529 B) 538 C) 557 D) 564 E) 576

9. $1 + 3 + 5 + \dots + 21 = ?$

- A) 120 B) 121 C) 122
D) 123 E) 124

13. $14 + 15 + 16 + \dots + 28 = ?$

- A) 270 B) 285 C) 300
D) 315 E) 320

10. $1 + 3 + 5 + \dots + 49 = ?$

- A) 576 B) 595 C) 615
D) 625 E) 636

14. $12 + 14 + 16 + \dots + 40 = ?$

- A) 378 B) 382 C) 386 D) 390 E) 394

15. $12 + 14 + 16 + \dots + 36 = ?$

- A) 312 B) 318 C) 324
D) 330 E) 336

11. $5 + 6 + 7 + \dots + 24 = ?$

- A) 280 B) 290 C) 300
D) 310 E) 320

16. $13 + 15 + 17 + \dots + 37 = ?$

- A) 300 B) 305 C) 310 D) 315 E) 325

12. $16 + 17 + 18 + \dots + 32 = ?$

- A) 408 B) 404 C) 400 D) 396 E) 392

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YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	E	D	C	C	C	C	E
9	10	11	12	13	14	15	16
B	D	B	A	D	D	A	E

1. $9 + 11 + 13 + \dots + 29 = ?$
A) 203 B) 205 C) 207
D) 209 E) 211
2. $1 + 2 + 3 + \dots + n = 136 \Rightarrow n = ?$
A) 16 B) 17 C) 18 D) 19 E) 20
3. $1 + 2 + 3 + 4 + \dots + n = 300 \Rightarrow n = ?$
A) 15 B) 18 C) 21 D) 24 E) 27
4. $1 + 2 + 3 + \dots + n = 210 \Rightarrow n = ?$
A) 18 B) 19 C) 20 D) 21 E) 22
5. $2 + 4 + 6 + \dots + 2n = 110 \Rightarrow n = ?$
A) 5 B) 10 C) 15 D) 20 E) 25
6. $15 + 17 + \dots + 2n - 1 = 851 \Rightarrow n = ?$
A) 25 B) 30 C) 32 D) 35 E) 40
7. $5 + 6 + 7 + \dots + n = 45 \Rightarrow n = ?$
A) 7 B) 8 C) 9 D) 10 E) 11
8. $10 + 12 + 14 + \dots + 2n = 70 \Rightarrow n = ?$
A) 3 B) 6 C) 9 D) 12 E) 15

9. $7 + 9 + 11 + \dots + 2n - 1 = 135 \Rightarrow n = ?$
 A) 12 B) 10 C) 8 D) 6 E) 4

13. $-10 - 8 - 6 - \dots - 2 + 1 + 3 + 5 + \dots + 23 = ?$
 A) 110 B) 111 C) 112
 D) 113 E) 114

10. $1 \cdot a + 2 \cdot a + 3 \cdot a + \dots + 20 \cdot a = 105 \Rightarrow a = ?$
 A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 3

14. $a + a + 2 + a + 4 + \dots + a + 24 = 169$
 $\Rightarrow a = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

11. $a + (a + 1) + (a + 2) + \dots + (a + 12) = 130$
 $\Rightarrow a = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

15. $2n + (2n + 1) + (2n + 2) + \dots + (2n + 12) = 52$
 $\Rightarrow n = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

16. $12 + 14 + 16 + \dots + K = 390$
 $\Rightarrow K = ?$
 A) 36 B) 37 C) 38 D) 39 E) 40

12. $a + (a + 1) + (a + 2) + \dots + (a + 17) = 207$
 $\Rightarrow a = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

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YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	A	D	C	B	B	D	C
9	10	11	12	13	14	15	16
A	B	D	C	E	A	B	E

1. $7 + 14 + \dots + 140 = ?$

- A) 1390 B) 1410 C) 1460
D) 1470 E) 1500

2. $12 + 15 + 18 + \dots + 54 = ?$

- A) 490 B) 495 C) 500
D) 505 E) 510

3. $6 + 11 + 16 + \dots + 66 = ?$

- A) 468 B) 464 C) 460 D) 456 E) 452

4. $7 + 11 + 15 + \dots + 79 = ?$

- A) 811 B) 814 C) 817 D) 820 E) 823

5. $-12 - 5 + 2 + 9 + \dots + 79 = ?$

- A) 460 B) 463 C) 466 D) 469 E) 472

6. $6 + 12 + 18 + \dots + 96 = ?$

- A) 814 B) 815 C) 816
D) 817 E) 818

7. $5 + 12 + 19 + 26 + \dots + 75 = ?$

- A) 435 B) 440 C) 445
D) 450 E) 455

8. $-8 - 5 - 2 + 1 + 4 + \dots + 25 = ?$

- A) 100 B) 101 C) 102
D) 103 E) 104

9. $1 - 2 + 3 - 4 + \dots + 29 - 30 = ?$

- A) -11 B) -12 C) -13
D) -14 E) -15

10. $-1 - 2 - 3 - \dots - 14 + 15 + 14 + \dots + 3 = ?$

- A) 12 B) 13 C) 14 D) 15 E) 16

11. $1 - 2 + 3 - 4 + 5 - 6 + \dots + 31 - 32 = ?$

- A) -12 B) -14 C) -16 D) -18 E) -20

12. $4 - 5 + 6 - 7 + 8 - 9 + \dots + 18 - 19 + 20 = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

13. $2 - 4 + 6 - 8 + \dots + 42 - 44 + 46 = ?$

- A) -24 B) -20 C) 20
D) 23 E) 24

14. $6 - 7 + 8 - 9 + \dots + 20 - 21 + 17 = ?$

- A) 1 B) 3 C) 5 D) 7 E) 9

15. $1 - 4 + 7 - 10 + \dots + 91 - 94 + 97 = ?$

- A) 54 B) 49 C) 0 D) -49 E) -54

16. $15 - 18 + 21 - 24 + 27 - 30 + \dots + 63 - 66 = ?$

- A) -27 B) -17 C) 0 D) 17 E) 27



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	B	A	C	D	C	B	C
9	10	11	12	13	14	15	16
E	A	C	C	E	E	B	A

1. $A = 1 \cdot 2 + 2 \cdot 3 + 3 \cdot 4 + \dots + 10 \cdot 11$
 $B = 3 \cdot 8 + 6 \cdot 12 + 9 \cdot 16 + \dots + 30 \cdot 44$
 $\Rightarrow \frac{B}{A} = ?$

- A) 3 B) 4 C) 6 D) 12 E) 16

2. $A = 10 + 20 + \dots + 110$
 $B = 8 + 16 + \dots + 88$
 $\Rightarrow \frac{A}{B} = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{3}{4}$ D) 1 E) $\frac{5}{4}$

3. $\frac{4+8+12+\dots+104}{3+6+9+\dots+78} = ?$

- A) 1 B) $\frac{1}{2}$ C) $\frac{1}{3}$ D) $\frac{4}{3}$ E) $\frac{3}{4}$

4. $A = 4 + 5 + 6 + \dots + 18$
 $B = 5 + 8 + 11 + \dots + 47$
 $\Rightarrow B - A = ?$

- A) 200 B) 205 C) 215
D) 220 E) 225

5. $A = 12 + 13 + 14 + \dots + n$
 $B = 1 + 2 + 3 + 4 + \dots + n$
 $\Rightarrow B - A = ?$

- A) 54 B) 56 C) 62 D) 64 E) 66

6. $A = 1 + 3 + 5 + \dots + 25$
 $B = 2 + 4 + 6 + \dots + 26 \Rightarrow B - A = ?$

- A) 11 B) 12 C) 13 D) 14 E) 15

7. $\frac{1}{5} + \frac{2}{5} + \frac{3}{5} + \dots + \frac{14}{5} = A$
 $\frac{1}{6} + \frac{3}{6} + \frac{5}{6} + \dots + \frac{11}{6} = B$
 $\Rightarrow A - B = ?$

- A) 5 B) 10 C) 15 D) 20 E) 25

8. $8 + 10 + 12 + \dots + 88 = A$
 $5 + 7 + 9 + \dots + 89 = B$
 $\Rightarrow 1 + 2 + 3 + \dots + 87 + 88 + 89 = ?$

- A) $A + B - 16$ B) $A + B - 13$ C) $A + B$
D) $A + B + 13$ E) $A + B + 16$

9. $A = 1 + 2 + 3 + \dots + n$
 $B = 10 + 11 + 12 + \dots + n - 1$
 $A - B = 90 \Rightarrow n = ?$
 A) 41 B) 42 C) 43 D) 44 E) 45

10. $A = 1 + 2 + 3 + \dots + n - 2$
 $B = 15 + 16 + \dots + n$
 $A - B = 42 \Rightarrow n = ?$
 A) 30 B) 31 C) 32 D) 33 E) 34

11. $A = 1 + 2 + 3 + \dots + n - 1$
 $B = 11 + 12 + \dots + n$
 $A - B = 5 \Rightarrow n = ?$
 A) 30 B) 40 C) 50 D) 60 E) 70

12. $A = 4 + 6 + 8 + \dots + n$
 $B = 8 + 10 + 12 + \dots + n$
 $A + B = 330 \Rightarrow B = ?$
 A) 155 B) 160 C) 165 D) 170 E) 175

13. $A = 1 \cdot 2 + 2 \cdot 4 + 3 \cdot 6 + \dots + 14 \cdot 28$
 $B = 1 \cdot 3 + 2 \cdot 5 + 3 \cdot 7 + \dots + 14 \cdot 29$
 $\Rightarrow B = ?$
 A) $A - 5$ B) $A + 25$ C) $A + 45$
 D) $A + 90$ E) $A + 105$

14. $A = 1 \cdot 2 + 2 \cdot 4 + 3 \cdot 6 + 4 \cdot 8 + \dots + 12 \cdot 24$
 $B = 1 \cdot 3 + 2 \cdot 5 + 3 \cdot 7 + 4 \cdot 9 + \dots + 12 \cdot 25$
 $\Rightarrow B = ?$
 A) $A + 10$ B) $A + 12$ C) $A + 14$
 D) $A + 16$ E) $A + 78$

15. $A = 1 \cdot 2 + 2 \cdot 4 + 3 \cdot 6 + \dots + 10 \cdot 20$
 $B = 1 \cdot 3 + 2 \cdot 5 + 3 \cdot 7 + \dots + 10 \cdot 21$
 $\Rightarrow B = ?$
 A) $50 - A$ B) $55 + A$ C) $60 - A$
 D) $50 + A$ E) $40 + A$

16. $x = 1 \cdot 2 \cdot 3 + 2 \cdot 3 \cdot 4 + \dots + 14 \cdot 15 \cdot 16$
 $\Rightarrow 4 \cdot 6 \cdot 8 + 6 \cdot 8 \cdot 10 + \dots + 28 \cdot 30 \cdot 32 = ?$
 A) $x - 6$ B) $x + 4$ C) $4x - 32$
 D) $8x - 48$ E) $8x$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	E	D	E	E	C	C	E
9	10	11	12	13	14	15	16
E	C	C	B	E	E	B	D

1. a ve b aralarında asal sayılardır.

a and b are relatively prime.

$$\frac{a+2b}{a-b} = \frac{4}{3} \Rightarrow a+b = ?$$

- A) 9 B) 10 C) 11 D) 12 E) 13

2. $x, y, z \in \mathbb{N}^+$

$$1800 = 2^x \cdot 3^y \cdot 5^z$$

$$\Rightarrow x+y+z = ?$$

- A) 4 B) 5 C) 6 D) 7 E) 8

3. $x, y, z \in \mathbb{N}^+$

$$150 = 2^x \cdot 3^y \cdot 5^z$$

$$\Rightarrow x+y-5z = ?$$

- A) 0 B) 3 C) -4 D) -8 E) -12

4. $360 = 2^x \cdot 3^y \cdot 5^z \Rightarrow x \cdot y \cdot z = ?$

- A) 4 B) 6 C) 8 D) 9 E) 12

5. $a, b, c \in \mathbb{Z}^+$,

$$660 = k \cdot 2^a \cdot 3^b \Rightarrow \min(k) = ?$$

- A) 30 B) 44 C) 55 D) 60 E) 66

6. $a, z \in \mathbb{N}^+$,

$$a \cdot 150 = z^2 \Rightarrow \min(a) = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

7. $x, y \in \mathbb{N}^+$

$$24 \cdot x = y^3 \Rightarrow \min(x+y) = ?$$

- A) 12 B) 14 C) 15 D) 17 E) 18

8. $A, B \in \mathbb{N}^+$

$$40 \cdot A = B^3 \Rightarrow \min(A+B) = ?$$

- A) 15 B) 20 C) 25 D) 30 E) 35

9. $A, B \in \mathbb{N}^+$,
 $75 \cdot A = B^3$
 $\Rightarrow \min(A) = ?$
 A) 30 B) 40 C) 45 D) 50 E) 75

10. $x, y \in \mathbb{Z}^+$,
 $144 \cdot x = y^3 \Rightarrow \min(x + y) = ?$
 A) 16 B) 18 C) 20 D) 22 E) 24

11. $x, y \in \mathbb{Z}^+$,
 $72 \cdot x = y^4 \Rightarrow \min(x + y) = ?$
 A) 21 B) 22 C) 23 D) 24 E) 25

12. $x, y \in \mathbb{N}^+$,
 $60 \cdot x^2 = y^3 \Rightarrow \min(x + y) = ?$
 A) 120 B) 136 C) 142 D) 156 E) 172

13. 180 sayısının tam sayı bölenlerinin sayısı kaçtır?

What is the number of integer divisors of 180?

- A) 18 B) 26 C) 32
 D) 36 E) 38

14. $A = 2^n \cdot 3^2 \cdot 10$ sayısının pozitif tam sayı bölenlerinin sayısı 42 ise n kaçtır?

If the number of positive integer divisors of $A = 2^n \cdot 3^2 \cdot 10$ is 42, what is the value of n ?

- A) 4 B) 5 C) 6
 D) 7 E) 8

15. $A = 3 \cdot 20^n$ sayısının tam sayı bölenlerinin sayısı 180 ise A sayısı kaç basamaklıdır?

If the number of integer divisors of $A = 3 \cdot 20^n$ is 180, how many digits does the number A have?

- A) 2 B) 3 C) 4
 D) 5 E) 6

16. $1 < n < 50$ olmak üzere pozitif bölenlerinin sayısı 3 olan kaç tane n tam sayısı vardır?

If $1 < n < 50$, how many integer numbers n exist are there in a way that the number of its positive integer divisors are 3?

- A) 2 B) 3 C) 4
 D) 5 E) 7



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1	2	3	4	5	6	7	8
C	D	D	B	C	E	C	E
9	10	11	12	13	14	15	16
C	E	D	A	D	B	E	C

1. $13! = x \cdot 12! \Rightarrow x = ?$

- A) 13 B) 12 C) 11 D) 10 E) 9

2. $21! = a \cdot 20! \Rightarrow a = ?$

- A) 20 B) 21 C) 22 D) 23 E) 24

3. $\frac{2! + 3! + 4!}{5!} = ?$

- A)
- $\frac{1}{15}$
- B)
- $\frac{2}{15}$
- C)
- $\frac{1}{5}$
-
- D)
- $\frac{4}{15}$
- E)
- $\frac{1}{3}$

4. $\frac{10! + 9!}{8!} = ?$

- A) 17 B) 72 C) 80 D) 90 E) 99

5. $\frac{4! + 5! + 6!}{4! + 5!} = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

6. $\frac{5! + 6!}{5!} = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

7. $\frac{8! + 9!}{9!} = ?$

- A) 1 B)
- $\frac{9}{8}$
- C)
- $\frac{10}{9}$
- D)
- $\frac{8}{9}$
- E)
- $\frac{9}{10}$

8. $n \in \mathbb{N}$

$$\frac{12! + 11! + 10!}{12! - 11!} = \frac{n^2}{121} \Rightarrow n = ?$$

- A) 6 B) 8 C) 10 D) 12 E) 14

9. $42 \cdot 5! = n(n-1)! \Rightarrow n = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

13. $\frac{(n-2)!}{(n-3)!} = 10 \Rightarrow n = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

10. $7! \cdot x + 8! \cdot x = 10! \Rightarrow x = ?$

- A) 80 B) 72 C) 63 D) 54 E) 45

14. $\frac{(n+1)!}{(n-1)!} = 72 \Rightarrow n = ?$

- A) 10 B) 9 C) 8 D) 7 E) 6

15. $\frac{(n-1)!}{(n-2)!} + \frac{(n+3)!}{(n+2)!} = 18 \Rightarrow n = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

11. $\frac{n!}{7!} = 72 \Rightarrow n = ?$

- A) 8 B) 9 C) 10 D) 11 E) 12

16. $\frac{n!}{(n-1)!} + \frac{(n-1)!}{(n-2)!} + \frac{(n-2)!}{(n-3)!} = 30 \Rightarrow n = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

12. $\frac{(x-2)!}{9!} = 110 \Rightarrow x = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14



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1	2	3	4	5	6	7	8
A	B	D	E	C	D	C	D
9	10	11	12	13	14	15	16
C	A	B	D	C	C	D	B

$$1. \frac{(n-1)!}{(n-2)!} + \frac{(n+2)!}{(n+1)!} + \frac{n!}{(n-1)!} = 61$$

$$\Rightarrow n = ?$$

- A) 16 B) 19 C) 20 D) 21 E) 25

$$2. \frac{(2n-1)!}{(2n-2)!} \cdot \frac{(n-1)!}{n!} = \frac{11}{6} \Rightarrow n = ?$$

- A) 4 B) 5 C) 6 D) 7 E) 8

$$3. \frac{a! \cdot (2a+1)!}{(a-1)! \cdot (2a+2)!} = \frac{4}{9} \Rightarrow a = ?$$

- A) 5 B) 6 C) 7 D) 8 E) 9

$$4. \frac{(n-3)!}{(n-4)!} \cdot \frac{(n+3)!}{(n+2)!} = 16 \Rightarrow \frac{n!}{4!} = ?$$

- A) 4 B) 5 C) 6 D) 7 E) 8

$$5. \frac{(n+1)!}{n \cdot (n-2)!} = 15 \Rightarrow n = ?$$

- A) 3 B) 4 C) 5 D) 6 E) 7

$$6. \frac{(n-2)! + (n-1)! + n!}{(n-2)!} = 64 \Rightarrow n = ?$$

- A) 6 B) 7 C) 8 D) 9 E) 10

$$7. \frac{(n-3)! - 2(n-5)!}{(n-4)! - (n-5)!} = ?$$

- A) $n-1$ B) $n-2$ C) $n-3$ D) $n-4$ E) $n-5$

$$8. \frac{(n+2)! + (n+1)!}{n! + (n+2) \cdot n!} = ?$$

- A) n B) $n+1$ C) $n+2$ D) $n+3$ E) $n+4$

9. $n! + (n+1)! = \frac{(n+2)!}{6} \Rightarrow n = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

10. $(4-a)! + (a+1)! + (a-4)! = ?$

- A) 118 B) 120 C) 122 D) 124 E) 126

11. $A = \frac{(n-4)! + n!}{(4-n)! + 4} \Rightarrow A = ?$

- A) 1 B) 5 C) 12 D) 24 E) 25

12. $a, b \in \mathbb{N},$

$\frac{a!}{b!} = 720 \Rightarrow \max(a+b) = ?$

- A) 6 B) 7 C) 720
D) 721 E) 1439

13. $a, b \in \mathbb{N},$

$\frac{a!}{b!} = 120 \Rightarrow \min(a+b) + \max(a+b) = ?$

- A) 5 B) 11 C) 15 D) 120 E) 244

14. $n, m \in \mathbb{N}, n > 1$

$\frac{(n-1)!}{m!} = 120 \Rightarrow \min(n+m) = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

15. $\frac{a!}{b!} = 12 \Rightarrow \min(a+b) = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

16. $x, y \in \mathbb{N},$

$\frac{x!}{y!} = 6 \Rightarrow \sum(x+y) = ?$

- A) 10 B) 12 C) 14 D) 16 E) 18


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	C	D	B	B	C	B	B
9	10	11	12	13	14	15	16
A	C	B	E	E	A	D	E

1. $n, A \in \mathbb{N}$,

$$42! = A \cdot 10^n \Rightarrow \max(n) = ?$$

- A) 9 B) 16 C) 17 D) 21 E) 27

2. $A, n \in \mathbb{N}$,

$$38! = A \cdot 10^n \Rightarrow \max(n) = ?$$

- A) 7 B) 8 C) 9 D) 10 E) 11

3. $n, A \in \mathbb{N}$,

$$120! = A \cdot 10^n \Rightarrow \max(n) = ?$$

- A) 30 B) 29 C) 28 D) 27 E) 26

4. $n, A \in \mathbb{N}$,

$$48! = A \cdot 5^n \Rightarrow \max(n) = ?$$

- A) 7 B) 8 C) 9 D) 10 E) 11

5. $n, A \in \mathbb{N}$,

$$34! = A \cdot 3^n \Rightarrow \max(n) = ?$$

- A) 11 B) 12 C) 13 D) 14 E) 15

6. $n, A \in \mathbb{N}$,

$$49! = A \cdot 7^n \Rightarrow \max(n) = ?$$

- A) 7 B) 8 C) 9 D) 10 E) 11

7. $A, x, y, z \in \mathbb{N}$,

$$12! = 5^x \cdot 7^y \cdot 11^z \cdot A \Rightarrow \max(x + y + z) = ?$$

- A) 4 B) 6 C) 8 D) 10 E) 12V

8. $a, b, c \in \mathbb{N}$,

$$\frac{35!}{5^a \cdot 7^b} = c \Rightarrow \max(a + b) = ?$$

- A) 13 B) 14 C) 15 D) 16 E) 17

9. $A, n \in \mathbb{N}$,

$27! = A \cdot 6^n \Rightarrow \max(n) = ?$

- A) 9 B) 10 C) 11 D) 12 E) 13

10. $A, n \in \mathbb{N}$,

$38! = 21^n \cdot A \Rightarrow \max(n) = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

11. $x, y, z \in \mathbb{N}$,

$11! = 2^x \cdot 3^y \cdot 5^z \cdot m$

$\Rightarrow \min(m) = ?$

- A) 44 B) 55 C) 66 D) 77 E) 88

12. $n, A \in \mathbb{N}$,

$30! = A \cdot 9^n \Rightarrow \max(n) = ?$

- A) 14 B) 12 C) 9 D) 7 E) 6

13. $A, n \in \mathbb{N}$,

$43! = A \cdot 4^n \Rightarrow \max(n) = ?$

- A) 19 B) 24 C) 30 D) 33 E) 39

14. $n, A \in \mathbb{N}$,

$17! = A \cdot 4^n \Rightarrow \sum n = ?$

- A) 20 B) 22 C) 24 D) 26 E) 28

15. $n, A \in \mathbb{N}$,

$20! = A \cdot 8^n \Rightarrow \max(n) = ?$

- A) 10 B) 9 C) 8 D) 7 E) 6

16. $n, A \in \mathbb{N}$,

$29! = A \cdot 12^n \Rightarrow \max(n) = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

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1	2	3	4	5	6	7	8
A	B	C	D	E	B	A	A
9	10	11	12	13	14	15	16
E	A	D	D	A	E	E	D

1. $n, A \in \mathbb{N}$,

$15! + 25! = A \cdot 10^n \Rightarrow \max(n) = ?$

- A) 3 B) 5 C) 6 D) 9 E) 10

2. $n, A \in \mathbb{N}^+$,

$35! + 36! = A \cdot 10^n \Rightarrow \sum n = ?$

- A) 34 B) 35 C) 36 D) 37 E) 38

3. $n, A \in \mathbb{N}^+$,

$38! + 39! = A \cdot 10^n \Rightarrow \max(n) = ?$

- A) 8 B) 9 C) 10 D) 11 E) 12

4. $A, n \in \mathbb{N}$,

$48! + 49! = A \cdot 10^n \Rightarrow \max(n) = ?$

- A) 8 B) 12 C) 14 D) 16 E) 20

5. $40! - 1 = \dots\dots 999\dots 9 \Rightarrow n = ?$

n tane / n times

- A) 10 B) 9 C) 8 D) 7 E) 6

6. $51! - 3 = \dots\dots 999\dots 97 \Rightarrow n = ?$

n tane / n times

- A) 10 B) 11 C) 12 D) 13 E) 14

7. $A = 50!$

$A - 2357 = \dots abcd$

$\Rightarrow a + b + c + d = ?$

- A) 14 B) 16 C) 18 D) 20 E) 22

8. $1! + 2! + 3! + \dots + 28! = \dots x \Rightarrow x = ?$

- A) 0 B) 1 C) 2 D) 3 E) 7

9. $A = 1! + 2! + 3! + \dots + 19!$

$$\begin{array}{r} A \overline{) 15} \\ \underline{} \\ K \end{array}$$

$\Rightarrow K = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

10. $A = 1! + 2! + 3! + \dots + 48!$

$$\begin{array}{r} A \overline{) 6} \\ \underline{} \\ x \end{array} \Rightarrow x = ?$$

- A) 0 B) 1 C) 2 D) 3 E) 4

11. $A = 1! + 2! + 3! + \dots + 25!$

$$\begin{array}{r} A \overline{) 12} \\ \underline{} \\ k \end{array} \Rightarrow k = ?$$

- A) 7 B) 8 C) 9 D) 10 E) 11

12. $\frac{8! + 9!}{7!}$

$$\begin{array}{r} \overline{) 7} \\ \underline{} \\ ? \end{array}$$

- A) 0 B) 1 C) 2 D) 3 E) 4

13. $A = 60!$

$$\Rightarrow \begin{array}{r} A \overline{) 40} \\ \underline{} \\ ? \end{array}$$

- A) 0 B) 20 C) 30 D) 35 E) 39

14. $A = 72!$

$$\Rightarrow \begin{array}{r} A \overline{) 108} \\ \underline{} \\ ? \end{array}$$

- A) 0 B) 18 C) 36 D) 72 E) 107

15. $A = 6! + 7! + 8!$

A sayısının kaç tane asal çarpanı vardır?

How many prime factors does the number A have?

- A) 2 B) 3 C) 4 D) 5 E) 6

16. $A = \frac{22!}{4^x}$

A sayısı bir çift tamsayı ise **x in alabileceği en büyük tamsayı değeri kaçtır?**

If the number A is an even integer, what is the biggest integer value that x can take?

- A) 9 B) 12 C) 15 D) 18 E) 21


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	C	B	B	B	B	D	D
9	10	11	12	13	14	15	16
D	D	C	A	A	A	B	A

1. $\frac{238}{y} \Big| \frac{17}{x} \Rightarrow x - y = ?$

- A) 17 B) 16 C) 15 D) 14 E) 13

2. $\frac{32132132}{y} \Big| \frac{321}{x} \Rightarrow x + y = ?$

- A) 100000 B) 100010 C) 100001
D) 100100 E) 100132

3. $\frac{A}{5} \Big| \frac{12}{3} \Rightarrow A = ?$

- A) 36 B) 37 C) 39
D) 41 E) 43

4. $\frac{A}{9} \Big| \frac{B}{10}$

$A + B = 130 \Rightarrow B = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

5. $\frac{A}{2} \Big| \frac{B}{5} \quad \frac{B}{2} \Big| \frac{6}{3} \quad \frac{A}{?} \Big| \frac{30}{?}$

- A) 10 B) 11 C) 12 D) 13 E) 14

6. $\frac{A}{4} \Big| \frac{B}{6} \quad \frac{A+2}{2} \Big| \frac{B-1}{8} \Rightarrow A = ?$

- A) 34 B) 35 C) 36 D) 37 E) 40

7. $\frac{A}{0} \Big| \frac{6}{B} \quad \frac{B}{0} \Big| \frac{12}{3} \Rightarrow A = ?$

- A) 208 B) 216 C) 244 D) 274 E) 198

8. $\frac{A}{C} \Big| \frac{11}{7} \Rightarrow \max(A) = ?$

- A) 87 B) 85 C) 83 D) 81 E) 79

9. $\frac{A}{5} \Big| \frac{B}{14} \Rightarrow \min(A) = ?$

- A) 83 B) 89 C) 91 D) 95 E) 101

10. $B \in \mathbb{N}$,

$\frac{A}{9} \Big| \frac{B}{11} \quad \frac{C}{B} \Big| \frac{11}{4} \Rightarrow A - C = ?$

- A) 61 B) 62 C) 63 D) 64 E) 65

11. $k \in \mathbb{N}$,

$\frac{A}{k^2} \Big| \frac{39}{2} \Rightarrow \max(A) = ?$

- A) 110 B) 114 C) 120 D) 130 E) 132

12. $A = 10^4 \cdot (8763) \cdot (9364)$

$\Rightarrow \frac{A}{?} \Big| \frac{30}{?}$

- A) 0 B) 1 C) 2 D) 5 E) 7

13. $\frac{A}{x^2} \Big| \frac{33}{4} \Rightarrow \max(A) = ?$

- A) 157 B) 162 C) 164 D) 166 E) 168

14. $\frac{A}{x^2} \Big| \frac{30}{x} \Rightarrow \max(A) = ?$

- A) 170 B) 175 C) 180 D) 185 E) 190

15. $\frac{A}{3} \Big| \frac{x}{7} \quad \frac{x}{2} \Big| \frac{y}{5} \Rightarrow \frac{A}{?} \Big| \frac{35}{?}$

- A) 5 B) 6 C) 12 D) 17 E) 23

16. $\frac{A}{2} \Big| \frac{6}{x} \quad \frac{x}{1} \Big| \frac{y}{4} \Rightarrow \frac{A}{?} \Big| \frac{12}{?}$

- A) 4 B) 6 C) 7 D) 8 E) 9



1	2	3	4	5	6	7	8
D	E	D	B	C	E	B	A
9	10	11	12	13	14	15	16
B	E	B	A	C	B	D	D

1.
$$\begin{array}{r} 534a \overline{) 2} \\ \underline{0} \\ 2 \end{array} \Rightarrow \sum a = ?$$

- A) 1 B) 7 C) 15 D) 19 E) 25

2.
$$\begin{array}{r} 462x \overline{) 3} \\ \underline{0} \\ 3 \end{array} \Rightarrow \max(x) = ?$$

- A) 9 B) 8 C) 7 D) 6 E) 5

3.
$$\begin{array}{r} 2615x \overline{) 3} \\ \underline{2} \\ 3 \end{array} \Rightarrow \sum x = ?$$

- A) 9 B) 10 C) 11 D) 12 E) 18

4.
$$\begin{array}{r} 26a2 \overline{) 4} \\ \underline{0} \\ 4 \end{array} \Rightarrow \sum a = ?$$

- A) 25 B) 22 C) 19 D) 16 E) 13

5.
$$\begin{array}{r} 37x5y \overline{) 5} \\ \underline{2} \\ 0 \end{array} \quad \begin{array}{r} 37x5y \overline{) 3} \\ \underline{0} \\ 3 \end{array} \Rightarrow \max(x) = ?$$

- A) 5 B) 6 C) 7 D) 8 E) 9

6.
$$\begin{array}{r} 456x \overline{) 6} \\ \underline{0} \\ 6 \end{array} \Rightarrow x = ?$$

- A) 2 B) 4 C) 5 D) 6 E) 8

7.
$$\begin{array}{r} 2734x \overline{) 9} \\ \underline{2} \\ 9 \end{array} \Rightarrow x = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

8. $A = (3412)^9 \cdot (254)^3$

$$\Rightarrow \begin{array}{r} A \overline{) 9} \\ \underline{0} \\ 9 \end{array}$$

- A) 4 B) 5 C) 6 D) 7 E) 8

$$9. \quad \begin{array}{r} ab4 \\ \underline{\quad} \\ 5 \end{array} \Big| \begin{array}{r} 9 \\ 2x \end{array} \Rightarrow \begin{array}{r} 76a8b \\ \underline{\quad} \\ ? \end{array} \Big| \begin{array}{r} 9 \\ \end{array}$$

- A) 1 B) 4 C) 6 D) 7 E) 8

$$10. \quad \begin{array}{r} 4x57y \\ \underline{\quad} \\ 0 \end{array} \Big| \begin{array}{r} 15 \\ \end{array} \Rightarrow \max(x) = ?$$

- A) 5 B) 6 C) 7 D) 8 E) 9

$$11. \quad \begin{array}{r} 9ABB \\ \underline{\quad} \\ 0 \end{array} \Big| \begin{array}{r} 45 \\ \end{array} \Rightarrow \sum A = ?$$

- A) 19 B) 18 C) 17 D) 16 E) 15

$$12. \quad x \in \mathbb{Z},$$

$$\begin{array}{r} A \\ \underline{\quad} \\ x^2 \end{array} \Big| \begin{array}{r} 27 \\ 2 \end{array} \Rightarrow \max(A) = ?$$

- A) 76 B) 77 C) 78 D) 79 E) 80

$$13. \quad \begin{array}{r} 5a4b \\ \underline{\quad} \\ 3 \end{array} \Big| \begin{array}{r} 30 \\ \end{array} \Rightarrow \max(a + b) = ?$$

- A) 7 B) 8 C) 10 D) 11 E) 12

$$14. \quad A = 48527134$$

$$\Rightarrow \begin{array}{r} A \\ \underline{\quad} \\ ? \end{array} \Big| \begin{array}{r} 11 \\ \end{array}$$

- A) 1 B) 4 C) 6 D) 7 E) 10

15. 9 basamaklı AAAA4675B sayısının 5 ile bölümünden kalan 3 tür. Bu sayı, 6 ile tam bölünebildiğine göre, A kaç farklı değer alabilir?

When the nine-digit number AAAA4675B is divided by 5, the remainder is 3. If this number is divisible by 6, how many different values can A take?

- A) 2 B) 3 C) 5 D) 6 E) 7

$$16. \quad A = 43251764$$

$$\Rightarrow \begin{array}{r} A \\ \underline{\quad} \\ ? \end{array} \Big| \begin{array}{r} 8 \\ \end{array}$$

- A) 0 B) 2 C) 3 D) 4 E) 6



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	A	E	A	D	D	C	E
9	10	11	12	13	14	15	16
B	E	C	D	E	D	B	D

1. **OBEB / GCF (80, 180) = ?**

- A) 5 B) 10 C) 20 D) 40 E) 8680

2. **OKEK / LCM (16, 24, 30) = ?**

- A) 240 B) 220 C) 200 D) 180 E) 160

3. $A = 2^3 \cdot 3^4 \cdot 5^2$

$B = 2^4 \cdot 3^2 \cdot 11$

\Rightarrow **OBEB / GCF (A, B) = ?**

- A) 64 B) 68 C) 72 D) 88 E) 96

4. $a, b \in \mathbb{Z}^+$

$2a = 5b$

OBEB / GCF (a, b) = 6

\Rightarrow **min(a + b) = ?**

- A) 40 B) 42 C) 44 D) 46 E) 48

5. $x, y \in \mathbb{N}^+$

$x + y = 44$

\Rightarrow **max(x, y)_{OKEK / LCM} = ?**

- A) 480 B) 481 C) 482 D) 483 E) 484

6. $a, b \in \mathbb{N}$

OKEK / LCM (12, 9) = 12a + 9b \Rightarrow min(a + b) = ?

- A) 3 B) 5 C) 7 D) 9 E) 11

7. **OKEK / LCM (A, B) = 60 \Rightarrow max(A + B) = ?**

- A) 108 B) 120 C) 124 D) 130 E) 132

8. **OKEK / LCM (A, B) = 18 \Rightarrow min(A + B) = ?**

- A) 5 B) 7 C) 9 D) 11 E) 13

9. OKEK / LCM (A, B, C) = 30, $A \neq B \neq C$
 $\Rightarrow \max(A + B + C) = ?$

A) 35 B) 44 C) 45 D) 48 E) 55

10. $A, B \in \mathbb{N}$

$$4A = 9B$$

$$\text{OBEB} / \text{GCF} (A, B) = 3 \Rightarrow \min(A + B) = ?$$

A) 37 B) 39 C) 41 D) 43 E) 45

11. $\text{OBEB} / \text{GCF} (x, x^2) = 4 \Rightarrow \text{OKEK} / \text{LCM} (x + 2, 2\sqrt{x} + 5) = ?$

A) 18 B) 24 C) 36 D) 48 E) 54

12. $x, y, z \in \mathbb{Z}^+$,

$$A = 3x + 2 = 5y + 2 = 9z + 2 \Rightarrow \min(A) = ?$$

A) 43 B) 45 C) 47 D) 59 E) 51

13. $A = 5a + 2 = 6b + 3 = 7c + 4$

$$\Rightarrow \min(A) = ?$$

A) 203 B) 205 C) 207 D) 209 E) 211

14. 120 metre ve 96 metre uzunluğundaki iki top kumaş eşit uzunlukta en büyük parçalara ayrılıyor.

Buna göre toplam kaç parça kumaş elde edilir?

Two fabric rolls with lengths of 120 meters and 96 meters are divided into the largest pieces in equal length. Accordingly how many pieces of fabrics are obtained?

A) 9 B) 10 C) 11 D) 12 E) 13

15. Kenar uzunlukları 49 cm ve 63 cm olan bir dikdörtgen kenar uzunlukları tam sayı olan en az kaç tane eş alanlı kareye ayrılabilir?

What is the smallest number of equal squares which we can make from a rectangle with the width of 49 cm and the length of 63 cm?

A) 59 B) 60 C) 61 D) 62 E) 63

16. Boyutları 144 cm, 192 cm ve 216 cm olan dikdörtgenler prizması eşit hacimli küplere ayrılacaktır.

Buna göre en az kaç küp oluşur?

The rectangular prism with dimensions of 144 cm, 192 cm and 216 cm will be divided into cubes of equal volume. Accordingly at least how many cubes are formed?

A) 430 B) 432 C) 436 D) 440 E) 444


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	A	C	B	D	A	B	D
9	10	11	12	13	14	15	16
E	B	A	C	C	A	E	B

1. $20 - 2 \cdot [72 : (24 : 8 + 5) - 1] = ?$

- A) -6 B) -4 C) 4 D) 6 E) 8

2. $x \in \mathbb{Z}, y \in \mathbb{N}^+$

$\Rightarrow \min(5y - 6x) = ?$

- A) -13 B) -11 C) -6 D) 11 E) 13

3. $1 + 3 + 5 + 7 + \dots + (2x - 7) = 400 \Rightarrow x = ?$

- A) 22 B) 23 C) 24 D) 25 E) 27

4. $x, y \in \mathbb{N}^+$

$(x + 2)(y - 1) = 13 \Rightarrow x - y = ?$

- A) 9 B) 12 C) 15 D) 18 E) 20

5. $x \in \mathbb{Z}$

$(x^5 + x^4 + x) = M,$

M çift sayı ise aşağıdakilerden hangisi tek sayıdır?

If M is even, which one of the followings is odd?

- A) x^5 B) $x^4 + x$ C) $x^5 - x$
D) $x^5 + x + 1$ E) $x^5 + x + 2$

6. $ABB, BAA \in \mathbb{N}$

$ABB - BAA = 445 \Rightarrow \max(A + B) = ?$

- A) 11 B) 12 C) 13 D) 14 E) 15

7. $AB, BC, CA \in \mathbb{N}$

$\frac{AB+BC+CA}{3} = 55 \Rightarrow \frac{A+B+C}{3} = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

8. $A, B, C \in \mathbb{N}^+$

$\frac{A}{2} \Big| \frac{B}{3} \quad \frac{B}{5} \Big| \frac{C}{4} \Rightarrow C = ?$

- A) $\frac{A-17}{12}$ B) $\frac{A-12}{17}$ C) $\frac{A}{17}$
D) $\frac{A+17}{2}$ E) $\frac{A}{12}$

9. $74A5B \in \mathbb{N}$

$$\begin{array}{r} 74A5B \overline{)12} \\ \underline{0} \\ 12 \end{array} \Rightarrow \max(A+B) = ?$$

- A) 11 B) 13 C) 14 D) 15 E) 17

13. $AB \in \mathbb{N}, CD \in \mathbb{N}$

$$AB = x, CD = y$$

$$\text{OBEB} / \text{GCF}(x, y) = 15 \Rightarrow \max(x + y) = ?$$

- A) 124 B) 130 C) 144 D) 150 E) 165

10. $\frac{10! + 11!}{8! + 9!} = ?$

- A) 108 B) 110 C) 112 D) 120 E) 124

14. $\frac{(n+1)!}{n!} + 3! = 43 \Rightarrow n = ?$

- A) 30 B) 32 C) 36 D) 37 E) 38

15. $\begin{array}{r} A \overline{)B} \\ \underline{0} \\ B \end{array} \quad \begin{array}{r} A+4 \overline{)B+1} \\ \underline{0} \\ B+1 \end{array} \Rightarrow \frac{B}{C} = ?$

- A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) 1 D) 2 E) 3

11. $x, A \in \mathbb{N}^+$

$$26! = 6^x \cdot A \Rightarrow \max(x) = ?$$

- A) 7 B) 8 C) 9 D) 10 E) 11

16. $AAB \in \mathbb{N}, BA \in \mathbb{N}$

$$\begin{array}{r} AAB \\ + BA \\ \hline 388 \end{array} \Rightarrow B - A = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

12. $\text{OKEK} / \text{LCM}(x+3, x+5) = 180$

$$\text{OBEB} / \text{GCF}(x+3, x+5) = 2 \Rightarrow x = ?$$

- A) 12 B) 15 C) 18 D) 21 E) 24


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	D	B	A	D	C	B	A
9	10	11	12	13	14	15	16
C	A	D	B	E	C	C	B

1. $A, x \in \mathbb{Z}^+$

$16! + 17! = 3^A \Rightarrow \max(x) = ?$

- A) 5 B) 6 C) 7 D) 4 E) 8

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

2. $a, b, c \in \mathbb{Z}^+$
 $a > b > c$
 $a + \frac{b}{c} = 20$

$\Rightarrow \max(a + b + c) = ?$

- A) 63 B) 90 C) 40 D) 42 E) 21

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

3. $a, b \in \mathbb{Z}$

$a = 19 - x^2$

$b = x^2 - 7$

a-b çarpımının alabileceği en büyük değer kaçtır?

What is the largest value stands for a-b multiplication?

- A) 48 B) 36 C) 32 D) 30 E) 24

[KARABÜK ÜNİVERSİTESİ – YÖS 2020]

4. $x, y \in \mathbb{Z}$

$23! = 2^k 5^k$

ve k çift sayı ise x + y en çok kaçtır?

If k is even number, what is the largest value of x + y?

- A) 19 B) 20 C) 21 D) 22 E) 23

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2020]

5. $abc = 2 \cdot ab + 120 \Rightarrow \min\{a + b + c\} = ?$

- A) 13 B) 4 C) 5 D) 6 E) 7

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2019]

6. $x3y2$ sayısının 29 ile bölümünden kalan 11 olduğuna göre $x5y1$ sayısının 29 ile bölümünden kalan kaçtır?

If the remainder of the number $x3y2$ dividing by 29 is 11, then, what is the remainder of the number $x5y1$ dividing by 29?

- A) 7 B) 10 C) 12 D) 18 E) 23

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2019]

7. $(423)_5 = (?)_3$

A) $(11012)_3$

B) $(21001)_3$

C) $(10122)_3$

D) $(20011)_3$

E) $(10012)_3$

[HARRAN ÜNİVERSİTESİ – YÖS 2019]

8. a, b, c ardışık tek sayılar ve $a < b < c$ dir.

 a, b and c are consecutive odd numbers and $a < b < c$.

$$\frac{(c-a) \cdot (a-b)}{2c-2b} = ?$$

- A) -2 B) 0 C) 2 D) 4 E) 6

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

9. $\frac{5}{3} + \frac{10}{3} + \frac{15}{3} + \dots + \frac{55}{3} = ?$

- A) 115 B) 110 C) 90 D) $\frac{260}{3}$ E) $\frac{285}{3}$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

10.
$$\begin{array}{r} abc \\ \times 2d \\ \hline \dots\dots \\ 714 \\ + \\ \hline 9996 \end{array} \Rightarrow a + b + c + d = ?$$

- A) 33 B) 29 C) 25 D) 23 E) 19

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

11. A, B, C birer rakam ve / A, B, C are each a digit and

$$\begin{array}{r} ABC \\ - ACB \\ \hline 72 \end{array} \Rightarrow B - C = ?$$

- A) 8 B) 12 C) 13 D) 14 E) 15

[FIRAT ÜNİVERSİTESİ – YÖS 2018]

12. Aşağıdakilerden hangisi tek sayıdır?

Which one of the following is an odd number?

- A) $2^{40} + 7!$ B) $63! - 3^{10}$ C) $0! + 5^{20}$
D) $4^7 \cdot 3^5 - 8^{14}$ E) $11! - 9!$

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2018]

13. $a, b, c \in \mathbb{N}^+$

$$\left. \begin{array}{l} a \cdot b = 30 \\ b \cdot c = 42 \end{array} \right\} \Rightarrow \min(a + b + c) = ?$$

- A) 78 B) 38 C) 27 D) 20 E) 18

[SELÇUK ÜNİVERSİTESİ – YÖS 2017]

- 14.

$$\begin{array}{r} AAB \\ \times BA \\ \hline \dots\dots \\ 1356 \\ + \\ \hline \dots\dots \end{array} \Rightarrow A = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

[ATATÜRK ÜNİVERSİTESİ – YÖS 2017]

- 15.

$$\frac{A}{2} \left| \frac{5}{B} \right., \quad \frac{A+9}{x} \left| \frac{B+2}{5} \right. \Rightarrow x = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

16. $a, b \in \mathbb{Z}^+$

$$a + \frac{b}{4} = 3,5 \Rightarrow \max(a) = ?$$

- A) 3 B) 4 C) 5 D) 6 E) 7

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	D	B	D	D	A	E	A
9	10	11	12	13	14	15	16
B	D	A	B	E	B	A	A

BÖLÜM CHAPTER

2

TARİHSEL NOT / HISTORICAL NOTE

Ali Kuşçu [1403 – 1474]

Ali Kuşçu asıl adı Ali Bin Muhammed Türk gökbilimci, matematikçi ve dilbilimci. Küçük yaştan itibaren matematik ve astronomiye ilgi duyan Ali Kuşçu, Uluğ Bey'in oğlu ve Bursalı Kadızade Rumi'nin öğrencisidir.

Ali Kuşçu, with real name of Ali bin Muhammed, was a Turkish astronomer, mathematician and physicist. He, son of Ulug and student of Qazizadeh, was interested to mathematics and astronomy from early ages.

RASYONEL ve ONDALIK SAYILAR RATIONAL and DECIMAL NUMBERS

Bu bölüm 224 test sorusu, 16 YÖS sorusu içermektedir.
This chapter includes 224 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 2

RASYONEL ve ONDALIK SAYILAR / RATIONAL and DECIMAL NUMBERS

- Rasyonel ve Ondalık Sayılar / Rational and Decimal Numbers 49 - 80

BÖLÜM
02
CHAPTER

RASYONEL ve ONDALIK SAYILAR
RATIONAL and DECIMAL NUMBERS

Bölüm / Chapter **2**

Rasyonel Sayılar / Rational Numbers

Test **1**

1. $\frac{2}{3} + \frac{4}{5} + \frac{1}{2} = ?$

- A) $\frac{59}{30}$ B) 2 C) $\frac{61}{30}$ D) $\frac{31}{10}$ E) $\frac{21}{10}$

2. $\frac{1}{8} + \frac{1}{5} + \frac{1}{2} = ?$

- A) $\frac{31}{40}$ B) $\frac{4}{5}$ C) $\frac{33}{40}$ D) $\frac{17}{20}$ E) $\frac{7}{8}$

3. $1 + \frac{1}{3} + \frac{1}{6} + \frac{1}{9} = ?$

- A) $\frac{17}{8}$ B) $\frac{19}{18}$ C) $\frac{23}{18}$ D) $\frac{29}{18}$ E) $\frac{31}{18}$

4. $\frac{1}{2} + \frac{1}{3} + \frac{1}{4} = ?$

- A) $\frac{11}{12}$ B) 1 C) $\frac{13}{12}$ D) $\frac{7}{6}$ E) $\frac{5}{4}$

5. $\frac{1}{6} - \frac{1}{5} + \frac{1}{10} = ?$

- A) $\frac{1}{15}$ B) $\frac{2}{15}$ C) $\frac{1}{5}$ D) $\frac{4}{15}$ E) $\frac{1}{3}$

6. $(8 - \frac{3}{5}) - (\frac{2}{5} + 8) = ?$

- A) $-\frac{1}{5}$ B) $-\frac{3}{5}$ C) -1 D) 16 E) $\frac{82}{5}$

7. $\frac{1}{3} - (\frac{1}{2} + \frac{1}{3}) + (\frac{2}{3} + \frac{1}{2}) = ?$

- A) $\frac{1}{6}$ B) $\frac{1}{2}$ C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $\frac{5}{6}$

8. $\frac{1}{63} - (\frac{1}{64} + \frac{1}{63}) + (\frac{2}{3} + \frac{1}{64}) = ?$

- A) $\frac{2}{3}$ B) $\frac{1}{32}$ C) $\frac{1}{63}$ D) $\frac{2}{63}$ E) $\frac{63}{64}$

9. $\left(\frac{1}{2} + \frac{1}{3} - \frac{1}{4}\right) + \left(1 - \frac{1}{2} + \frac{1}{4}\right) = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{2}{3}$ E) $\frac{4}{3}$

10. $\left(3 + \frac{1}{3}\right) - \left(3 - \frac{1}{3}\right) = ?$

- A) $-\frac{1}{3}$ B) $\frac{1}{3}$ C) $\frac{2}{3}$ D) 1 E) $\frac{4}{3}$

11. $\frac{3}{2} - \left(\frac{4}{3} + \frac{3}{2}\right) + \left(\frac{3}{10} + \frac{4}{3} - \frac{1}{2}\right) = ?$

- A) -1 B) $-\frac{4}{5}$ C) $-\frac{3}{5}$ D) $-\frac{2}{5}$ E) $-\frac{1}{5}$

12. $\left(4 + \frac{2}{5}\right) - \left(4 - \frac{3}{5}\right) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $\left(\frac{3}{8} - \frac{4}{5} + \frac{9}{10}\right) - \left(\frac{3}{8} + \frac{1}{5} - \frac{1}{10}\right) = ?$

- A) 0 B) $\frac{1}{10}$ C) $\frac{1}{5}$ D) $\frac{1}{2}$ E) 1

14. $\frac{1}{x} - \left(\frac{1}{x} - \frac{1}{y}\right) - \left(\frac{1}{x} + \frac{1}{y} - \frac{1}{2x}\right) = ?$

- A) $-\frac{1}{2x}$ B) $-\frac{x}{y}$ C) $\frac{3}{2x}$ D) $-\frac{3}{2x}$ E) $\frac{1}{2x}$

15. $\left(1 - \frac{1}{2}\right) + \left(2 - \frac{1}{2}\right) + \dots + \left(10 - \frac{1}{2}\right) = ?$

- A) 40 B) 45 C) 50 D) 55 E) 60

16. $\left(1 - \frac{1}{2}\right) + \left(2 - \frac{1}{2}\right) + \dots + \left(n - \frac{1}{2}\right) = 72$

$\Rightarrow n = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14


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1	2	3	4	5	6	7	8
A	C	D	C	A	C	D	A
9	10	11	12	13	14	15	16
E	C	E	A	A	A	C	C

$$1. \frac{1}{2} - \frac{1}{3} + \frac{1}{2} - \frac{1}{3} + \dots + \frac{1}{2} - \frac{1}{3} = ?$$

20 terim / 20 terms

- A) $\frac{5}{3}$ B) $\frac{3}{5}$ C) $\frac{2}{5}$ D) $\frac{5}{2}$ E) 1

$$2. \frac{1}{3} - \frac{1}{4} + \frac{1}{3} - \frac{1}{4} + \dots - \frac{1}{4} + \frac{1}{3} = ?$$

23 terim / 23 terms

- A) $\frac{7}{5}$ B) $\frac{5}{4}$ C) $\frac{12}{11}$ D) $\frac{13}{6}$ E) $\frac{1}{12}$

$$3. 2\frac{1}{2} - 1\frac{1}{3} = ?$$

- A) $\frac{7}{6}$ B) 1 C) $\frac{5}{6}$ D) $\frac{2}{3}$ E) $\frac{1}{2}$

$$4. \frac{1}{2} \cdot \frac{2}{3} \cdot \frac{3}{4} \cdot \dots \cdot \frac{16}{17} = ?$$

- A) $\frac{1}{2}$ B) $\frac{1}{6}$ C) $\frac{1}{12}$ D) $\frac{1}{16}$ E) $\frac{1}{17}$

$$5. \left(\frac{a}{a+1}\right) \cdot \left(\frac{a+1}{a+2}\right) \cdot \dots \cdot \left(\frac{a+9}{a+10}\right) = 3 \Rightarrow a = ?$$

- A) -20 B) -15 C) -10 D) 15 E) 20

$$6. \left(1\frac{1}{5}\right) \left(1\frac{1}{6}\right) \left(1\frac{1}{7}\right) \cdot \dots \cdot \left(1\frac{1}{21}\right) = ?$$

- A) 4 B) $\frac{21}{5}$ C) $\frac{22}{5}$ D) $\frac{23}{5}$ E) 5

$$7. \left(1\frac{1}{2}\right) \cdot \left(1\frac{1}{3}\right) \cdot \left(1\frac{1}{4}\right) \cdot \dots \cdot \left(1\frac{1}{18}\right) = ?$$

- A) $\frac{1}{19}$ B) $\frac{1}{18}$ C) $\frac{1}{9}$ D) $\frac{19}{2}$ E) 19

$$8. \left(1\frac{1}{2}\right) \cdot \left(1\frac{1}{3}\right) \cdot \left(1\frac{1}{4}\right) \cdot \dots \cdot \left(1\frac{1}{a}\right) = 48$$

 $\Rightarrow a = ?$

- A) 90 B) 92 C) 95 D) 97 E) 100

9. $\left(\frac{4}{7} : \frac{3}{14}\right) \cdot \frac{3}{4} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $2\frac{2}{3} - \frac{2}{5} - \frac{3}{4} = ?$

- A) $\frac{17}{20}$ B) $\frac{19}{20}$ C) $\frac{23}{30}$ D) $\frac{57}{30}$ E) $\frac{71}{30}$

10. $\frac{3}{10} - \frac{2}{10} : \frac{1}{5} = ?$

- A) $-\frac{3}{5}$ B) $-\frac{7}{10}$ C) 1 D) $\frac{3}{5}$ E) $\frac{10}{7}$

14. $2 - \frac{1}{2} : \frac{1 - \frac{1}{4}}{1 + \frac{1}{4}} = ?$

- A) $\frac{1}{6}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{5}{6}$ E) $\frac{7}{6}$

15. $\frac{\frac{2}{3}}{8} + \frac{3}{\frac{12}{13}} = ?$

- A) $\frac{8}{3}$ B) 3 C) $\frac{10}{3}$ D) $\frac{11}{3}$ E) 4

11. $\left(\frac{1}{4} - 4\right) \cdot \left(1 - \frac{11}{15}\right) = ?$

- A) $-\frac{3}{4}$ B) -1 C) $\frac{1}{2}$ D) $\frac{3}{4}$ E) 1

16. $\left[\frac{\frac{1}{8}}{\frac{1}{4}} : \frac{3}{\frac{1}{3}}\right]^{-1} = ?$

- A) $\frac{1}{18}$ B) $\frac{1}{9}$ C) 1 D) 9 E) 18

12. $\left(2\frac{1}{2} - 1\frac{1}{3}\right) : \left(1\frac{1}{4} - \frac{5}{6}\right) = ?$

- A) $\frac{7}{6}$ B) $\frac{12}{5}$ C) $\frac{11}{12}$ D) $\frac{14}{5}$ E) $\frac{13}{24}$

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1	2	3	4	5	6	7	8
A	B	A	E	B	C	D	C
9	10	11	12	13	14	15	16
B	B	B	D	E	E	C	E

1. $\frac{3}{5} - \frac{3}{5} = ?$

- A) $-\frac{9}{4}$ B) $-\frac{5}{4}$ C) $-\frac{1}{4}$ D) $\frac{5}{4}$ E) $\frac{9}{4}$

2. $\frac{1}{4} + \frac{1}{3} : \frac{4}{5} - \frac{1}{2} = ?$

- A) $\frac{5}{6}$ B) $\frac{2}{3}$ C) $\frac{1}{2}$ D) $\frac{1}{6}$ E) $\frac{1}{12}$

3. $\frac{1}{3} - \frac{1}{3} : \frac{1}{3} + \frac{1}{3} \cdot \frac{1}{3} = ?$

- A) $-\frac{10}{9}$ B) $-\frac{11}{9}$ C) $-\frac{5}{9}$ D) $-\frac{13}{9}$ E) $-\frac{14}{9}$

4. $\left(2\frac{2}{9} : \frac{5}{3}\right) + \frac{1}{3} : \frac{4}{3} - \frac{1}{3} = ?$

- A) $\frac{3}{4}$ B) 1 C) $\frac{5}{4}$ D) $\frac{3}{2}$ E) $\frac{7}{4}$

5. $3 + \frac{1}{1 - \frac{3}{5}} = ?$

- A) $\frac{5}{2}$ B) $\frac{7}{2}$ C) $\frac{9}{2}$ D) $\frac{11}{2}$ E) $\frac{13}{2}$

6. $\left(\frac{2}{3} + \frac{3}{5}\right) : \left(\frac{4}{9} - \frac{2}{15}\right) = ?$

- A) $\frac{12}{7}$ B) $\frac{18}{7}$ C) $\frac{27}{14}$ D) $\frac{43}{14}$ E) $\frac{57}{14}$

7. $x \neq 0, y \neq 0, z > 0,$
 $\frac{3x}{\frac{y}{z}} = \frac{x}{27y} \Rightarrow z = ?$

- A) 3 B) 6 C) 9 D) 12 E) 15

8. $\left(\frac{-1}{2} : \frac{3}{2}\right)^{-2} \cdot \left(\frac{2}{3}\right)^{-3} = ?$

- A) 8 B) 10 C) 12 D) 14 E) 16

9. $1 + \frac{1 - \frac{2}{5}}{1 + \frac{2}{5}} = ?$

- A) $\frac{6}{7}$ B) 1 C) $\frac{8}{7}$ D) $\frac{9}{7}$ E) $\frac{10}{7}$

13. $\frac{\left(\frac{1}{2} - \frac{1}{4}\right) : 4^{-1}}{\left(\frac{1}{3} - \frac{1}{6}\right) : 6^{-1}} = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{6}$ C) 1 D) 2 E) 3

10. $\frac{24 \cdot \left(\frac{1}{4} + \frac{1}{6}\right)}{\frac{1}{4} + 6} = ?$

- A) $\frac{6}{5}$ B) $\frac{8}{5}$ C) $\frac{12}{5}$ D) $\frac{14}{5}$ E) $\frac{16}{5}$

14. $\left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{3}\right) \dots \left(1 - \frac{1}{15}\right) = ?$

- A) 1 B) $\frac{1}{3}$ C) $\frac{1}{5}$ D) $\frac{1}{15}$ E) $\frac{1}{30}$

11. $\frac{\frac{1}{2} + \frac{1}{3}}{\left(\frac{2}{5} + \frac{4}{5}\right)^{-1}} = ?$

- A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) 1 D) $\frac{3}{2}$ E) 2

15. $\left(1 - \frac{1}{2}\right) \left(1 - \frac{1}{3}\right) \left(1 - \frac{1}{4}\right) \dots \left(1 - \frac{1}{16}\right) = A \Rightarrow 8 \cdot A = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{1}{5}$ E) $\frac{1}{6}$

16. $\left(1 - \frac{1}{2}\right) \cdot \left(1 + \frac{1}{2}\right) \cdot \left(1 + \frac{1}{4}\right) = 1 - \frac{1}{2^x} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

12. $\left(\frac{1 - \frac{2}{5}}{1 + \frac{2}{5}}\right) : \left(1 - \frac{1}{\frac{3}{4}}\right) = ?$

- A) $\frac{5}{7}$ B) $\frac{7}{9}$ C) $\frac{9}{14}$ D) $\frac{7}{36}$ E) $\frac{9}{49}$

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1	2	3	4	5	6	7	8
A	D	C	C	D	E	C	C
9	10	11	12	13	14	15	16
E	B	C	E	C	D	A	D

$$1. \quad 3 - \frac{1 + \frac{1}{1 + \frac{1}{2}}}{\frac{3}{5}} = ?$$

- A) $\frac{1}{9}$ B) $\frac{2}{9}$ C) $\frac{1}{3}$ D) $\frac{4}{9}$ E) $\frac{5}{9}$

$$2. \quad 1\frac{1}{3} - \frac{1 - \frac{3}{5}}{2 - \frac{1}{5}} = ?$$

- A) $\frac{10}{9}$ B) 1 C) $\frac{8}{9}$ D) $\frac{7}{9}$ E) $\frac{2}{3}$

$$3. \quad \frac{\left(2 - \frac{1}{2}\right) + \left(3 + \frac{1}{3}\right)}{\left(4 - \frac{1}{4}\right) + \left(4 + \frac{1}{4}\right)} = ?$$

- A) $\frac{29}{48}$ B) $\frac{31}{48}$ C) $\frac{17}{24}$ D) $\frac{35}{48}$ E) $\frac{13}{16}$

$$4. \quad \frac{3\frac{1}{2}}{4\frac{1}{5}} + \frac{7}{6} = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$5. \quad 2 - \frac{\frac{2}{3} - \frac{2}{5} + \frac{2}{7}}{\frac{1}{3} - \frac{1}{5} + \frac{1}{7}} = ?$$

- A) 0 B) $\frac{1}{2}$ C) 1 D) $\frac{3}{2}$ E) 2

$$6. \quad \frac{\left(3 - \frac{2}{3}\right) + \left(2 - \frac{1}{3}\right)}{\left(2 + \frac{2}{5}\right) - \left(\frac{7}{5} - 3\right)} = ?$$

- A) 0 B) 1 C) $\frac{3}{5}$ D) $\frac{5}{3}$ E) $\frac{1}{7}$

$$7. \quad 1 - \frac{1}{2} : \frac{1 + \frac{1}{3}}{1 - \frac{1}{3}} = ?$$

- A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) 1 D) $\frac{5}{4}$ E) $\frac{4}{5}$

$$8. \quad \frac{1 + \frac{1}{2 + \frac{1}{2}}}{\frac{1}{5}} = ?$$

- A) $\frac{1}{10}$ B) $\frac{1}{5}$ C) 2 D) 7 E) $\frac{5}{2}$

$$9. \frac{1}{19} : \frac{1 - \frac{1}{4}}{3 \frac{1}{4} - \frac{5}{3}} = ?$$

- A) $\frac{1}{9}$ B) $\frac{2}{9}$ C) $\frac{1}{3}$ D) $\frac{4}{9}$ E) $\frac{5}{9}$

$$10. \frac{\left(\frac{1}{2} - \frac{1}{3}\right) : \frac{1}{6}}{\left(\frac{1}{3} - \frac{1}{4}\right) : \frac{5}{12}} = ?$$

- A) 1 B) $\frac{1}{12}$ C) 5 D) $\frac{5}{12}$ E) $\frac{1}{6}$

$$11. \frac{\left(1 - \frac{1}{2}\right) \cdot \left(1 - \frac{1}{3}\right) \cdot \dots \cdot \left(1 - \frac{1}{10}\right)}{\left(1 - \frac{1}{10}\right) \cdot \left(1 - \frac{1}{11}\right) \cdot \left(1 - \frac{1}{12}\right) \cdot \dots \cdot \left(1 - \frac{1}{20}\right)} = ?$$

- A) 2 B) $\frac{2}{9}$ C) $\frac{1}{9}$ D) $\frac{1}{10}$ E) $\frac{1}{20}$

$$12. \frac{\left(\frac{2018}{4} - \frac{1}{4}\right) - \left(\frac{2019}{4} - \frac{3}{4}\right)}{\left(\frac{3}{4} - 2019\right) + \left(2019 - \frac{1}{4}\right)} = ?$$

- A) -1 B) -2 C) -3 D) -4 E) -5

$$13. \frac{\left(\frac{3}{1001} - \frac{5}{1003}\right) - \left(\frac{5}{1003} + \frac{3}{1001}\right)}{\frac{5}{1003}} = ?$$

- A) -2 B) $-\frac{5}{1003}$ C) 0
D) $\frac{1003}{5}$ E) $\frac{10}{1003}$

$$14. A = \left(\frac{1}{3} - 1\right) \cdot \left(\frac{1}{4} - 1\right) \cdot \dots \cdot \left(\frac{1}{10} - 1\right)$$

$$B = \left(1 + \frac{1}{2}\right) \cdot \left(1 + \frac{1}{3}\right) \cdot \dots \cdot \left(1 + \frac{1}{15}\right)$$

$$\Rightarrow \frac{B}{A} = ?$$

- A) -50 B) -40 C) -20 D) 20 E) 40

$$15. 1 - \frac{3 + \frac{1}{3}}{2 + \frac{1}{2}} = ?$$

- A) $-\frac{3}{8}$ B) $-\frac{3}{4}$ C) 0 D) $\frac{1}{4}$ E) $\frac{1}{3}$

$$16. \frac{33\frac{1}{2} - 29\frac{1}{3}}{16\frac{2}{3}} = ?$$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 2 E) 3



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1	2	3	4	5	6	7	8
B	A	A	B	A	B	B	D
9	10	11	12	13	14	15	16
A	C	B	A	A	E	A	A

$$1. \frac{2\frac{1}{2}}{\left(\frac{7}{2}-1\right) : \left(2\frac{1}{2}-\frac{7}{4}\right)} = ?$$

- A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) $\frac{3}{4}$

$$5. \frac{1 + \frac{1}{1 + \frac{1}{2}}}{\frac{1 + \frac{1}{4}}{\frac{1}{6}}} = ?$$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) 2 D) 3 E) 4

$$2. \left(\frac{2x-2}{3} - \frac{3}{4}\right) \cdot \frac{1}{6} = 0 \Rightarrow x = ?$$

- A) $\frac{13}{8}$ B) $\frac{15}{8}$ C) $\frac{17}{8}$ D) $\frac{19}{8}$ E) $\frac{21}{8}$

$$6. \left(\frac{103 + \frac{9}{4}}{105 + \frac{1}{4}}\right) \cdot \left(\frac{99 + \frac{5}{2}}{101 + \frac{1}{2}}\right) = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$3. \frac{1}{\frac{1}{x}-1} + \frac{2}{1-\frac{1}{x}} = 2 \Rightarrow x = ?$$

- A) 2 B) 3 C) 4 D) $\frac{1}{2}$ E) $\frac{1}{3}$

$$7. \frac{1 - \frac{1}{3}}{2 - \frac{1}{2}} + \frac{x}{9} = 1 \Rightarrow x = ?$$

- A) 3 B) 4 C) 5 D) 6 E) 7

$$4. 3 - \frac{1 + \frac{1}{2} + \frac{1}{3}}{5 + \frac{5}{2} + \frac{5}{3}} = ?$$

- A) $\frac{9}{5}$ B) $\frac{12}{5}$ C) $\frac{14}{5}$ D) $\frac{16}{5}$ E) $\frac{18}{5}$

$$8. 2 - \frac{1}{1 + \frac{3}{1 - \frac{1}{a}}} = \frac{1}{2} \Rightarrow a = ?$$

- A) $\frac{1}{10}$ B) $\frac{7}{10}$ C) $\frac{9}{10}$ D) $\frac{11}{10}$ E) $\frac{13}{10}$

9. $3 + \frac{10}{2 + \frac{6}{5-x}} = 9 \Rightarrow x = ?$

- A) 22 B) 23 C) 24 D) 25 E) 26

10. $\frac{15}{4 - \frac{1}{3 - \frac{1}{x}}} - 2 = 3 \Rightarrow x = ?$

- A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 3

11. $6 - \frac{2}{3 + \frac{1}{2 - \frac{1}{x}}} = 5 \Rightarrow x = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 2 E) 3

12. $2 + \frac{8}{1 + \frac{6}{4-x}} = 6 \Rightarrow x = ?$

- A) -4 B) -2 C) 2 D) 4 E) 6

13. $\frac{2}{3 + \frac{2}{\frac{4x}{9}}} = \frac{1}{6} \Rightarrow x = ?$

- A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 3

14. $1 - \frac{1}{1 - \frac{1}{x+1}} = ?$

- A) $-\frac{1}{x}$ B) $-x$ C) x D) 1 E) $\frac{1}{x}$

15. $a, b, c, d \in \mathbb{Z}^+$
 $\frac{57}{10} = a + \frac{1}{b + \frac{1}{c + \frac{1}{d}}} \Rightarrow a + b + c + d = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

16. $a, b, c \in \mathbb{Z}^+$
 $\frac{27}{11} = a + \frac{1}{b + \frac{1}{c}} \Rightarrow a + b + c = ?$

- A) 7 B) 8 C) 9 D) 10 E) 11



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1	2	3	4	5	6	7	8
E	C	A	C	E	A	C	A
9	10	11	12	13	14	15	16
B	B	B	B	B	A	B	C

$$1. \quad 1 - \frac{1}{1 + \frac{1}{1 + \frac{1}{3}}} = ?$$

- A) 1 B) $\frac{6}{7}$ C) $\frac{5}{7}$ D) $\frac{4}{7}$ E) $\frac{3}{7}$

$$2. \quad \frac{1 + \frac{1}{1 + \frac{1}{4}}}{1 - \frac{1}{4 - \frac{1}{2}}} = ?$$

- A) $\frac{18}{25}$ B) $\frac{27}{25}$ C) $\frac{9}{5}$ D) $\frac{54}{25}$ E) $\frac{63}{25}$

$$3. \quad \frac{3 - \frac{1 + \frac{1}{3}}{2}}{2 + \frac{1}{3 + \frac{1}{3}}} = ?$$

- A) $-\frac{1}{8}$ B) $\frac{1}{8}$ C) $\frac{1}{4}$ D) $\frac{3}{4}$ E) 1

$$4. \quad 1 + \frac{1 + \frac{2 + \frac{1}{4}}{1 + \frac{1}{4}}}{\frac{1}{4}} = ?$$

- A) 41 B) 39 C) 35 D) 33 E) 29

$$5. \quad 2 + \frac{1 - \frac{1}{1 - \frac{1}{2}}}{1 - \frac{1}{1 + \frac{2}{3}}} = ?$$

- A) $\frac{3}{2}$ B) $\frac{2}{3}$ C) $-\frac{1}{3}$ D) $-\frac{1}{2}$ E) $-\frac{1}{6}$

$$6. \quad 3 - \frac{1}{2 - \frac{1}{1 - \frac{1}{3}}} = ?$$

- A) 2 B) $\frac{4}{3}$ C) 1 D) $\frac{2}{3}$ E) $\frac{1}{2}$

$$7. \quad 3 - \frac{1}{1 + \frac{1}{3 - \frac{1}{1 - \frac{1}{2}}}} = ?$$

- A) $\frac{20}{7}$ B) $\frac{1}{6}$ C) $\frac{1}{4}$ D) $\frac{1}{3}$ E) $\frac{1}{2}$

$$8. \quad 1 - \frac{3 + \frac{1}{3 + \frac{1}{3}}}{2 + \frac{1}{2 + \frac{1}{2}}} = ?$$

- A) $-\frac{3}{8}$ B) $-\frac{3}{4}$ C) 0 D) $\frac{1}{4}$ E) $\frac{1}{3}$

$$9. \quad 1 - \frac{1}{1 - \frac{2}{1 - \frac{3}{2}}} = ?$$

- A) $\frac{3}{4}$ B) $\frac{4}{5}$ C) $\frac{5}{6}$ D) $\frac{3}{5}$ E) $\frac{2}{3}$

$$10. \quad \frac{3}{8} - \frac{\frac{3}{4}}{1 + \frac{1}{1 - \frac{1}{2}}} = ?$$

- A) $\frac{1}{8}$ B) $\frac{3}{8}$ C) $\frac{5}{8}$ D) $\frac{1}{4}$ E) $\frac{3}{4}$

$$11. \quad \frac{1 - \frac{1}{2}}{1 + \frac{1}{1 + \frac{1}{2}}} = ?$$

- A) $\frac{3}{5}$ B) $\frac{3}{10}$ C) $\frac{1}{5}$ D) $\frac{1}{10}$ E) $\frac{4}{15}$

$$12. \quad 2 - \frac{1}{1 - \frac{1}{1 + \frac{1}{3}}} = ?$$

- A) 0 B) 1 C) 2 D) 3 E) 4

$$13. \quad \frac{3}{4} + \frac{1}{5} + \frac{4}{7} = A$$

$$\Rightarrow \frac{1}{4} + \frac{4}{5} + \frac{3}{7} = ?$$

- A) $1 - A$ B) $2 - A$ C) $3 - A$
D) A E) $A - 3$

$$14. \quad \frac{5}{6} + \frac{7}{10} + \frac{8}{11} = x \Rightarrow \frac{1}{6} + \frac{13}{10} + \frac{3}{11} = ?$$

- A) $3 - x$ B) $4 - x$ C) $5 - x$
D) $6 - x$ E) $7 - x$

$$15. \quad \frac{6}{7} - \frac{5}{6} + \frac{7}{8} = A \Rightarrow \frac{1}{7} - \frac{1}{6} + \frac{1}{8} = ?$$

- A) $1 - A$ B) $2A - 1$ C) $3 - A$
D) $4 + A$ E) $5 - 2A$

$$16. \quad \frac{5}{8} - \frac{2}{7} + \frac{1}{6} - \frac{4}{5} = x$$

$$\Rightarrow \frac{3}{8} - \frac{5}{7} + \frac{1}{6} - \frac{1}{5} = ?$$

- A) $-x$ B) $1 - x$ C) $x - 1$
D) $-1 - x$ E) $1 + x$

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1	2	3	4	5	6	7	8
E	E	D	A	D	C	A	A
9	10	11	12	13	14	15	16
B	A	B	A	C	B	A	D

$$1. \quad \frac{3}{5} + \frac{4}{7} + \frac{5}{9} = x$$

$$\Rightarrow \frac{2}{5} + \frac{3}{7} + \frac{4}{9} = ?$$

- A) $x - 1$ B) $2x$ C) $\frac{x}{3}$
D) $3 - x$ E) $x - 3$

$$5. \quad \frac{2}{5} + \frac{3}{7} - \frac{1}{3} = x \Rightarrow \frac{1}{5} + \frac{1}{7} - \frac{1}{3} = ?$$

- A) $1 - x$ B) $1 + x$ C) $1 - 2x$
D) $2x + 1$ E) $2x - 1$

$$2. \quad \frac{4}{9} + \frac{3}{7} + \frac{8}{11} = A$$

$$\Rightarrow \frac{13}{9} - \frac{4}{7} - \frac{3}{11} = ?$$

- A) $1 - A$ B) $2 - A$ C) A
D) $A - 1$ E) $A - 2$

$$6. \quad \frac{a}{b} + \frac{b}{c} + \frac{c}{d} = x$$

$$\Rightarrow \frac{a-b}{b} + \frac{b+c}{c} + \frac{c+d}{d} = ?$$

- A) $x + 3$ B) $x + 1$ C) x
D) $2x + 1$ E) $2x$

$$3. \quad \frac{1}{3} + \frac{1}{5} + \frac{1}{7} = x$$

$$\Rightarrow \frac{1}{3} + \frac{3}{5} + \frac{5}{7} = ?$$

- A) $3 - x$ B) $1 - x$ C) $3 - 2x$
D) $1 - 2x$ E) $-x + 1$

$$7. \quad 2 + \frac{3}{2 + \frac{3}{\vdots}} = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$4. \quad \frac{68}{72} + \frac{142}{73} + \frac{209}{71} = a$$

$$\Rightarrow \frac{1}{73} + \frac{1}{72} + \frac{1}{71} = ?$$

- A) $\frac{4-a}{4}$ B) $\frac{5-a}{4}$ C) $\frac{6-a}{4}$
D) $\frac{4+a}{4}$ E) $\frac{6+a}{4}$

$$8. \quad 4 + \frac{5}{4 + \frac{5}{\vdots}} = x, \quad 3 + \frac{4}{3 + \frac{4}{\vdots}} = y \Rightarrow x + y = ?$$

- A) 4 B) 5 C) 7 D) 9 E) 11

9. $5 + \frac{6}{1 + \frac{6}{1 + \frac{6}{\ddots}}} = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

13. $3 - \frac{\ddots}{2} = ?$

- A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) $\frac{3}{2}$ D) 2 E) 3

10. $1 - \frac{2}{1 + \frac{2}{1 + \frac{2}{1 + \frac{2}{\ddots}}}} = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

14. $3 + \frac{3}{3} = ?$

- A) 2 B) $\frac{5}{2}$ C) 4 D) $\frac{9}{2}$ E) 5

11. $1 + \frac{1}{-1 + \frac{2}{-1 + \frac{2}{\ddots}}} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

15. $\frac{1 + \frac{5}{3 + \frac{4}{3 + \frac{4}{\ddots}}}}{4} = ?$

- A) $\frac{5}{2}$ B) 1 C) $\frac{5}{4}$ D) $\frac{5}{16}$ E) $\frac{5}{32}$

12. $A = 1 + \frac{30}{1 + \frac{30}{1 + \frac{30}{\ddots}}}$, $B = 4 - \frac{4}{4 - \frac{4}{\ddots}} = ?$

- $\Rightarrow A - B = ?$
A) 1 B) 2 C) 3 D) 4 E) 5

16. $5 + \frac{x}{5 + \frac{x}{5 + \frac{x}{\ddots}}} = 9 \Rightarrow x = ?$

- A) 32 B) 36 C) 42 D) 48 E) 52

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1	2	3	4	5	6	7	8
D	D	C	C	C	B	C	D
9	10	11	12	13	14	15	16
B	A	B	D	D	D	D	B

$$1. \quad x = 3 + \frac{4}{3 + \frac{4}{\vdots}}, \quad y = 8 + \frac{9}{8 + \frac{9}{\vdots}} \Rightarrow y - x = ?$$

- A) 3 B) 4 C) 5 D) 6 E) 7

$$2. \quad 2x + \frac{12}{2x + \frac{12}{2x + \frac{12}{\vdots}}} = 4 \Rightarrow 4x = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$3. \quad x = \frac{3}{4}, \quad y = \frac{2}{5}, \quad z = \frac{1}{10} \Rightarrow ? > ? > ?$$

- A) $x > y > z$ B) $x > z > y$ C) $z > x > y$
 D) $y > x > z$ E) $y > z > x$

$$4. \quad \left. \begin{array}{l} a = \frac{2}{7} \\ b = \frac{3}{8} \\ c = \frac{6}{11} \end{array} \right\} \Rightarrow ? > ? > ?$$

- A) $a > b > c$ B) $a > c > b$ C) $c > a > b$
 D) $c > b > a$ E) $b > a > c$

$$5. \quad a = \frac{5}{6}, \quad b = \frac{1}{3}, \quad c = \frac{3}{4}$$

$$\Rightarrow ? > ? > ?$$

- A) $a > c > b$ B) $a > b > c$ C) $c > b > a$
 D) $c > a > b$ E) $b > a > c$

$$6. \quad a = \frac{2}{11}, \quad b = \frac{3}{20}, \quad c = \frac{4}{21}$$

$$\Rightarrow ? > ? > ?$$

- A) $c > b > a$ B) $c > a > b$ C) $b > a > c$
 D) $b > c > a$ E) $a > b > c$

$$7. \quad x = \frac{2}{5}, \quad y = \frac{3}{7}, \quad z = \frac{4}{11}$$

$$\Rightarrow ? < ? < ?$$

- A) $x < y < z$ B) $y < x < z$ C) $z < x < y$
 D) $z < y < x$ E) $x < z < y$

$$8. \quad a = \frac{-7}{15}, \quad b = \frac{-2}{5}, \quad c = \frac{-1}{6} \Rightarrow ? < ? < ?$$

- A) $a < c < b$ B) $a < b < c$ C) $b < c < a$
 D) $c < b < a$ E) $c < a < b$

9. $x = \frac{1001}{1000}, y = \frac{1003}{1002}, z = \frac{1004}{1003} \Rightarrow ? > ? > ?$

- A) $x > y > z$ B) $x > z > y$ C) $z > x > y$
D) $y > x > z$ E) $y > z > x$

10. $a = \frac{117}{115}, b = \frac{119}{117}, c = \frac{121}{119} \Rightarrow ? < ? < ?$

- A) $c < b < a$ B) $b < c < a$ C) $b < a < c$
D) $a < b < c$ E) $a < c < b$

11. $a = \frac{105}{103}, b = \frac{101}{99}, c = \frac{109}{107}$

$\Rightarrow ? > ? > ?$

- A) $b > a > c$ B) $c > b > a$ C) $b > c > a$
D) $c > a > b$ E) $a > b > c$

12. $a = \frac{73}{75}, b = \frac{75}{77}, c = \frac{77}{79}$

$\Rightarrow ? < ? < ?$

- A) $c < b < a$ B) $b < c < a$ C) $a < b < c$
D) $b < a < c$ E) $a < c < b$

13. $\left. \begin{array}{l} a-b = \frac{6}{13} \\ a-c = \frac{8}{15} \\ b-c = \frac{4}{7} \end{array} \right\} \Rightarrow ? > ? > ?$

- A) $a > b > c$ B) $c > a > b$ C) $c > b > a$
D) $a > c > b$ E) $b > a > c$

14. $\left. \begin{array}{l} a+b = \frac{6}{11} \\ a+c = \frac{14}{13} \\ b+c = \frac{17}{18} \end{array} \right\} \Rightarrow ? > ? > ?$

- A) $a > b > c$ B) $c > a > b$ C) $c > b > a$
D) $a > c > b$ E) $b > a > c$

15. $x < y < z < 0$

$\left. \begin{array}{l} a = \frac{x}{y} \\ b = \frac{z}{y} \\ c = \frac{x}{z} \end{array} \right\} \Rightarrow ? < ? < ?$

- A) $a < b < c$ B) $a < c < b$ C) $b < a < c$
D) $b < c < a$ E) $c < a < b$

16. $x, y, z \in \mathbb{R}^+$
 $\frac{x+y}{4} = \frac{y+z}{5} = \frac{x+z}{7}$
 $\Rightarrow ? > ? > ?$

- A) $y < x < z$ B) $y < z < x$ C) $x < y < z$
D) $x < z < y$ E) $z < x < y$

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1	2	3	4	5	6	7	8
C	B	A	D	A	B	C	B
9	10	11	12	13	14	15	16
A	A	A	C	C	B	C	E

1. $0,1 + 0,2 - 0,3 = ?$

- A) 0,1 B) 0,2 C) 0
D) -0,1 E) -0,2

2. $\frac{0,3}{3} + \frac{0,2}{2} - \frac{0,4}{4} = ?$

- A) 0,1 B) 0,2 C) 0,3
D) 0,4 E) 0,5

3. $\frac{2}{0,2} + \frac{1}{0,1} - \frac{3}{0,3} = ?$

- A) 0,1 B) 10 C) 0,3
D) $\frac{10}{3}$ E) 0,2

4. $\frac{0,99}{0,33} + \frac{0,44}{0,11} - \frac{0,4}{0,2} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

5. $\frac{2,3}{0,23} + \frac{0,4}{0,04} = ?$

- A) 10 B) 11 C) 20 D) 100 E) 101

6. $\frac{0,04}{0,008} + \frac{0,02}{0,004} - \frac{0,03}{0,005} = ?$

- A) -4 B) -2 C) 2 D) 4 E) 6

7. $\frac{1,2}{0,2} - \frac{1,2}{0,15} + \frac{1,6}{0,2} = ?$

- A) 14 B) 12 C) 8 D) 6 E) 4

8. $\frac{1}{3} + \frac{1}{0,3} + \frac{1}{0,03} = ?$

- A) 19 B) 23 C) 29 D) 31 E) 37

9. $\frac{0,5}{0,01} \cdot 0,2 = ?$

- A) 0,1 B) 10 C) 0,2 D) 20 E) 0,5

10. $10 - \frac{9}{10} + \frac{99}{100} = ?$

- A) 9,91 B) 99,9 C) 99,1
D) 9,19 E) 10,09

11. $\frac{0,22}{4,4} + \frac{0,02}{5} = ?$

- A) 0,1 B) 0,03 C) 0,64
D) 0,009 E) 0,054

12. $\frac{16,32}{0,8} - \frac{2}{0,5} = ?$

- A) 6 B) 8 C) 12 D) 16,4 E) 18,2

13. $(0,9 - 0,3 : 0,1) : 3 \cdot (0,3 - 1) = ?$

- A) 0,1 B) 1 C) 0
D) -0,1 E) -1

14. $\frac{1,1}{12,1} - \frac{1}{1,1} = ?$

- A) $\frac{11}{9}$ B) 1,1 C) $\frac{10}{11}$ D) $-\frac{9}{11}$ E) $\frac{9}{11}$

15. $\frac{0,8}{0,08} + \frac{2,5}{5} + \frac{3}{20} = ?$

- A) 1,05 B) 1,75 C) 10,5 D) 10,65 E) 100,7

16. $\frac{0,125}{0,5} + \frac{0,27}{3} - \frac{9,9}{0,11} = ?$

- A) 89,66 B) 89,67 C) -89,66
D) -89,67 E) 89,88



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1	2	3	4	5	6	7	8
C	A	B	E	C	D	D	E
9	10	11	12	13	14	15	16
B	E	E	D	B	D	D	C

1. $\frac{0,11}{0,1} - 0,4 : 0,4 = ?$

- A) 0,1 B) 1,1 C) 0 D) 1 E) 2

2. $\frac{0,0016}{0,03} : \frac{0,04}{0,012} = ?$

- A) 1,6 B) 0,16 C) 0,016 D) 0,12 E) 0,012

3. $0,005(0,27 - 0,07) = ?$

- A) 0,1 B) 0,01 C) 0,001 D) 0,2 E) 0,02

4. $\left(0,8 - 0,5 : 0,3 + \frac{5}{3}\right) \cdot \frac{2}{0,2} = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

5. $\frac{0,12}{0,3} + \frac{8}{0,02} + \frac{0,06}{0,002} = ?$

- A) 430 B) 430,4 C) 432
D) 432,4 E) 450

6. $5 - \frac{7}{10} + \frac{71}{1000} = ?$

- A) 5,001 B) 7,771 C) 4,229
D) 4,371 E) 4,971

7. $\frac{0,003}{0,3} + \frac{62,5}{6,25} - 0,01 = ?$

- A) 100,1 B) 100 C) 10 D) 1 E) 0

8. $\frac{0,51}{1,7} + 0,64 : 32 + 1 = ?$

- A) 1,32 B) 0,132 C) 10,2
D) 132 E) 11,2

$$9. \frac{4,68}{0,117} + \frac{10,4}{0,052} - \frac{9}{0,3} = ?$$

- A) 195 B) 200 C) 205 D) 210 E) 215

$$10. \frac{2+0,2}{1-0,8} - \frac{0,4-0,04}{0,36} = ?$$

- A) 8 B) 10 C) 12 D) 14 E) 16

$$11. \frac{0,32}{0,24} : \left(\frac{0,3}{0,02} \right)^{-1} = ?$$

- A) 20 B) 10 C) 1 D) $\frac{2}{3}$ E) $\frac{1}{2}$

$$12. \frac{1,32}{0,12} + \frac{0,3}{0,03} - \frac{1,8}{0,06} = ?$$

- A) -9 B) -6 C) -3 D) 6 E) 9

$$13. \frac{0,025}{0,25} + \frac{15}{0,02} - \frac{1,01}{0,1} = ?$$

- A) 320 B) 340 C) 370 D) 720 E) 740

$$14. \frac{a, bc + b, ca + c, ab}{10a + 10b + 10c} = ?$$

- A) 0,001 B) 0,011 C) 0,111
D) 0,101 E) 0,1

$$15. 0,005 - \frac{0,002}{4} = ?$$

- A) 0,4998 B) 0,4989 C) 0,002
D) 0,045 E) 0,0045

$$16. \frac{0,0008}{0,05} : \frac{0,02}{0,015} = ?$$

- A) 1,2 B) 1,6 C) 0,08
D) 0,004 E) 0,012


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1	2	3	4	5	6	7	8
A	C	C	E	B	D	C	A
9	10	11	12	13	14	15	16
D	B	A	A	E	C	E	E

$$1. \frac{0,03}{0,12} - \frac{0,003}{0,01} : \frac{0,12}{0,5} = ?$$

- A) 3 B) 1 C) 0 D) -1 E) -2

$$2. \frac{0,aa}{aa} - 0,00b : 0,b = ?$$

- A) -1 B) -2 C) 0 D) 1 E) 2

$$3. \frac{0,aaa}{aaa} - \frac{0,b}{0,00b} - \frac{0,c}{0,0c} = ?$$

- A) 1 B) 0,1 C) 0,2 D) 2 E) 0,3

$$4. \frac{0,5}{0,2 + \frac{1}{\frac{1}{0,2}}} = ?$$

- A) $\frac{3}{4}$ B) $\frac{5}{4}$ C) $\frac{7}{4}$ D) 1 E) $\frac{9}{4}$

$$5. \frac{0,8}{0,4 + \frac{1}{\frac{1}{0,2}}} = ?$$

- A) 1 B) $\frac{4}{3}$ C) $\frac{3}{4}$ D) $\frac{1}{2}$ E) $\frac{8}{7}$

$$6. 1 - \frac{0,1}{1 - \frac{0,01}{0,02}} = ?$$

- A) 0,4 B) 0,8 C) 1,4 D) 1,8 E) 2,4

$$7. \frac{0,4}{0,032} + \frac{0,05}{0,0002} - \frac{3}{0,02} = ?$$

- A) 0,1125 B) 1,125 C) 11,25 D) 112,5 E) 1125

$$8. \frac{0,4}{0,004} + \frac{0,03}{0,3} + \frac{(0,2)^{-1}}{0,2} = ?$$

- A) 1,251 B) 12,15 C) 125,1 D) 1251 E) 12510

9. $\frac{(0,72)^2 - (0,36)^2}{(0,38)^2 - (0,02)^2} = ?$

- A) 0,27 B) 2,7 C) 27 D) 270 E) 2700

10. $\frac{0,21}{x} = \frac{1}{0,2} + \frac{1}{0,01} \Rightarrow x = ?$

- A) 0,2 B) 0,02 C) 0,002 D) 0,4 E) 0,04

11. $\frac{0,005 \cdot 0,004}{0,02} = 10^k \Rightarrow k = ?$

- A) -1 B) -2 C) -3 D) -4 E) -5

12. $\frac{0,27 \cdot 10^3 + 50}{0,008 \cdot 10^5} = ?$

- A) 0,4 B) 0,04 C) 0,004 D) 0,2 E) 0,02

13. $\frac{5 \cdot 10^{-5} + 0,04 \cdot 10^{-3} + 90 \cdot 10^{-6}}{4,5 \cdot 10^{-6}} = ?$

- A) 10 B) 20 C) 30 D) 40 E) 50

14. $a, k \in \mathbb{Z}$,
 $\frac{0,0016 \cdot 0,0032}{0,64} = a \cdot 10^k \Rightarrow \min(a+k) = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

15. $\frac{0,125 \cdot 10^5 \cdot 0,8}{10^3} = ?$

- A) 0,001 B) 0,1 C) 1 D) 10 E) 100

16. $\frac{0,72 \cdot 0,05 \cdot 10^4}{10^2} = 10^m \cdot 6^n \Rightarrow m+n = ?$

- A) -1 B) 0 C) 1 D) 2 E) 4

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1	2	3	4	5	6	7	8
D	C	A	B	B	B	D	C
9	10	11	12	13	14	15	16
B	C	C	B	D	A	D	C

1. $5,0\overline{5} = ?$

A) $\frac{91}{18}$

B) $\frac{92}{19}$

C) $\frac{93}{90}$

D) $\frac{94}{25}$

E) $\frac{18}{91}$

5. $\frac{5,\overline{6} + 3,\overline{3}}{2,\overline{8}} = ?$

A) $3\frac{3}{26}$

B) $4\frac{2}{13}$

C) $5\frac{5}{26}$

D) $\frac{9}{26}$

E) $\frac{1}{26}$

2. $0,2\overline{72} = ?$

A) $\frac{1}{11}$

B) $\frac{2}{11}$

C) $\frac{3}{11}$

D) $\frac{4}{11}$

E) $\frac{5}{11}$

6. $0,\overline{6} + 0,\overline{7} + 0,\overline{8} = \frac{a+4}{a}$
 $\Rightarrow a = ?$

A) 3

B) 4

C) 5

D) 7

E) 9

3. $1,0\overline{12} = ?$

A) $\frac{167}{165}$

B) $\frac{169}{195}$

C) $\frac{1012}{99}$

D) $\frac{1013}{90}$

E) $\frac{1012}{89}$

7. $(0,\overline{2} + 0,\overline{5}) \cdot \frac{9}{7} = ?$

A) 1

B) 2

C) 0,1

D) 0,2

E) 0,9

4. $\frac{2,\overline{5} + 1,\overline{4}}{1,\overline{9}} = ?$

A) 1

B) $\frac{3}{2}$

C) $\frac{4}{3}$

D) 2

E) $\frac{5}{2}$

8. $\frac{0,\overline{4} + 0,\overline{6}}{0,9} = ?$

A) 1

B) $\frac{1}{9}$

C) $\frac{1}{10}$

D) $\frac{81}{100}$

E) $\frac{100}{81}$

9. $\frac{1}{9} + 0,\bar{2} - 0,\bar{6} = ?$

- A) $-\frac{1}{6}$ B) $-\frac{1}{3}$ C) $-\frac{1}{2}$ D) $\frac{1}{2}$ E) $\frac{1}{3}$

10. $\frac{0,\bar{9}}{0,\bar{3}} : \frac{0,\bar{6}}{0,\bar{7}} = ?$

- A) $\frac{1}{2}$ B) $\frac{3}{2}$ C) $\frac{5}{2}$ D) $\frac{7}{2}$ E) $\frac{9}{2}$

11. $\frac{1,\bar{2} + 3,\bar{4}}{2,\bar{1} - 1,\bar{2}} = ?$

- A) $\frac{17}{4}$ B) $\frac{19}{4}$ C) $\frac{21}{4}$ D) $\frac{23}{4}$ E) $\frac{25}{4}$

12. $\frac{2,\bar{2} - 3,\bar{3} + 4,\bar{4} - 5,\bar{5} + 6,\bar{6} - 7,\bar{7}}{0,\bar{5} + 2,\bar{4}} = ?$

- A) $-\frac{10}{9}$ B) $-\frac{8}{9}$ C) $\frac{8}{9}$ D) $\frac{10}{9}$ E) $\frac{14}{9}$

13. $\frac{1 + \frac{1}{0,\bar{3}}}{2 - \frac{1 + 0,\bar{2}}{0,\bar{12}}} + 4 = ?$

- A) 1 B) $\frac{2}{3}$ C) $\frac{7}{2}$ D) $\frac{5}{3}$ E) $\frac{7}{3}$

14. $\frac{5 \cdot 0,\bar{39} + 3 \cdot 0,\bar{13}}{0,\bar{16}} = ?$

- A) $\frac{18}{5}$ B) $\frac{32}{5}$ C) $\frac{48}{5}$ D) $\frac{64}{5}$ E) $\frac{72}{5}$

15. $\frac{0,\bar{12} - \frac{1}{9}}{2 - 1,\bar{2}} = ?$

- A) $\frac{1}{30}$ B) $\frac{1}{35}$ C) $\frac{1}{70}$ D) $\frac{1}{90}$ E) $\frac{1}{120}$

16. $\frac{1 + \frac{0,\bar{03}}{1 - \frac{1}{2}}}{1 + 0,\bar{2}} = ?$

- A) $\frac{27}{55}$ B) $\frac{11}{90}$ C) $\frac{7}{9}$ D) $\frac{9}{11}$ E) $\frac{48}{55}$


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1	2	3	4	5	6	7	8
A	C	A	D	A	A	A	E
9	10	11	12	13	14	15	16
B	D	C	A	C	E	C	E

1. $\frac{2,\overline{7} + 1,\overline{6}}{\frac{10}{3} + \frac{10}{9}} = ?$

- A) 1 B) 2 C) $\frac{9}{10}$
D) $\frac{1}{3}$ E) $\frac{1}{11}$

2. $\frac{1,0\overline{6} + 0,1\overline{3}}{1,3\overline{6}} = ?$

- A) 0,6 B) 0,64 C) 0,88 D) 0,06 E) 0,96

3. $\left(\frac{-1}{\frac{2}{3}}\right)^{-1} : 0,\overline{6} = ?$

- A) -3 B) -2 C) -1 D) 1 E) 3

4. $\frac{0,1\overline{9}}{4} + \frac{0,3\overline{6}}{1,2} = ?$

- A) $\frac{9}{10}$ B) 1 C) 2 D) $\frac{7}{20}$ E) $\frac{1}{90}$

5. $\frac{0,7\overline{9} + 0,1\overline{9} + 0,3\overline{9}}{\frac{1}{30}} = ?$

- A) 42 B) 30 C) 90 D) 9 E) 3

6. $\frac{\left(-2\frac{1}{3}\right) : (0,1\overline{5}) + 3}{(0,3)^{-1}} = ?$

- A) -6 B) -4 C) -3 D) 3 E) 4

7. $\left(2\frac{1}{3} : 0,3\overline{3} + 2\right) : \left(4 - 0,7 : \frac{28}{9}\right) = ?$

- A) 1,2 B) 1,4 C) 2,4 D) 3,2 E) 3,6

8. $\frac{0,2\overline{7} - 0,\overline{9}}{2 - \frac{4}{11}} : 2 = ?$

- A) $-\frac{3}{5}$ B) $-\frac{2}{5}$ C) $-\frac{1}{5}$ D) $\frac{1}{5}$ E) $\frac{2}{5}$

$$9. \frac{2}{3 + \frac{2}{\frac{0,4}{x}}} = \frac{1}{6} \Rightarrow x = ?$$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 2 D) 4 E) 6

$$10. \frac{\frac{3}{2} + \left(\frac{2}{9}\right)^{-1}}{(0,3 + 0,1)^{-2}} = ?$$

- A) $\frac{17}{32}$ B) $\frac{23}{32}$ C) $\frac{27}{32}$ D) $\frac{32}{17}$ E) $\frac{32}{27}$

$$11. \frac{1}{0,13} + \frac{1}{0,26} = ?$$

- A) $\frac{25}{4}$ B) $\frac{27}{4}$ C) $\frac{35}{4}$ D) $\frac{43}{4}$ E) $\frac{45}{4}$

$$12. \frac{0,4}{x} = \frac{4,40}{4,4} \Rightarrow x = ?$$

- A) $\frac{44}{109}$ B) $\frac{44}{115}$ C) $\frac{22}{57}$ D) $\frac{22}{63}$ E) $\frac{33}{115}$

$$13. \frac{a,0\bar{a}}{0,0\bar{a}} = ?$$

- A) 89 B) 91 C) 96 D) 99 E) 101

$$14. \frac{1,\bar{3} - 1,3}{0,7 - 0,6} = ?$$

- A) 0,1 B) 0,2 C) 0,3 D) 0,4 E) 0,5

$$15. \left. \begin{array}{l} x = 0,2 \\ y = 0,02 \end{array} \right\} \Rightarrow \frac{1}{x} + \frac{1}{y} = ?$$

- A) 49 B) $\frac{99}{2}$ C) 50 D) $\frac{101}{2}$ E) 51

$$16. a = 0,\bar{3}, b = 0,\bar{5}$$

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{a \cdot b} = ?$$

- A) 9 B) $\frac{47}{5}$ C) $\frac{49}{5}$ D) $\frac{51}{5}$ E) $\frac{53}{5}$


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	C	C	D	A	B	C	B
9	10	11	12	13	14	15	16
C	E	E	A	B	C	B	D

1. $\frac{x}{x+1} = 0,0\bar{3} \Rightarrow x = ?$

- A) 25 B) 29 C) $\frac{1}{29}$ D) $\frac{3}{29}$ E) $\frac{5}{29}$

2. $\frac{a, \bar{b} - b, \bar{a}}{16} = \frac{1}{18} \Rightarrow a - b = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

3. $0, \bar{1}a = 0, \bar{b}2\bar{c}d \Rightarrow a + b + c + d = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

4. $0,9 + 0,09 + 0,009 + \dots = ?$

- A) 1 B) 0,9 C) $\frac{10}{9}$
D) $\frac{1}{9}$ E) 0,1

5. $x = 0,2 + 0,02 + 0,002 + \dots$

$y = 0,5 + 0,05 + 0,005 + \dots \Rightarrow 2x + y = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 1 E) 2

6. $\frac{3 - 0,6666\dots}{1 - 0,7} = ?$

- A) $\frac{15}{2}$ B) $\frac{17}{2}$ C) $\frac{19}{2}$ D) $\frac{21}{2}$ E) $\frac{23}{2}$

7. $\left. \begin{array}{l} x = 0,5454\dots \\ y = 0,3636\dots \end{array} \right\} \Rightarrow \frac{x+y}{x-y} = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

8. $a = 1,555\dots$

$b = 1,333\dots$

$\Rightarrow \frac{1}{a} + \frac{b}{2} = ?$

- A) $\frac{55}{42}$ B) $\frac{47}{198}$ C) $\frac{67}{198}$ D) $\frac{113}{99}$ E) 1

9. $A = 0,6 + 0,06 + 0,006 + \dots$
 $B = 0,1 + 0,01 + 0,001 + \dots$
 $\Rightarrow A - B = ?$

- A) 1 B) $\frac{1}{9}$ C) 0,9
 D) $\frac{5}{9}$ E) 9

10. $A = \frac{3}{10} + \frac{3}{100} + \frac{3}{1000} + \dots$
 $B = \frac{4}{10} + \frac{4}{100} + \frac{4}{1000} + \dots$
 $\Rightarrow A + B = ?$

- A) $\frac{4}{9}$ B) $\frac{5}{9}$ C) $\frac{2}{3}$
 D) $\frac{7}{9}$ E) $\frac{8}{9}$

11. $A = 2,2828\dots$
 $B = 1,1010\dots$
 $\Rightarrow \frac{A}{B} = ?$

- A) $\frac{226}{109}$ B) $\frac{224}{109}$ C) $\frac{222}{109}$
 D) $\frac{220}{10}$ E) $\frac{218}{109}$

12. $\frac{0,636363\dots}{0,1272727\dots} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $\frac{a,\bar{a} + b,\bar{b}}{a0 + b0} = ?$

- A) $\frac{1}{10}$ B) $\frac{1}{9}$ C) 1 D) 2 E) 9

14. $\frac{0,\bar{x} + 0,\overline{xx}}{x,\bar{x} + 0,\bar{x}} = ?$

- A) $\frac{1}{6}$ B) $\frac{1}{9}$ C) $\frac{2}{9}$ D) $\frac{2}{11}$ E) $\frac{3}{11}$

15. $\frac{x,0\bar{x} + y,0\bar{y}}{xy + yx} \cdot \frac{11}{91} = ?$

- A) 1 B) 11 C) $\frac{1}{90}$
 D) 90 E) $\frac{1}{11}$

16. $\left. \begin{matrix} m \neq 0, n \neq 0 \\ m + n = 6 \end{matrix} \right\} \Rightarrow m,\overline{nn} + n,\overline{mm} = ?$

- A) $\frac{14}{3}$ B) $\frac{16}{3}$ C) $\frac{17}{3}$ D) $\frac{19}{3}$ E) $\frac{20}{3}$

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YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	A	B	A	D	D	C	A
9	10	11	12	13	14	15	16
D	D	A	E	B	D	C	E

$$1. \frac{\frac{2}{7} - \frac{3}{4} + \frac{1}{2}}{\frac{4}{7} - \frac{2}{3}} = ?$$

- A) $\frac{5}{21}$ B) $\frac{2}{24}$ C) $-\frac{3}{28}$ D) $-\frac{5}{21}$ E) $-\frac{3}{8}$

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

$$2. \frac{1 + \frac{1}{4}}{1 - \frac{1}{4}} \div \left(1 - \frac{1}{1 - \frac{1}{4}}\right) = ?$$

- A) -5 B) $-\frac{5}{9}$ C) $\frac{5}{3}$ D) $\frac{1}{4}$ E) 1

[HARRAN ÜNİVERSİTESİ – YÖS 2020]

$$3. \sqrt{\sqrt{x - \sqrt{x - \sqrt{x - \dots}}} = 5 \Rightarrow x = ?$$

- A) 30 B) 25 C) 20 D) 15 E) 10

[HARRAN ÜNİVERSİTESİ – YÖS 2020]

$$4. \left[\frac{2}{1 - \frac{2}{3}} - \left(3 - \frac{2}{3}\right) \right] \cdot 6 = ?$$

- A) 1 B) 6 C) 11 D) 18 E) 22

[İSTANBUL ÜNİVERSİTESİ – YÖS 2019]

$$5. \frac{0,0\bar{3}}{0,0\bar{3}} + \frac{0,0\bar{1}}{0,0\bar{1}} + \frac{0,0\bar{2}}{0,0\bar{2}} = ?$$

- A) $\frac{10}{3}$ B) $\frac{3}{10}$ C) $\frac{10}{27}$ D) $\frac{27}{20}$ E) $\frac{27}{100}$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2019]

$$6. \frac{(0,8 + 3,2)! + 4!}{1,6} = ?$$

- A) 15 B) 20 C) 25 D) 30 E) 35

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2019]

$$7. \frac{0,1234}{0,005} + \frac{0,567}{0,05} + \frac{0,89}{0,5} = ?$$

- A) 378 B) 37,8 C) 0,358 D) 35,8 E) 3,58

[AKDENİZ ÜNİVERSİTESİ – YÖS 2019]

$$8. a + \frac{1}{b + \frac{1}{c + \frac{2}{d}}} = \frac{43}{12} \Rightarrow a + b + c + d = ?$$

- A) 10 B) 9 C) 7 D) 5 E) 4

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

9. $-\frac{2}{3} - \frac{2}{7} + \frac{5}{3} = ?$

- A)
- $\frac{5}{3}$
- B)
- $\frac{4}{7}$
- C)
- $\frac{5}{7}$
- D)
- $\frac{2}{3}$
- E)
- $\frac{16}{21}$

[ANKARA ÜNİVERSİTESİ – YÖS 2018]

13. $\left[\frac{3 - \frac{3}{5}}{2 + \frac{1}{3}} \right] \cdot \left[\frac{4 - \frac{1}{2}}{6 - \frac{6}{5}} \right] = ?$

- A)
- $\frac{3}{2}$
- B) 1 C)
- $\frac{3}{4}$
- D)
- $\frac{1}{2}$
- E)
- $\frac{1}{3}$

[İSTANBUL ÜNİVERSİTESİ – YÖS 2017]

10. $\frac{2 - \frac{3}{4}}{1 - \frac{3}{8}} = ?$

- A) 2 B)
- $\frac{25}{32}$
- C)
- $\frac{32}{25}$
- D) 1 E)
- $\frac{13}{9}$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

14. $\frac{(0,00005)^3}{(0,0025)^{-2}} = ?$

- A)
- $5^{-7} \cdot 10^{19}$
- B)
- $5 \cdot 10^{-7}$
- C)
- $5^{-7} \cdot 10^{-19}$
-
- D)
- $5^7 \cdot 10^{-23}$
- E)
- $5^{-7} \cdot 10^{-23}$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

15. $\frac{2,5}{0,25} + \frac{0,2}{0,02} = ?$

- A) 10 B) 11 C) 20 D) 100 E) 101

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2017]

11. $\frac{33,33}{0,3 + 0,03} - \frac{20,2}{0,2} = ?$

- A) 0 B) 1 C) 2 D) 200 E) 400

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

16. $\frac{4 + \frac{3}{19} - \frac{35}{17}}{1 + \frac{22}{19} - \frac{1}{17}} = ?$

- A) 2 B) 1 C)
- $\frac{1}{2}$
- D)
- $\frac{3}{323}$
- E)
- $\frac{1}{323}$

[İSTANBUL ÜNİVERSİTESİ – YÖS 2016]

12. $\frac{0,5}{0,05} + \frac{1,7}{0,17} - \frac{2,81}{0,281} = ?$

- A) 1 B) 5 C) 10 D) 15 E) 20

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2018]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	A	A	E	A	D	B	A
9	10	11	12	13	14	15	16
C	A	A	C	C	D	C	B

BÖLÜM CHAPTER

3

TARİHSEL NOT / HISTORICAL NOTE

Omar Khayyam [1048 – 1122]

Ömer Hayyam, anlaşılması güç matematiksel konuları, şiirsel bir dille açıklayan, derin felsefi bilgisi olan bir düşünür ve şairdir. O astronomik tablolar oluşturarak, yeni bir takvimin ortaya çıkmasına katkıda bulunmuştur. Ayrıca bir çemberin, bir parabol ile kesişiminden oluşan ve üçüncü dereceden denklemleri içeren problemleri çözerek yeni geometrik yöntemler de geliştirmiştir.

Omar Khayyam was a scholar who was a poet as well as a mathematician. He compiled astronomical tables and contributed to calendar reform and discovered a geometrical method of solving cubic equations by intersecting a parabola with a circle.

ÜSLÜ SAYILAR EXPONENTIALS

Bu bölüm 272 test sorusu, 16 YÖS sorusu içermektedir.

This chapter includes 272 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 3

ÜSLÜ SAYILAR / EXPONENTIALS

- Üslü Sayılar / Exponentials 81 - 118

1. $\frac{(-1)^2 - (-2)^2 - (-3)^3 + 1}{(-5)^2 + (-2)^5 + 2} = ?$
A) -5 B) -2 C) $-\frac{1}{2}$ D) $-\frac{1}{5}$ E) $-\frac{1}{3}$

2. $\frac{(-99)^0 - (-5)^2 - (-2)^5}{(-1)^8 - (-1)^9 - (1)^0} = ?$
A) -8 B) $-\frac{1}{2}$ C) $\frac{1}{8}$ D) 2 E) 8

3. $(5^{-1} - 2^{-2})^{-2} = ?$
A) 100 B) 200 C) 300 D) 400 E) 500

4. $\left[2^0 + \left(\frac{3}{2}\right)^{-1}\right]^{-2} = ?$
A) $\frac{16}{25}$ B) $\frac{9}{25}$ C) $\frac{3}{25}$ D) $\frac{9}{5}$ E) $\frac{3}{5}$

5. $\left[\left(-\frac{1}{2}\right)^3 \cdot \left(-\frac{1}{2}\right)^{-4} \cdot (-2)^2\right]^2 = ?$
A) $\frac{1}{64}$ B) $\frac{1}{32}$ C) 16 D) 32 E) 64

6. $\left(-\frac{2}{3}\right) - 3 \cdot (-2)^{-4} \cdot \left(-\frac{2}{3}\right)^2 \cdot \left(-\frac{1}{2}\right)^{-5} = ?$
A) -2 B) $-\frac{1}{2}$ C) $-\frac{1}{4}$ D) 2 E) 4

7. $(-2^4)^{-3} + (-2^{-2})^6 + (2^{-1})^{12} = ?$
A) 2^{-16} B) 2^{-14} C) 2^{-12} D) 2^{-10} E) 2^{-8}

8. $\frac{4^8 + 8^8}{2^8 + 4^8} = ?$
A) 2^4 B) 2^5 C) 2^6 D) 2^7 E) 2^8

9. $2^{x+1} + 2^{x+2} + 2^{x+3} = 112 \Rightarrow x = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

10. $2^{x+4} - 2^{x+2} = 96 \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

11. $2^x + 5^x + 7^x = 81$

$\Rightarrow 6^x + 15^x + 21^x = ?$

- A) 3^{x+1} B) 3^{x+2} C) 3^{x+3} D) 3^{x+4} E) 3^{x+5}

12. $\left. \begin{array}{l} 2^x + 3^x + 4^x = a \\ 4^x + 6^x + 8^x = 16a \end{array} \right\} \Rightarrow x = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

13. $\frac{2^{x+1} \cdot 4^x}{8^{x+1} \cdot 2^x} = 64 \Rightarrow x = ?$

- A) -8 B) -4 C) -2 D) 4 E) 8

14. $\frac{2 \cdot 6^{22} - 10 \cdot 6^{21}}{36^{10}} = ?$

- A) 8 B) 12 C) 16 D) 24 E) 32

15. $2^{2a} - 1 = 3 \Rightarrow \frac{12^a + 48^a}{3^a} = ?$

- A) 16 B) 18 C) 20 D) 22 E) 24

16. $a, b \in \mathbb{N}$,

$4^b + 16^4 + 64^3 + 2^{18} + 256^2 = a \cdot 2^b$

$\min(a)$ için / for $\Rightarrow a + b = ?$

- A) 21 B) 24 C) 27 D) 32 E) 36



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	E	D	B	E	D	C	E
9	10	11	12	13	14	15	16
A	B	D	B	A	B	C	C

1. $16^0 + (-2)^3 - 1^2 + \left(\frac{1}{3}\right)^{-2} = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

2. $(-3)^2 - (-2)^3 + (-5)^2 - (-4)^2 = ?$

- A) -24 B) -12 C) -10 D) -6 E) -2

3. $\left(\frac{a^{-4} \cdot b^2}{a^{-1} \cdot b^{-4}}\right)^{\frac{1}{3}} = ?$

- A) $\frac{1}{ab}$ B) $\frac{b^2}{a}$ C) $\frac{b}{a}$ D) $\frac{a^2}{b}$ E) ab^2

4. $x^y = -2 \Rightarrow \frac{x^{2y} - x^{3y}}{x^y} = ?$

- A) -6 B) -2 C) -1 D) 1 E) 2

5. $4x^5 + 6x^5 - 8x^5 = 64 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

6. $\left. \begin{array}{l} x^m = x^7 \cdot y^{13} \\ y^m = x^{14} \cdot y^8 \end{array} \right\} \Rightarrow m = ?$

- A) 16 B) 18 C) 19 D) 21 E) 24

7. $\frac{3^x + 6^x + 9^x}{5^x + 10^x + 15^x} = \frac{9}{25} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $\frac{2 \cdot 5^{x+1} + 5^{x-1} - 5^{x+2}}{5^{x-1}} = ?$

- A) -80 B) -74 C) -70 D) -56 E) -40

9. $(x + y - 4)^6 + (x - y + 10)^6 = 0 \Rightarrow x \cdot y = ?$

- A) -24 B) -21 C) -10
D) -8 E) -4

10. $\frac{5^{20} - 5^{10}}{5^5 - 1} \cdot \frac{5^{-9}}{5^5 + 1} = ?$

- A) $-\frac{1}{5}$ B) 5 C) 5^2 D) 5^3 E) 5^4

11. $\frac{0,7 \cdot 10^{-4} + 0,08 \cdot 10^{-3}}{1,5 \cdot 10^{-4}} = ?$

- A) 0,01 B) 0,1 C) 1
D) 10 E) 15

12. $3^{x-1} = 2 \Rightarrow 3^{x+1} + 3^{x-1} - 3^{2x} = ?$

- A) -32 B) -16 C) -8
D) 8 E) 16

13. $\frac{1}{3} \cdot 3^{a+1} + 9 \cdot 3^{a-1} - 27 \cdot 3^a - 3^a = x \cdot 3^{a+1} \Rightarrow x = ?$

- A) -16 B) -8 C) -4
D) 2 E) 8

14. $8^{a-4} = 32^a \Rightarrow 3^{a+3} = ?$

- A) 243 B) 81 C) $\frac{1}{27}$ D) $\frac{1}{9}$ E) $\frac{1}{3}$

15. $\frac{1}{2+2^{a+1}} + \frac{1}{2+2^{1-a}} = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 4

16. $\left. \begin{array}{l} a + b^{-1} = 4^{-1} \\ b + a^{-1} = 4 \end{array} \right\} \Rightarrow a^{-1} \cdot b = ?$

- A) $\frac{1}{16}$ B) $\frac{1}{4}$ C) 1 D) 4 E) 16


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	A	B	A	B	D	B	B
9	10	11	12	13	14	15	16
B	B	C	B	B	C	B	E

1. $(-3)^2 + 1^{100} - 4^2 = ?$

- A) 6 B) 3 C) 1 D) -3 E) -6

2. $(-3)^3 + (-4)^2 + 3^2 - (-2)^3 = ?$

- A) 2 B) 4 C) 6 D) 9 E) 12

3. $1^{2018} + (-2)^3 + (2018)^0 = ?$

- A) -4 B) -5 C) -6 D) -8 E) -10

4. $(x-4)^2 + (y+3)^2 = 0 \Rightarrow x \cdot y = ?$

- A) -12 B) -6 C) 0 D) 6 E) 12

5. $\frac{4^4 + 4^4 + 4^4 + 4^4}{16} = ?$

- A) 1 B) 4 C) 16 D) 64 E) 128

6. $2^x + 2^x + 2^x + 2^x = 128 \Rightarrow x = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

7. $\frac{3^{2x} \cdot 9}{3^{x-1}} = 81 \Rightarrow x = ?$

- A) 5 B) 4 C) 3 D) 2 E) 1

8. $4 \cdot 2^x + 2 \cdot 2^x + 3 \cdot 2^x = 72 \Rightarrow x = ?$

- A) 1 B) 3 C) 5 D) 7 E) 9

9. $3^{x+1} + 3^{x+3} + 3^{x+4} = 111 \Rightarrow x = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

13. $\left. \begin{array}{l} 2^a = m \\ 5^a = n \end{array} \right\} \Rightarrow 20^a = ?$
 A) $2mn$ B) m^2n C) mn^2 D) m^2n^3 E) mn

10. $\frac{5^{x+2} + 5^{x+3} + 5^{x+4}}{5^x + 5^{x+1} + 5^{x+2}} = ?$
 A) 0 B) 5 C) 15 D) 25 E) 50

14. $\frac{15^x + 15^x + 15^x}{5^x + 5^x} = 27 \Rightarrow 3^x = ?$
 A) 3 B) 9 C) 18 D) 27 E) 36

11. $\frac{9^4 + 9^4 + 9^4 + 9^4 + 9^4 + 9^4}{3^3 + 3^3} = ?$
 A) 3^3 B) 3^4 C) 3^6 D) 3^8 E) 3^{10}

15. $5^{x+1} = m \Rightarrow 5^{x-1} = ?$
 A) m B) $\frac{m}{5}$ C) $\frac{m}{20}$ D) $\frac{m}{25}$ E) $\frac{m}{125}$

16. $15^{x+1} = 5^{x+2} \Rightarrow 3^x = ?$
 A) $\frac{2}{5}$ B) $\frac{3}{5}$ C) $\frac{5}{2}$ D) $\frac{5}{3}$ E) $\frac{5}{4}$

12. $\left. \begin{array}{l} 2^x = a \\ 3^x = b \end{array} \right\} \Rightarrow 6^x = ?$
 A) ab B) $2ab$ C) $3ab$ D) $\frac{ab}{2}$ E) $\frac{ab}{3}$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	C	C	A	D	C	E	B
9	10	11	12	13	14	15	16
C	D	C	A	B	C	D	D

$$1. \frac{\left(-\frac{1}{2}\right)^3 \cdot (-2^4)}{(-2)^4 \cdot (4)^{-1}} = ?$$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1 D) -2 E) -4

$$2. \frac{(-1)^{1881} - 1^{1938} - (-1)^{1955}}{1^{1923} - (3)^{-1}} = ?$$

- A) -1 B) $-\frac{1}{2}$ C) $-\frac{3}{2}$ D) $\frac{1}{2}$ E) $\frac{3}{2}$

$$3. (3^{-1} - 7^0)^{-2} \cdot \left(\frac{3}{4}\right)^{-3} = ?$$

- A) $\frac{2}{3}$ B) $\frac{4}{9}$ C) $\frac{8}{3}$ D) $\frac{16}{3}$ E) $\frac{8}{9}$

$$4. \frac{(-a^4) \cdot (a)^{-3} \cdot (-a)^6}{(-a^{-1})^5 \cdot (-a)^{-3}} = ?$$

- A) $-a^3$ B) $-a$ C) a^{-3} D) a^{-5} E) a^{-9}

$$5. \frac{(-3)^{-2} \cdot (-3^6) \cdot (-3)^{-3}}{3^{-1}} = ?$$

- A) $\frac{1}{9}$ B) $\frac{1}{3}$ C) 3 D) 9 E) 24

$$6. \frac{(125)^3 \cdot 12^2}{10^5 \cdot 15^3} = ?$$

- A) $\frac{5}{6}$ B) $\frac{5}{12}$ C) $\frac{10}{3}$ D) $\frac{15}{2}$ E) $\frac{25}{6}$

$$7. \frac{8^{2x+1}}{4^{3x-1}} = ?$$

- A) 2 B) 4 C) 8 D) 16 E) 32

$$8. 2^{x-1} \cdot 3^{x+1} = A \Rightarrow 6^{x-2} = ?$$

- A) $\frac{A}{54}$ B) $\frac{A}{36}$ C) $\frac{A}{12}$ D) 12A E) 36A

9. $2^{x-2} = a \Rightarrow 8^{x-2} = ?$

- A) a B)
- a^3
- C)
- $2a$
- D)
- $2a^3$
- E)
- $8a^3$

10. $5^{x-1} = 2 \Rightarrow 25^{x+1} = ?$

- A) 25 B) 125 C) 225 D) 625 E) 2500

11. $\frac{3^{x+1} + 3^x}{6 \cdot 3^{x-2}} + \frac{5^x - 5^{x-1}}{5^{x-2}} = ?$

- A) 24 B) 26 C) 27 D) 32 E) 36

12. $1 + 3 + 3^2 + \dots + 3^{16} = x \Rightarrow 3^3 + 3^4 + \dots + 3^{19}$

- A)
- $9x$
- B)
- $27x$
- C)
- $81x$
- D)
- $243x$
- E)
- $276x$

13. $\frac{12^{x-1}}{2^{4-2x}} = \frac{3^{x+2}}{27} \Rightarrow x = ?$

- A)
- $\frac{1}{2}$
- B) 1 C)
- $\frac{3}{2}$
- D) 2 E)
- $\frac{5}{2}$

14. $\frac{5^{x-2}}{2^y \cdot 3^y} = \frac{30}{6^{y+1}} \Rightarrow x = ?$

- A) 1 B)
- $\frac{3}{2}$
- C) 2 D)
- $\frac{5}{2}$
- E) 3

15. $\frac{0,3 \cdot 10^{-5} + 0,05 \cdot 10^{-4}}{16 \cdot 10^{-6}} = ?$

- A)
- 2^{-2}
- B)
- 2^{-1}
- C) 2 D)
- 2^2
- E)
- 2^3

16. $x \in \mathbb{R},$

$(x^2 + 2)^{x^2 - 2x} = 1 \Rightarrow \sum x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2



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1	2	3	4	5	6	7	8
B	C	D	A	D	A	E	A
9	10	11	12	13	14	15	16
B	E	B	B	C	E	B	E

1. $\left(\frac{1}{8}\right)^{-\frac{1}{3}} = ?$

- A) -0,1 B) 0,5 C) 1 D) 2 E) 10

2. $(-x^{-1})^{-2} \cdot (-x^{-2})^{-1} \cdot (-x^3)^{-1} = ?$

- A) -1 B) 1 C) x^{-1} D) x E) x^2

3. $3^{(2^3)} = k \cdot (3^2)^3 \Rightarrow k = ?$

- A) $\frac{1}{9}$ B) 1 C) 2 D) 3 E) 9

4. $A = \frac{2^x + 2^x + 2^x}{6^x + 6^x + 6^x} \Rightarrow A = ?$

- A) 2^{-x} B) 3^{-x} C) 1 D) 2^x E) 3^x

5. $3^{-1} \cdot 3^2 \cdot 3^{-3} \cdot 3^4 \cdot \dots \cdot 3^{-19} \cdot 3^{20} = ?$

- A) 3^5 B) 3^8 C) 3^{10} D) 3^{12} E) 3^{15}

6. $7^{-x} = 2 \Rightarrow 7^{x+1} = ?$

- A) 1,5 B) 2,5 C) 3,5 D) 4,5 E) 5,5

7. $\frac{3^{a+3} - 3^{a+2}}{3^{a+4} - 3^{a+2}} = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 2 E) 4

8. $\frac{3^n + 3^n + 3^n}{5^n + 5^n + 5^n + 5^n + 5^n} = \left(\frac{5}{3}\right)^{\frac{1}{3}} \Rightarrow n = ?$

- A) $-\frac{4}{3}$ B) $-\frac{3}{4}$ C) $-\frac{2}{5}$ D) $\frac{4}{5}$ E) $\frac{3}{4}$

9. $3^{x-3} = m \Rightarrow 3^{2-x} = ?$

- A) $\frac{3}{m}$ B) $3m$ C) $\frac{1}{9m}$ D) $\frac{1}{3m}$ E) $9m$

10. $6^{1-\frac{1}{a}} = 3 \Rightarrow 2^a = ?$

- A) 6 B) 3 C) 2 D) $\frac{3}{2}$ E) 1

11. $(2x-1)^{16} = (x+2)^{16} \Rightarrow \prod x = ?$

- A) -3 B) -2 C) -1 D) 1 E) 3

12. $(a-1)^{a-1} = 1 \Rightarrow \sum a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $\left(\frac{x^x}{y^y}\right)^{a-b} \cdot \left(\frac{y^y}{x^{x+y}}\right)^{a-b} = ?$

- A) 1 B) x^y C) x^{a-b} D) x^{a-by} E) x^{y^b-ya}

14. $m, n \in \mathbb{N}^+$,

$x^{2m} = y^5,$

$x^{3n} = y,$

$m \cdot n = 30 \Rightarrow m + n = ?$

- A) 19 B) 17 C) 7 D) 3 E) 1

15. $x > 0,$

$\left. \begin{array}{l} x^{a+b} = 9 \\ x^{a-b} = 4 \end{array} \right\} \Rightarrow x^a + x^b = ?$

- A) $\frac{13}{2}$ B) $\frac{15}{2}$ C) $\frac{17}{2}$ D) $\frac{19}{2}$ E) $\frac{21}{2}$

16. $\left. \begin{array}{l} x^a \cdot y^a = 3 \\ \frac{x^a}{y^a} = 3 \end{array} \right\} \Rightarrow x^a - y^a = ?$

- A) -3 B) 0 C) 1 D) 2 E) 3



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1	2	3	4	5	6	7	8
D	D	E	B	C	C	A	A
9	10	11	12	13	14	15	16
D	A	C	B	E	B	B	D

$$1. \frac{(-a)^8 \cdot (-a)^4 \cdot (-a^2)^3}{-a^4 \cdot a^5} = ?$$

- A) $-\frac{1}{a}$ B) $-a$ C) 1 D) a E) a^2

$$2. \frac{(-a)^3 \cdot (-a^6) \cdot (-a^4)}{(-a^2)^3 \cdot (a^3)^{-1}} = ?$$

- A) $-a^6$ B) $-a^4$ C) $-a^2$ D) a^2 E) a^4

$$3. \frac{(-1905)^0 + 1917^0}{(-1923) + (1929)} = ?$$

- A) $\frac{1}{6}$ B) $\frac{1}{4}$ C) $\frac{1}{3}$ D) $\frac{1}{2}$ E) 1

$$4. \frac{125^{\frac{1}{3}} + 49^{\frac{1}{2}}}{\left(\frac{1}{2}\right)^{-3} + 2^4} = ?$$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 4

$$5. \frac{\left(-\frac{1}{3}\right)^4 (27)^{-2} (81)^4}{(-3^2)^3 \cdot (-3^{-7})} = ?$$

- A) -3^2 B) -3 C) 3^4 D) 3^5 E) 3^7

$$6. 5^x = 3^y \Rightarrow 5^{\frac{x}{y}} + 3^{\frac{y}{x}} = ?$$

- A) 2 B) 3 C) 5 D) 8 E) 10

$$7. \left. \begin{array}{l} 3^x = 5 \\ 5^y = 10 \\ 10^z = 16 \end{array} \right\} \Rightarrow 3^{xyz} = ?$$

- A) 5 B) 7 C) 9 D) 12 E) 16

$$8. x > 0, \frac{x^{2a} - 4}{x^a + 2} : \frac{x^a - 2}{x^4} = (0,2)^{-4} \Rightarrow x = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

9. $(7x - 12)^7 = (5x - 2)^7 \Rightarrow \sum x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

10. $(2x - 9)^6 = (x - 3)^6 \Rightarrow \sum x = ?$

- A) 7 B) 8 C) 9 D) 10 E) 11

11. $a^{x-1} = b^x \Rightarrow \left(\frac{b}{a}\right)^{3-2x} = ?$

- A) $\frac{b}{a}$ B) $a^{-1}b^3$ C) $a^{-2}b^2$
D) $\frac{b^3}{a^2}$ E) a^2b^{-2}

12. $(2x - 5)^{x^2-4} = 1 \Rightarrow \sum x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

13. $\left. \begin{array}{l} x^a = 8 \\ 16^a = x^2 \end{array} \right\} \Rightarrow 4a^2 + 2 = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

14. $\left. \begin{array}{l} 25^x = 4^y \\ 5^{x-1} = 2^{y+1} \end{array} \right\} \Rightarrow x = ?$

- A) $-y$ B) $-\frac{1}{y}$ C) y D) $y + 1$ E) $2y$

15. $\left. \begin{array}{l} 3^x = 4 \\ 3^y = 100 \end{array} \right\} \Rightarrow 0,2 = ?$

- A) 3^{y-x} B) -2^{x-y} C) $3^{\frac{x-y}{2}}$
D) 3^{x+y} E) $3^{\frac{x-y}{4}}$

16. $\left. \begin{array}{l} a^{x-y} = 81 \\ a^{x+y} = 27 \end{array} \right\} \Rightarrow \frac{x}{y} = ?$

- A) -7 B) -5 C) 5 D) 7 E) 9


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1	2	3	4	5	6	7	8
D	D	C	B	E	D	E	E
9	10	11	12	13	14	15	16
E	D	B	B	D	A	C	A

1. $a, b \in \mathbb{N}^+$,
 $16^{2a} = 64^{3b} \Rightarrow \min(a+b) = ?$
 A) 12 B) 13 C) 15 D) 17 E) 21
2. $2 \cdot 3^{x+1} - 6 \cdot 3^x + 5 \cdot 3^{x-2} = 405$
 $\Rightarrow x = ?$
 A) 4 B) 5 C) 6 D) 7 E) 8
3. $\left(\frac{4}{25}\right)^a \cdot \left(\frac{5}{2}\right)^{a+1} = 6,25 \Rightarrow a = ?$
 A) -2 B) -1 C) 1 D) 2 E) 3
4. $\frac{3^a - 2}{3^a} = \frac{1}{3} \Rightarrow 4^{a+2} = ?$
 A) 16 B) 32 C) 48 D) 64 E) 72
5. $\frac{3}{3^{1-x}} = y \Rightarrow 9^{x+1} = ?$
 A) $3y$ B) $3y^2$ C) $9y$ D) $9y^2$ E) $12y^2$
6. $3^{a-2} = x \Rightarrow 3^{3-a} = ?$
 A) $\frac{1}{x}$ B) $\frac{2}{x}$ C) $\frac{3}{x}$ D) $\frac{x}{2}$ E) $\frac{x}{3}$
7. $5^x = b \Rightarrow b^3 \cdot 5^{2-3x} = ?$
 A) 5 B) 25 C) 50 D) 75 E) 125
8. $\frac{3^x + 3^x + 3^x}{3^x \cdot 3^x} = \frac{1}{81} \Rightarrow x = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

9. $36^{x-1} = 4 \Rightarrow 6^x = ?$

- A) 12 B) 14 C) 16 D) 18 E) 20

13. $7^{a+1} = 28^{a-1} \Rightarrow 2^a = ?$

- A) 7 B) 9 C) 12 D) 14 E) 21

10. $8^{x+2} = 27 \Rightarrow 2^{2x+6} = ?$

- A) 12 B) 18 C) 24 D) 36 E) 48

14. $10^a = 2^{a+1} \Rightarrow 5^{2a+1} = ?$

- A) 20 B) 32 C) 40 D) 52 E) 60

15. $9^x = 4 \Rightarrow 3^x + 27^{x+1} = ?$

- A) 72 B) 108 C) 144 D) 196 E) 218

11. $(b^x)^y = b^x \cdot b^y \Rightarrow y = ?$

- A)
- $\frac{1}{x-1}$
- B)
- $\frac{x-1}{x}$
- C)
- $\frac{x}{x-1}$
- D)
- $\frac{1}{x}$
- E)
- $\frac{x}{x+1}$

16. $\frac{1}{3^{x+3}} = 6 \Rightarrow ? < x < ?$

- A)
- $-5 < x < -4$
- B)
- $-4 < x < -3$
- C)
- $-3 < x < -2$
-
- D)
- $-2 < x < -1$
- E)
- $-1 < x < 0$

12. $27^{1-2a} \cdot 9^a = 243^{-1} \Rightarrow a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5



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1	2	3	4	5	6	7	8
B	C	B	D	D	C	B	D
9	10	11	12	13	14	15	16
A	D	C	B	D	A	E	A

1. $\frac{(-a)^6 \cdot (-a^4) \cdot (-a^2)^3}{(-a)^{10}} = ?$

- A) $-a^6$ B) $-a^{-4}$ C) a^4 D) a^6 E) a^{10}

2. $5^{2x-1} = 125^{x+4} \Rightarrow x = ?$

- A) -13 B) -9 C) -5 D) 5 E) 9

3. $3^x = A \Rightarrow 81^{x+1} = ?$

- A) A^4 B) $3A^4$ C) $9A^4$ D) $27A^4$ E) $81A^4$

4. $5^x + 2 \cdot 5^x + 5^{x+2} = 700 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

5. $2^{x+3} \cdot 2^{x-2} \cdot 2^{2x-4} = 32 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

6. $2^x = a, 3^x = b, 5^x = c \Rightarrow 18 \cdot (90)^{x-1} = ?$

- A) $\frac{abc}{5}$ B) $\frac{ab^2c}{4}$ C) $\frac{ab^2c}{5}$
 D) $\frac{a^2bc}{4}$ E) $\frac{a^2bc}{5}$

7. $2^x = a, 3^x = b, 5^x = c \Rightarrow (14,4)^x = ?$

- A) $\frac{a^3b^2}{c}$ B) $\frac{a^2b^3}{c}$ C) $\frac{ab^2}{c}$
 D) $\frac{a^4b^2}{c}$ E) $\frac{a^3b}{c}$

8. $\frac{4^{3x-2y+1}}{8^{2x-y}} = 16 \Rightarrow y = ?$

- A) -4 B) -2 C) 2 D) 4 E) 6

9. $x, y, m \in \mathbb{Z}^+$,
 $\frac{9^{10} + 9^{10} + 9^{10} + 9^{10}}{3^7 + 3^7} = x \cdot y^m \Rightarrow \min(x + y + m) = ?$
 A) 13 B) 14 C) 16 D) 17 E) 18

10. $\left(\frac{11}{2}\right)^{x-11} = (0, \overline{18})^{3x-5} \Rightarrow x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

11. $(5x - 4)^5 = (2x + 23)^5 \Rightarrow x = ?$
 A) 3 B) 5 C) 6 D) 9 E) 12

12. $(2x + 5)^4 = (3x - 25)^4 \Rightarrow \sum x = ?$
 A) 26 B) 30 C) 34 D) 38 E) 40

13. $(x - 5)^{x+3} = 1 \Rightarrow \sum x = ?$
 A) 3 B) 6 C) 7 D) 10 E) 13

14. $(x - 3)^{x+5} = 1 \Rightarrow \sum x = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

15. $(x - 2)^{x^2-4} = 1 \Rightarrow \sum x = ?$
 A) -2 B) -1 C) 1 D) 2 E) 4

16. $\left. \begin{array}{l} 3^{m-1} = x^3 \\ 3^{m+2} = x^2 \end{array} \right\} \Rightarrow m = ?$
 A) -8 B) -6 C) -4 D) 6 E) 8



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1	2	3	4	5	6	7	8
D	A	E	B	B	C	A	B
9	10	11	12	13	14	15	16
E	D	D	C	A	B	C	A

1. $-(-2)^3 - (2)^4 + (-2)^2 = ?$

- A) 12 B) 20 C) -12 D) -4 E) 8

2. $-\left(\frac{2}{3}\right)^2 : \left(-\frac{2}{3}\right)^4 = ?$

- A)
- $-\frac{3}{2}$
- B)
- $\frac{2}{3}$
- C)
- $\frac{3}{2}$
- D)
- $-\frac{27}{8}$
- E)
- $-\frac{9}{4}$

3. $32^x = \left(\frac{1}{16}\right)^2 \Rightarrow x = ?$

- A) -2 B)
- $-\frac{8}{5}$
- C)
- $\frac{1}{2}$
- D)
- $\frac{3}{2}$
- E) 2

4. $\left. \begin{array}{l} x^a = 64 \\ x^b = 4 \end{array} \right\} \Rightarrow \frac{a}{b} = ?$

- A) 1 B)
- $\frac{1}{2}$
- C)
- $\frac{1}{3}$
- D) 2 E) 3

5. $\frac{3^x + 3^x + 3^x + 3^x}{6^x + 6^x + 6^x} = \frac{64}{3} \Rightarrow x = ?$

- A) 3 B) 2 C) 0 D) -2 E) -4

6. $3^x + 2 \cdot 3^{x-1} - 9 \cdot 3^{x-2} = 162 \Rightarrow x = ?$

- A) 6 B) 5 C) 4 D) 2 E) 1

7. $3^{2x} = 4 \Rightarrow 3^{4x+3} = ?$

- A) 396 B) 408 C) 416 D) 432 E) 440

8. $(0,2)^{x-3} = 25^x \Rightarrow x = ?$

- A)
- $\frac{1}{3}$
- B)
- $\frac{1}{2}$
- C) 1 D)
- $\frac{3}{2}$
- E) 2

9. $\frac{-4^2 : (0,04)^2}{2^{x-3}} = -(800)^2 \Rightarrow x = ?$
 A) -3 B) 1 C) 0 D) 7 E) 9

10. $\frac{2 \cdot 4^{3x+1}}{8^x} = \left(\frac{1}{16}\right)^3 \Rightarrow x = ?$
 A) -9 B) -5 C) 0 D) 3 E) 12

11. $\frac{2 \cdot 10^x}{480 \cdot 10^3} = \frac{1}{2,4 \cdot 10^{-3}} \Rightarrow x = ?$
 A) 8 B) 7 C) 6 D) 5 E) 4

12. $\left. \begin{array}{l} 2^{a-1} = x \\ 5^{a+2} = y \end{array} \right\} \Rightarrow 10^a = ?$
 A) $\frac{xy}{5}$ B) $\frac{3xy}{4}$ C) $\frac{xy}{2}$ D) $\frac{2xy}{9}$ E) $\frac{2xy}{25}$

13. $\frac{1}{2^{1-a}-1} + \frac{1}{2^{a-1}-1} = ?$
 A) 1 B) 2^a C) 2^{a-1} D) -1 E) $2^a - 1$

14. $3^{a-b} - 3^{b-a} = 4 \Rightarrow \frac{9^a - 9^b}{3^{a+b+1}} = ?$
 A) -1 B) 0 C) $\frac{4}{3}$ D) $\frac{5}{8}$ E) 1

15. $\left. \begin{array}{l} 16^{x+4} = 81y^4 \\ 6^x = 12 \\ 3^{-x} = k \cdot y \end{array} \right\} \Rightarrow k = ?$
 A) $\frac{1}{3}$ B) $\frac{1}{4}$ C) $\frac{1}{9}$ D) $\frac{1}{16}$ E) $\frac{1}{64}$

16. $\left. \begin{array}{l} x = (2^3)^4 \\ y = (2^4)^3 \\ z = (2^3)^4 \end{array} \right\} \Rightarrow ? < ? < ?$
 A) $x = y = z$ B) $x < y < z$ C) $y < x < z$
 D) $z < x < y$ E) $x < z < y$



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1	2	3	4	5	6	7	8
D	E	B	E	E	B	D	C
9	10	11	12	13	14	15	16
A	B	A	E	D	C	E	B

1. $2^{3x+1} = m \Rightarrow 2^{6x-2} = ?$

- A)
- $\frac{m}{4}$
- B)
- $\frac{m}{16}$
- C)
- $\frac{m^2}{4}$
- D)
- $\frac{m^2}{16}$
- E)
- $\frac{m}{32}$

2. $\frac{2^{11} + 2^{12} + 2^{13} + 2^{14}}{2^9 + 2^8 + 2^7 + 2^6} = ?$

- A)
- 2^{14}
- B)
- 2^{16}
- C)
- 2^{18}
- D)
- 2^{20}
- E)
- 2^{22}

3. $\frac{2^{m-n}}{4^{n-m}} = ?$

- A)
- 2^{m-n}
- B)
- 4^{m-n}
- C)
- 8^{m-n}
- D)
- 4^{n-m}
- E)
- 8^{n-m}

4. $\frac{1}{2^{x-2}} \cdot \frac{2}{4^{1-x}} = ?$

- A)
- 2^x
- B)
- 2^{x+1}
- C)
- 2^{x+2}
- D)
- 2^{x+3}
- E)
- 2^{x+4}

5. $3^{x-1} \cdot 15^{1-x} = 25^{x+2} \Rightarrow x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

6. $\left. \begin{array}{l} a = 3^{3x-1} \\ b = 9^{x+1} \\ a^2 = b^2 \end{array} \right\} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

7. $(2^m - 4^m) \cdot (1 - 2^{2m})^{-1} \cdot (4^m + 2 \cdot 2^m + 1) = ?$

- A)
- 2^m
- B)
- 4^m
- C)
- 8^m
- D)
- 4^{m+4}
- E)
- $2^m + 4^m$

8. $\left. \begin{array}{l} a^2 = 2^{3x+8} \\ 4a = 8^{x+1} \end{array} \right\} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

9. $\frac{15^{1-2x} \cdot 9^x}{25^{2-x}} = \frac{3^{1-x}}{125} \Rightarrow x = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

10. $\sqrt{\frac{5}{4^{x-1}} + 2^{4-2x}} = ?$

- A) 2^{-x} B) $3 \cdot 2^{-x}$ C) $5 \cdot 8^{-x}$ D) $6 \cdot 2^{-x}$ E) 2^{-2x}

11. $2^{\frac{1}{16}} = x \Rightarrow (2^{\frac{1}{16}} + 1) \cdot (2^{\frac{1}{8}} + 1) \cdot (2^{\frac{1}{4}} + 1) \cdot (2^{\frac{1}{2}} + 1) = ?$

- A) $\frac{1}{x-4}$ B) $\frac{1}{x}$ C) $\frac{1}{x-2}$ D) $\frac{1}{x-1}$ E) $\frac{1}{x+1}$

12. $\left. \begin{array}{l} 5^x = 25 \\ x^y = \frac{1}{4} \end{array} \right\} \Rightarrow x - y^{x-y} = ?$

- A) -14 B) -12 C) -8 D) -6 E) -4

13. $(0,5)^{-x} + \frac{3}{2^{1-x}} = 20 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

14. $20^x = 45$
 $\Rightarrow 5^{x-1} \cdot 2^{2x+1} = ?$

- A) 12 B) 14 C) 16 D) 18 E) 20

15. $\frac{3^{x+1} + 6}{9^x - 4} = \frac{3}{7} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

16. $2^{x+2} = 12$

$15^{y+1} = (125)^2 \cdot (64)^x \Rightarrow y = ?$

- A) 1 B) 3 C) 5 D) 6 E) 7



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1	2	3	4	5	6	7	8
D	D	C	B	B	C	E	B
9	10	11	12	13	14	15	16
A	D	D	A	C	D	B	C

1. $2^x - 3 \cdot 2^x = A \cdot 3^{x-1}$,
 $\left(\frac{2}{3}\right)^x = 4 \Rightarrow A = ?$

- A) -24 B) -20 C) -16 D) -12 E) -10

2. $\frac{2^a + 4^a + 8^a}{1 + 2^a + 4^a} = \frac{1}{4} \Rightarrow a^2 = ?$

- A) 1 B) 4 C) 9 D) 16 E) 25

3. $2^{1-x} = 3 \Rightarrow \frac{2 \cdot 3^{x+1}}{6^x} = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

4. $\left. \begin{array}{l} 3^x = 25 \\ 3 = 5^y \end{array} \right\} \Rightarrow 3^{xy+x} = ?$

- A) 125 B) 150 C) 175 D) 225 E) 250

5. $\frac{3^{x+2} - 2 \cdot 3^{x+1}}{3^x + 3^{x+1}} = \frac{x+2}{x-1} \Rightarrow x = ?$

- A) -11 B) -9 C) -7 D) -5 E) -3

6. $(0,005)^5 \cdot (0,04)^4 = A \cdot 10^x \Rightarrow \min(A) + x = ?$

- A) -12 B) -10 C) -8 D) -6 E) -4

7. $\left. \begin{array}{l} 2^x = 18 \\ 4^y = 65 \\ 5^z = 120 \end{array} \right\} \Rightarrow ? > ? > ?$

- A) $x > y > z$ B) $x > z > y$ C) $y > x > z$
D) $y > z > x$ E) $z > y > x$

8. $\left. \begin{array}{l} x^{y-1} = 5 \\ x^y - 12 = x \end{array} \right\} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

9. $\frac{x \in \mathbb{Z}, 2^{x+3} - 2^{x+2}}{2^{x-3} - 2^{x-4}} = x^y, \min(x)$ için / for $\Rightarrow x+y = ?$
 A) 5 B) 6 C) 7 D) 8 E) 9

10. $\left(\frac{0,0032}{0,0002}\right)^{a+2} = \frac{1}{256} \Rightarrow a = ?$
 A) -5 B) -4 C) -3 D) -2 E) -1

11. $\left. \begin{array}{l} 2^x = a \\ 3^x = b \end{array} \right\} \Rightarrow 108^x = ?$
 A) ab^2 B) ab^3 C) a^2b D) a^2b^2 E) a^2b^3

12. $5^6 \cdot (250)^5 \cdot 625^8 = a \cdot 5^b$ min(a) için / for $\Rightarrow a+b = ?$
 A) 72 B) 75 C) 84 D) 85 E) 96

13. $(-24)^3 \cdot (-16)^5 \cdot (-64)^8 = a \cdot 2^b$, min(a) için / for
 $\Rightarrow b-a = ?$
 A) 20 B) 30 C) 40 D) 50 E) 60

14. $\left(\frac{5}{3}\right)^{a-b} \cdot \left(\frac{3}{5}\right)^{-a} = \frac{81}{625} \Rightarrow 2a-b = ?$
 A) -5 B) -4 C) -3 D) -2 E) -1

15. $\left. \begin{array}{l} 3^x \cdot 4^y = 72 \\ 4^x \cdot 3^y = 24 \end{array} \right\} \Rightarrow x+y = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

16. $\left. \begin{array}{l} a^{a+b} = b^9 \\ b^{a+b} = b^3 a^{12} \end{array} \right\} \Rightarrow a+b = ?$
 A) 6 B) 8 C) 10 D) 12 E) 14



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	B	E	D	A	B	A	C
9	10	11	12	13	14	15	16
D	B	E	D	D	B	C	D

1. $2^x + 2^{-x} = 3 \Rightarrow 4^x + 4^{-x} = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

2. $x, y, z \in \mathbb{Z}$,
 $2^{2x-4} = 7^{y+1} = 3^{2z-2}$
 $\Rightarrow x + y + z = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

3. $\left. \begin{array}{l} 2^x = 5 \\ 2^y = 15 \end{array} \right\} \Rightarrow 2^{2x-y} = ?$

- A)
- $\frac{2}{5}$
- B)
- $\frac{3}{5}$
- C)
- $\frac{4}{5}$
- D)
- $\frac{5}{2}$
- E)
- $\frac{5}{3}$

4. $\left. \begin{array}{l} 2^a = 9 \\ 27^b = 8 \end{array} \right\} \Rightarrow a \cdot b = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

5. $\left. \begin{array}{l} 3^x = 2 \\ 81^{x-1} = y^4 \end{array} \right\} \Rightarrow y = ?$

- A)
- $\frac{1}{3}$
- B)
- $\frac{2}{3}$
- C)
- $\frac{3}{2}$
- D)
- $\frac{4}{3}$
- E)
- $\frac{3}{4}$

6. $\frac{7^{2x}-1}{7^{x+1}+7} = \frac{48}{7} \Rightarrow x = ?$

- A)
- $\frac{1}{2}$
- B) 1 C)
- $\frac{3}{2}$
- D) 2 E)
- $\frac{5}{2}$

7. $\frac{3^x+1}{3^{x+y}+3^x+3^y+1} = \frac{1}{244} \Rightarrow y = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $\frac{1}{3^{a-2}} + \frac{1}{3^{a-1}} = 4 \Rightarrow a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

9. $\frac{3^a + 9^a + 15^a}{1 + 3^a + 5^a} = 81 \Rightarrow a = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

10. $2^{x-1} = 3, 4^{3y+1} = 12 \Rightarrow \frac{x-1}{y} = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

11. $\left. \begin{array}{l} 5^{2x-y} = 125 \\ 2^{3x+y} = 128 \end{array} \right\} \Rightarrow x+y = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

12. $\left. \begin{array}{l} 3^x = 4 \\ 9^y = 2 \end{array} \right\} \Rightarrow \frac{x+y}{x-y} = ?$

- A) $\frac{2}{5}$ B) $\frac{3}{5}$ C) $\frac{4}{5}$ D) $\frac{5}{3}$ E) $\frac{5}{2}$

13. $x^a = 5 \cdot x^2,$
 $25 \cdot 5^a = (x)^{b^2} \Rightarrow a^2 - b^2 = ?$

- A) 4 B) 6 C) 8 D) 10 E) 12

14. $\left. \begin{array}{l} \frac{a}{3} = b \\ a^{a+5} = b^{6b+10} \end{array} \right\} \Rightarrow 2a - b = ?$

- A) 12 B) 13 C) 15 D) 16 E) 18

15. $\left. \begin{array}{l} 2^{x+y} = 0,125 \\ (0,125)^{x-y} = 2 \end{array} \right\} \Rightarrow x^2 - y^2 = ?$

- A) 1 B) 2 C) 4 D) 8 E) 10

16. $\left. \begin{array}{l} x = 2 + 2^{a-1} \\ y = 2 - 2^{a+1} \end{array} \right\} \Rightarrow y = ?$

- A) $10 - 4x$ B) $10 - 2x$ C) $10 - x$
 D) $2x - 10$ E) $4x - 10$

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1	2	3	4	5	6	7	8
D	B	E	B	B	D	E	A
9	10	11	12	13	14	15	16
C	D	B	D	A	C	A	A

1. $5^x = y \Rightarrow y^3 \cdot 5^{2-3x} = ?$

- A) 5 B) 10 C) 15 D) 25 E) 50

2. $\left. \begin{array}{l} 2^{2x} = 49 \\ 2^y = 7 \end{array} \right\} \Rightarrow \frac{x+2y}{3y-x} = ?$

- A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) 2 E) $\frac{5}{2}$

3. $\left. \begin{array}{l} 3^a \cdot 4^b = 12 \\ 4^a \cdot 3^b = 144 \end{array} \right\} \Rightarrow a+b = ?$

- A) 1 B) 3 C) 5 D) 7 E) 11

4. $\left. \begin{array}{l} m = 2^x \\ n = 5^{2x+1} \end{array} \right\} \Rightarrow (0,08)^x = ?$

- A) $\frac{m}{n}$ B) $\frac{5m}{n}$ C) $\frac{5n}{m}$ D) 5m E) 5n

5. $\left. \begin{array}{l} 2^x = m \\ 3^x = n \end{array} \right\} \Rightarrow 192^x = ?$

- A) m^6n B) m^5n^2 C) m^4n^3 D) m^3n^4 E) m^2n^5

6. $\frac{12^n + 12^n + 12^n}{6^n + 6^n + 6^n + 6^n + 6^n + 6^n} = 64 \Rightarrow n = ?$

- A) 1 B) 3 C) 5 D) 7 E) 9

7. $x, y, z \in \mathbb{R}$,
 $5^{x+2} = 7^{2y-6} = 3^{z-2} \Rightarrow x+y+z = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $\left. \begin{array}{l} x = 2^{m-1} \\ 4x = 16^{\frac{m}{2}-2} \end{array} \right\} \Rightarrow m = ?$

- A) 9 B) 8 C) 6 D) 4 E) 2

9. $\frac{8 \cdot 4^{x-1}}{2^{3x+2}} = 16 \Rightarrow x = ?$

- A) -7 B) -5 C) -3 D) 1 E) 3

10. $\frac{2^x + 2^x + 2^x + 2^x}{(0,4)^x + (0,4)^x} = 50 \Rightarrow x = ?$

- A) 1 B) $\frac{3}{2}$ C) 2 D) $\frac{5}{2}$ E) 3

11. $\left. \begin{array}{l} A = 3^x + 3^{-x} \\ B = 9^x + 9^{-x} \end{array} \right\} \Rightarrow B = ?$

- A) $A^2 - 1$ B) $A^2 - 2$ C) $A^2 - 3$
D) $A^2 - 4$ E) $A^2 - 6$

12. $(x-3)^{x^2-9} = 1, x \in \mathbb{Z} \Rightarrow \sum x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $\left. \begin{array}{l} 4^{x-1} = 2^{-x+4} \\ 9^{x-2y} = 27^{\frac{x+y}{2}} \end{array} \right\} \Rightarrow y = ?$

- A) $-\frac{1}{7}$ B) $-\frac{1}{3}$ C) $\frac{1}{3}$ D) $\frac{1}{7}$ E) $\frac{1}{14}$

14. $-2^{-6} : \left(-\frac{1}{2}\right)^{-3} = ?$

- A) 2^{-7} B) 2^{-8} C) 2^{-9} D) 2^{-10} E) 2^{-11}

15. $\frac{32^{-1} \cdot 128^{10} \cdot 3}{96 \cdot 64^{10}} = ?$

- A) -2 B) $-\frac{1}{2}$ C) $\frac{1}{2}$ D) 1 E) 2

16. $x, n \in \mathbb{N}^+,$

$25^{12} \cdot 4^{11} = x \cdot 10^n \Rightarrow n + x = ?$

- A) 41 B) 43 C) 45 D) 47 E) 49


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1	2	3	4	5	6	7	8
D	C	B	B	A	D	C	A
9	10	11	12	13	14	15	16
B	C	B	A	D	C	D	D

1. $3^a = k \Rightarrow \frac{81^{a+1}}{27} = ?$

- A) $\frac{k^2}{3}$ B) $\frac{k^3}{3}$ C) $3k^3$ D) $4k^3$ E) $3k^4$

2. $2^{x-2} = 3 \Rightarrow 4^{x+1} = ?$

- A) 144 B) 180 C) 240 D) 480 E) 576

3. $5^{2x+1} = 80 \Rightarrow 25^{x-1} = ?$

- A) $\frac{4}{25}$ B) $\frac{16}{25}$ C) $\frac{25}{16}$ D) $\frac{25}{4}$ E) 25

4. $\frac{3^{x-2} + 3^{x+1}}{2 \cdot 3^{x+1} - 3^x} = ?$

- A) $-\frac{28}{45}$ B) $-\frac{26}{3}$ C) $-\frac{17}{3}$ D) $\frac{17}{3}$ E) $\frac{28}{45}$

5. $5^x = 81, 5^y = 3 \Rightarrow \frac{3x-y}{2x-3y} = ?$

- A) $\frac{7}{3}$ B) $\frac{8}{5}$ C) $\frac{11}{5}$ D) $\frac{13}{3}$ E) $\frac{12}{5}$

6. $81^x = 8, 32^y = 9 \Rightarrow y = ?$

- A) $\frac{1}{10x}$ B) $\frac{3}{10x}$ C) $\frac{7}{10x}$ D) $\frac{x}{10}$ E) $\frac{3x}{10}$

7. $x \in \mathbb{Z},$

$$\left(\frac{2}{3}\right)^{3x-5} < \left(\frac{2}{3}\right)^{2x-17} \Rightarrow \min(x) = ?$$

- A) -11 B) -12 C) -13 D) -14 E) -15

8. $(x+3)^{x^2-4} = 1,$

$$\text{Ç.K (S.S)} = \{x_1, x_2, x_3\} \Rightarrow \sum x = ?$$

- A) -4 B) -2 C) 0 D) 2 E) 4

9. $a = -3$ ve / and $b = -\frac{1}{2} \Rightarrow b^a + a^{-(b)^{-1}} = ?$

- A) $-\frac{1}{3}$ B) $-\frac{1}{2}$ C) -1 D) 1 E) $\frac{1}{2}$

10. $3^x = 2 \Rightarrow 27^x + 9^{x+1} = ?$

- A) 36 B) 42 C) 44 D) 46 E) 52

11. $\frac{4 \cdot 3^x - 2 \cdot 3^{x-2}}{3^x - 3^{x-1}} = ?$

- A) $\frac{17}{2}$ B) $\frac{19}{2}$ C) $\frac{23}{2}$ D) $\frac{17}{3}$ E) $\frac{19}{3}$

12. $9^{x+2} = 27^{x-1} \Rightarrow 5^{x-5} = ?$

- A) $\frac{1}{25}$ B) $\frac{1}{5}$ C) 5 D) 25 E) 125

13. $(0,6)^{2x-8} = \left(\frac{5}{3}\right)^{3x-2} \Rightarrow 2^{-x+1} + 3^x = ?$

- A) $\frac{17}{2}$ B) $\frac{19}{2}$ C) $\frac{21}{2}$ D) $\frac{23}{2}$ E) $\frac{25}{2}$

14. $\left. \begin{array}{l} 2^x = 18 \\ 3^y = 49 \\ 5^z = 81 \end{array} \right\} \Rightarrow ? < ? < ?$

- A) $x < y < z$ B) $y < z < x$ C) $z < y < x$
D) $x < z < y$ E) $z < x < y$

15. $\left. \begin{array}{l} 2^x \cdot 3^y = 54 \\ 3^x \cdot 2^y = 4 \end{array} \right\} \Rightarrow x + y = ?$

- A) 1 B) 2 C) 3 D) 4 E) 6

16. $(4^{0,72} : 2) = ?$

- A) $2^{1,44}$ B) $2^{0,72}$ C) $2^{0,44}$ D) $2^{0,22}$ E) $2^{0,11}$


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1	2	3	4	5	6	7	8
E	E	B	E	C	B	A	A
9	10	11	12	13	14	15	16
D	C	D	D	B	C	C	C

1. $5^{a-2} = 3^{2b+1} = 2^{4c-1} \Rightarrow a - 3b + 2c = ?$

- A)
- $\frac{5}{6}$
- B)
- $\frac{1}{6}$
- C)
- $\frac{1}{2}$
- D) 2 E) 4

2. $\frac{7,2 \cdot 10^3 \cdot 0,3 \cdot 10^{-2}}{8 \cdot 10^{-3}} = A \cdot 10^n \Rightarrow A + n = ?$

- A) 23 B) 25 C) 27 D) 29 E) 32

3. $\frac{3^x \cdot 4^x}{3^{x-2} \cdot 2^{2x-1}} = ?$

- A) 18 B) 14 C) 10 D) 6 E) 4

4. $5^{x+1} = 3 \Rightarrow 5^{2x+3} = ?$

- A) 27 B) 36 C) 40 D) 45 E) 54

5. $x^m = y^{m+1} \Rightarrow \left(\frac{x}{y}\right)^{2m+1} = ?$

- A)
- y^2
- B)
- $\frac{x^2}{y}$
- C)
- $\frac{y^2}{x}$
- D)
- $x \cdot y$
- E)
- $\frac{12}{5}$

6. $\frac{5^x + 10^x + 25^x}{5^x + 2^x + 1} = 125 \Rightarrow 2^{x+1} = ?$

- A)
- $\frac{1}{2}$
- B) 2 C) 4 D) 8 E) 16

7. $75^{12} = 9^x \cdot 25^{12} \Rightarrow 2^x \cdot 7^{x-6} = ?$

- A) 16 B) 32 C) 64 D) 128 E) 256

8. $\frac{0,003 \cdot 10^{27} + 0,5 \cdot 10^{25}}{0,02 \cdot 10^{26}} = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

$$9. \begin{cases} 2^x = 3 \\ 3^y = 25 \\ 5^z = 32 \end{cases} \Rightarrow x \cdot y \cdot z = ?$$

- A) 4 B) 9 C) 10 D) 28 E) 36

$$10. \frac{3^{x-1}}{5^{3-x}+1} + \frac{3^{x-1}}{5^{x-3}+1} = 27 \Rightarrow x = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$11. \begin{cases} a \cdot b = a^b \\ \frac{a^2}{b} = a^{3b} \end{cases} \Rightarrow b = ?$$

- A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) $\frac{3}{4}$ D) $\frac{4}{3}$ E) $\frac{3}{2}$

$$12. \begin{cases} x = 3^{54} \\ y = 5^{36} \\ z = 2^{72} \end{cases} \Rightarrow ? < ? < ?$$

- A) $y < x < z$ B) $y < z < x$ C) $x < y < z$
D) $z < y < x$ E) $z < x < y$

$$13. \begin{cases} 5^{x+1} + 5^x = 48 \\ 25^x = 32^y \end{cases} \Rightarrow y = ?$$

- A) $\frac{5}{6}$ B) $\frac{6}{5}$ C) $\frac{8}{5}$ D) $\frac{5}{8}$ E) $\frac{3}{5}$

$$14. 2^{1-2x} = \frac{2}{9} \Rightarrow \frac{4 \cdot 3^{x+2}}{6^{x+1}} = ?$$

- A) -1 B) $-\frac{1}{2}$ C) $\frac{1}{2}$ D) 1 E) 2

$$15. \frac{2^x + 2^{-x}}{1 + 4^x} = 64 \Rightarrow 3^{x+4} = ?$$

- A) $\frac{1}{9}$ B) $\frac{1}{3}$ C) 3 D) 9 E) 27

$$16. \begin{cases} 2^{x+y} - 3^{y+2} = -11 \\ 3^{y+1} - 2^x = 1 \end{cases} \Rightarrow x + y = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5


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1	2	3	4	5	6	7	8
E	D	A	D	D	E	C	B
9	10	11	12	13	14	15	16
C	D	C	D	B	E	A	D

1. $8^x + 8^x + 8^x + 8^x = 8^y \cdot 8^y \cdot 8^y \Rightarrow \frac{x}{9y-2} = ?$
 A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 3

2. $(0,3)^{x+1} = m \Rightarrow 9^{x+2} = ?$
 A) $\frac{1}{m^2}$ B) $\frac{3}{m^2}$ C) $\frac{9}{m^2}$
 D) $\frac{27}{m^2}$ E) $\frac{81}{m^2}$

3. $7^{x-9} = 14^{x-10} \Rightarrow 4^{x-11} = ?$
 A) $\frac{7}{2}$ B) $\frac{7}{4}$ C) $\frac{7}{8}$
 D) $\frac{49}{2}$ E) $\frac{49}{4}$

4. $\left(\frac{8^9 + 8^9 + 8^9 + \dots + 8^9}{32 \text{ tane / 32 times}} \right) : (4^4 \cdot 4^4 \cdot 4^4 \cdot 4^4) = ?$
 A) 1 B) 2 C) 4 D) 8 E) 16

5. $\left. \begin{array}{l} 5^x = 27 \\ 81 = 25^y \end{array} \right\} \Rightarrow \frac{3x+y}{x-2y} = ?$
 A) -13 B) -12 C) -11 D) -9 E) -7

6. $(2x-9)^{2012} = (x-3)^{2012} \Rightarrow \sum x = ?$
 A) 4 B) 5 C) 6 D) 8 E) 10

7. $(x+2)^{x^2-x-6} = 1 \Rightarrow \sum x = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

8. $3^{1-x} - \frac{5}{3^{x-1}} = -108 \Rightarrow x = ?$
 A) -2 B) -1 C) 2 D) 4 E) 6

9. $\frac{2^{x+1} + 5 \cdot 2^{x-1} + 3 \cdot 2^{x-2}}{2^{x+2} + \frac{1}{5} \cdot 2^x} = ?$

- A) $\frac{2}{5}$ B) $\frac{4}{5}$ C) $\frac{5}{2}$ D) $\frac{5}{4}$ E) $\frac{1}{5}$

10. $\frac{5^x}{3} + 5^{x+1} - 5^x \cdot 2 = \frac{250}{3} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

11. $x^x = 2^{24}, y^y = 3^{18} \Rightarrow \frac{2y + 3x}{y - x} = ?$

- A) 17 B) 23 C) 32 D) 36 E) 42

12. $\left[\frac{x^{a-b}}{x^{-b}} \right]^b : \left[\frac{x^{b-a}}{x^{-a}} \right]^a = ?$

- A) x^a B) x^b C) 1 D) x E) $\frac{1}{x}$

13. $A, n \in \mathbb{N},$

$(32)^6 \cdot (125)^9 = A \cdot 10^n \Rightarrow \min(A + n) = ?$

- A) 32 B) 35 C) 38 D) 40 E) 45

14. $a = 1 + x^{-1}, b = 1 - x^{-2} \Rightarrow \left(\frac{a}{b} \right)^{-1} = ?$

- A) $\frac{x}{x-1}$ B) $\frac{x}{x+1}$ C) $\frac{x-1}{x}$ D) $\frac{x+1}{x}$ E) $\frac{1}{x^2}$

15. $9^{x+\frac{1}{2}} = 48 \Rightarrow 27^{x-\frac{2}{3}} = ?$

- A) $\frac{64}{9}$ B) $\frac{32}{3}$ C) $\frac{27}{2}$ D) $\frac{81}{4}$ E) $\frac{81}{2}$

16. $2^x = 3 \Rightarrow 6^{\frac{1}{x+1}} = ?$

- A) 3 B) 2 C) $\frac{1}{2}$ D) $\frac{1}{3}$ E) $\frac{1}{6}$



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1	2	3	4	5	6	7	8
A	C	E	A	C	E	B	A
9	10	11	12	13	14	15	16
D	B	E	C	B	C	A	B

1. $\frac{1+2^{x-y}}{1+2^{y-x}} = 4 \Rightarrow x-y = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

2. $\left. \begin{array}{l} a^2 = 2^{6x+4} \\ \frac{a}{4} = 16^{x-2} \end{array} \right\} \Rightarrow x = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

3. $\left. \begin{array}{l} x^{y+2} = a^3 \\ x^{2-2y} = b^3 \end{array} \right\} \Rightarrow x^y = ?$

- A) $\frac{b}{a}$ B) $\frac{a}{b}$ C) $\frac{b^2}{a}$ D) $\frac{a^2}{b}$ E) $\frac{a}{b^2}$

4. $\left. \begin{array}{l} 3^{a+b} = 2 \\ 2^{a+b} = 5 \end{array} \right\} \Rightarrow 36^{a+b} = ?$

- A) 10 B) 40 C) 50 D) 80 E) 100

5. $4 \cdot 3^{x+2} + 18 \cdot 2^{x+1} = a^2$ ve / and,
 $2^x + 3^x = a \Rightarrow a = ?$

- A) 6 B) 12 C) 18 D) 24 E) 36

6. $\left. \begin{array}{l} 3^a = 15^{a-1} \\ 6^a = 10^{a+1} \end{array} \right\} \Rightarrow 3^a = ?$

- A) 115 B) 120 C) 135 D) 150 E) 180

7. $\left. \begin{array}{l} 3^x = 15 \\ 5^y = 45 \end{array} \right\} \Rightarrow y = ?$

- A) $\frac{x-1}{x+1}$ B) $\frac{x+1}{x-1}$ C) $\frac{x}{x-1}$ D) $\frac{x}{x+1}$ E) $\frac{x+1}{x}$

8. $\left. \begin{array}{l} x = 3^n - 1 \\ y = 3^{-n} + 1 \end{array} \right\} \Rightarrow x = ?$

- A) $\frac{2-y}{y-1}$ B) $\frac{1-y}{y-2}$ C) $\frac{y+1}{y-1}$ D) $\frac{y+1}{y-2}$ E) $\frac{y-2}{y+1}$

$$9. \left. \begin{array}{l} \frac{a}{b} = 2 \\ \left(\frac{b}{a}\right)^{\frac{1}{x}} = 64 \end{array} \right\} \Rightarrow 3^{6x} = ?$$

- A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) $\frac{2}{3}$ D) $\frac{3}{2}$ E) $\frac{4}{3}$

$$10. \left. \begin{array}{l} 4^x = 27 \\ 3^y = 512 \end{array} \right\} \Rightarrow x \cdot y = ?$$

- A) $\frac{15}{2}$ B) $\frac{17}{2}$ C) $\frac{23}{2}$ D) $\frac{25}{2}$ E) $\frac{27}{2}$

$$11. \left. \begin{array}{l} 6^{n+1} = a \\ 6^{2-n} = b \end{array} \right\} \Rightarrow \frac{a \cdot b}{12} = ?$$

- A) 12 B) 14 C) 16 D) 18 E) 20

$$12. 3^{x+1} = 2^{x+1} \Rightarrow 4^x + \frac{1}{4} = ?$$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 1 E) 2

$$13. 2^{x+1} = 6^{x+1} \Rightarrow 9^{x+2} = ?$$

- A) 6 B) 9 C) 12 D) 18 E) 27

$$14. a, b \in \mathbb{N}^+,$$

$$a^b = 81,$$

$$b^a = 64$$

$$\Rightarrow 2a + 3b = ?$$

- A) 18 B) 24 C) 28 D) 32 E) 36

$$15. 2^{\frac{3}{2}} \cdot 3^{\frac{1}{2}} \cdot 6^{\frac{3}{2}} = a^b \cdot b^a \Rightarrow a + b = ?$$

- A) 3 B) 5 C) 7 D) 9 E) 10

$$16. \left. \begin{array}{l} x^{m+n} = 54 \\ x^{m-n} = 6 \end{array} \right\} \Rightarrow \frac{x^m + x^n}{x^m - x^n} = ?$$

- A) $\frac{2}{5}$ B) $\frac{3}{5}$ C) $\frac{5}{7}$ D) $\frac{5}{8}$ E) $\frac{7}{5}$


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	D	B	E	E	D	B	A
9	10	11	12	13	14	15	16
A	E	D	C	B	A	B	E

1. $7^{x+1} = 5 \Rightarrow 35^{\frac{x+1}{2}} = ?$

- A) 14 B) 1 C) 5 D) 7 E) 10

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

2. $x = 32^4 \cdot 25^8$

x sayısı kaç basamaklıdır?

How many digits are there in x?

- A) 18 B) 19 C) 20 D) 21 E) 22

[KARABÜK ÜNİVERSİTESİ – YÖS 2020]

3. $(0,000027)^{\frac{11}{3}} \cdot 10^{22} = ?$

- A) 3^3 B) 3^5 C) 3^7 D) 3^9 E) 3^{11}

[HARRAN ÜNİVERSİTESİ – YÖS 2020]

4. $\left. \begin{array}{l} 3^a = 2 \\ 3^b = 10 \end{array} \right\} \Rightarrow (0,1\bar{1})^{b-a+1} = ?$

- A) $\frac{25}{9}$ B) $\frac{9}{25}$ C) $\frac{1}{75}$ D) $\frac{1}{225}$ E) $\frac{1}{400}$

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2019]

5. $-(-a)^2 \cdot (-a)^3 \cdot (a)^{-8} \cdot (-a)^5 = ?$

- A) $-a^2$ B) $-a$ C) $-a^{-2}$ D) a E) a^2

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2019]

6. $\left(\frac{4}{x^2}\right)^{-1} = \left(\frac{2}{49}\right)^{-2}, x > 0 \Rightarrow x = ?$

- A) 7 B) 14 C) 21 D) 28 E) 49

[GAZİANTEP ÜNİVERSİTESİ – YÖS 2019]

7.
$$\frac{(-x^5)^2 \cdot (-x^{-2})^3 \cdot (-x)^6}{-(x^{-2})^4 \cdot (-x^{-2})^{-3}}$$

yukarıdaki işlemin sonucu nedir?

What is the result of the operation above?

- A) $-x^8$ B) x^{10} C) x^{12} D) $-x^{12}$ E) $-x^{10}$

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

8.
$$\frac{(x^{a+1})^b \cdot (x^{a-1})^b}{(x^{2a})^{-b}}$$

yukarıdaki işlemin sonucu kaçtır?

What is the result of the operation above?

- A) -1 B) x^{ab} C) x^{2ab} D) 1 E) x^{4ab}

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

9. $2^{3x-4} = 32 \Rightarrow x^2 = ?$

- A) 1 B) 2 C) 4 D) 9 E) 16

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

10. $\frac{2^4 + 2^7 + 2^{10}}{2^{-4} + 2^{-7} + 2^{-10}} = ?$

- A)
- 2^9
- B)
- 2^{12}
- C)
- 2^{14}
- D)
- 2^{18}
- E)
- 2^{20}

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

11. $4^{2-\frac{x}{2}} \leq 1 \leq 3^{6-x}$
 $x \in \mathbb{Z} \Rightarrow \sum x = ?$

- A) 5 B) 10 C) 15 D) 20 E) 25

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2017]

12. $0 < x, 5^x = a \Rightarrow \frac{25^{x+1} - 25}{5^{x+1} - 5} = ?$

- A)
- $3(a+1)$
- B)
- $5(a+1)$
- C)
- $3(a-1)$

- D)
- $-5(a+1)$
- E)
- $5(a-1)$

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2017]

13. $x \in \mathbb{Z},$
 $\left(\frac{1}{27}\right)^{3x} > (81)^{11} \Rightarrow \max(x) = ?$

- A) -6 B) -2 C) -5 D) 4 E) 5

[SELÇUK ÜNİVERSİTESİ – YÖS 2017]

14. $\frac{4^{-2} - 9^{-2}}{(6^{-2})^2} = ?$

- A) 24 B) 36 C) 54 D) 65 E) 70

[SELÇUK ÜNİVERSİTESİ – YÖS 2017]

15. $625^{-3x} = \left(\frac{1}{5}\right)^{4x-8} \Rightarrow 81^x = ?$

- A) 1 B)
- $\frac{1}{81}$
- C) 3 D) 9 E) 27

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

16. $3^m = 5^n \Rightarrow 27^{\frac{m}{n}} = ?$

- A) 5 B) 9 C)
- $\frac{25}{9}$
- D) 25 E) 125

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2016]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	A	E	D	A	E	D	E
9	10	11	12	13	14	15	16
D	C	C	B	C	D	B	E

BÖLÜM CHAPTER

4

TARİHSEL NOT / HISTORICAL NOTE

Leonhard Euler [1707 – 1783]

Leonhard Euler, matematik, fizik, analitik geometri, trigonometri ve sayı teorisi konusunda katkılarda bulunan bir İsviçre matematikçisidir.

Leonhard Euler was a Swiss mathematician who made enormous contributions to a wide range of mathematics and physics including analytic geometry, trigonometry, geometry, calculus and number theory.

KÖKLÜ SAYILAR RADICALS

Bu bölüm 272 test sorusu, 16 YÖS sorusu içermektedir.

This chapter includes 272 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 4

KÖKLÜ SAYILAR / RADICALS

- Köklü Sayılar / Radicals 119 - 156

1. $\sqrt{(-5)^2} - \sqrt[3]{(-4)^3} = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

2. $\sqrt{72} + \sqrt{50} - \sqrt{32} = ?$

- A) $6\sqrt{2}$ B) $7\sqrt{2}$ C) $8\sqrt{2}$ D) $9\sqrt{2}$ E) $10\sqrt{2}$

3. $\frac{\sqrt[3]{(-27)^2} - \sqrt{16}}{\sqrt{36} - \sqrt{4}} = ?$

- A) $\frac{3}{4}$ B) 1 C) $\frac{5}{4}$ D) $\frac{3}{2}$ E) $\frac{7}{4}$

4. $\sqrt[3]{8} + \sqrt[4]{81} - \sqrt[3]{-27} = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

5. $\sqrt{1 + \frac{9}{16}} + \sqrt{1 - \frac{9}{25}} = ?$

- A) $\frac{41}{20}$ B) 2 C) $\frac{19}{10}$ D) $\frac{9}{5}$ E) $\frac{3}{2}$

6. $\sqrt{2 + \frac{1}{4}} + \sqrt{2 + \frac{7}{9}} = ?$

- A) 3 B) $\frac{19}{6}$ C) $\frac{10}{3}$ D) $\frac{7}{2}$ E) $\frac{11}{3}$

7. $\sqrt{21 + \sqrt{13 + \sqrt{9}}} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $\sqrt{1,44} - \sqrt{0,04} + \sqrt[3]{0,064} = ?$

- A) 1 B) $\frac{6}{5}$ C) $\frac{3}{2}$ D) $\frac{7}{5}$ E) $\frac{8}{5}$

9. $3\sqrt{8} + 2\sqrt{18} - 3\sqrt{32} = ?$

- A)
- $3\sqrt{2}$
- B) 0 C)
- $2\sqrt{2}$
- D)
- $5\sqrt{2}$
- E)
- $7\sqrt{2}$

13. $(\sqrt{3} + \sqrt{5})^2 - \sqrt{60} = ?$

- A) 3 B) 5 C) 7 D) 8 E) 10

10. $\sqrt{27} - \sqrt{48} + \sqrt{108} = ?$

- A)
- $\sqrt{3}$
- B)
- $3\sqrt{3}$
- C)
- $5\sqrt{3}$
- D)
- $7\sqrt{3}$
- E)
- $9\sqrt{3}$

14. $(\sqrt{6} - \sqrt{2})^2 + \sqrt{48} = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

15. $(\sqrt{5} + \sqrt{2})^2 + (\sqrt{5} - \sqrt{2})^2 = ?$

- A) 7 B) 10 C) 14 D) 17 E) 21

11. $3\sqrt{5} \cdot \sqrt{10} \cdot \sqrt{2} = ?$

- A) 30 B) 27 C) 25 D) 21 E) 15

16. $\sqrt{3x-6} + \sqrt{x+y-5} = 0 \Rightarrow x \cdot y = ?$

- A) 1 B) 2 C) 3 D) 6 E) 12

12. $\left. \begin{array}{l} \sqrt{3} = x \\ \sqrt{5} = y \end{array} \right\} \Rightarrow \sqrt{135} = ?$

- A)
- $x^3 \cdot y^2$
- B)
- $x^3 \cdot y^3$
- C)
- $x^2 \cdot y^3$
- D)
- $x^2 \cdot y^2$
- E)
- $x^3 \cdot y$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	B	C	C	A	B	E	D
9	10	11	12	13	14	15	16
B	C	A	E	D	E	C	D

1. $\sqrt{18} + \sqrt{32} - \sqrt{8} = ?$
 A) $4\sqrt{2}$ B) $5\sqrt{2}$ C) $6\sqrt{2}$ D) $7\sqrt{2}$ E) $8\sqrt{2}$

2. $\frac{\sqrt{50} + \sqrt{72}}{\sqrt{8} - \sqrt{2}} = ?$
 A) 7 B) 8 C) 9 D) 10 E) 11

3. $\sqrt{72} - 2\sqrt{8} + 3\sqrt{50} = ?$
 A) $14\sqrt{2}$ B) $15\sqrt{2}$ C) $16\sqrt{2}$ D) $17\sqrt{2}$ E) $18\sqrt{2}$

4. $\frac{\sqrt[4]{(-4)^4} - \sqrt[3]{-8} - \sqrt{16}}{\sqrt[5]{-32}} = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

5. $\frac{1}{2 + \sqrt{3} - \sqrt{7}} - \frac{1}{2 + \sqrt{3} + \sqrt{7}} = ?$
 A) $\frac{\sqrt{3}}{12}$ B) $\frac{\sqrt{17}}{12}$ C) $\frac{\sqrt{5}}{6}$ D) $\frac{\sqrt{21}}{6}$ E) $\frac{\sqrt{24}}{12}$

6. $\frac{\sqrt{0,25} + \sqrt{1,21}}{\sqrt{0,04} + \sqrt{0,16}} = ?$
 A) $\frac{21}{4}$ B) $\frac{15}{4}$ C) $\frac{21}{2}$ D) $\frac{15}{2}$ E) $\frac{13}{2}$

7. $\frac{\sqrt{0,09} - 0,09}{\sqrt{0,81} - 0,81} = ?$
 A) $\frac{3}{7}$ B) $\frac{3}{5}$ C) $\frac{2}{7}$ D) $\frac{5}{3}$ E) $\frac{7}{3}$

8. $\sqrt{\frac{3^{-1}}{0,3}} : \frac{0,3}{3} = ?$
 A) $\frac{3}{10}$ B) $\frac{3}{5}$ C) $\frac{5}{3}$ D) $\frac{10}{3}$ E) $\frac{12}{5}$

9. $\frac{\sqrt{1,44} - \sqrt[3]{0,125}}{\sqrt[4]{0,0016}} = ?$

- A) $\frac{5}{2}$ B) $\frac{7}{2}$ C) $\frac{9}{2}$ D) $\frac{13}{2}$ E) $\frac{15}{2}$

10. $\frac{\sqrt[3]{(-5)^9} + \sqrt[4]{(-3)^4} - \sqrt[5]{(-2)^5}}{\sqrt[3]{(-8)}} = ?$

- A) -4 B) -2 C) 0 D) 2 E) 4

11. $\sqrt{5 + \sqrt{11 + \sqrt{12 + \sqrt{169}}}} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

12. $\sqrt[3]{\sqrt[4]{8}} = 2^x \Rightarrow x = ?$

- A) $\frac{1}{8}$ B) $\frac{1}{6}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) 1

13. $\sqrt{149^2 - 140^2} = ?$

- A) 42 B) 45 C) 48 D) 51 E) 54

14. $A = \sqrt{12^2 + 3^4 + 24 \cdot 3^2} \Rightarrow 5A = ?$

- A) 45 B) 65 C) 75 D) 85 E) 105

15. $\sqrt[7]{8^4 + 4^6 + 2^{12} + 16^3} = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

16. $\sqrt{a, \overline{b}} = 1, \overline{3} \Rightarrow a + b = ?$

- A) 4 B) 6 C) 8 D) 10 E) 12


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	E	D	B	D	A	E	D
9	10	11	12	13	14	15	16
B	C	C	A	D	E	B	C

1. $\sqrt{33^2 + 44^2 + 132^2} = ?$
 A) 120 B) 124 C) 132 D) 143 E) 144

2. $\sqrt{\left(\frac{9^{-5}}{9^{-2} + 9^{-3}}\right)^{-1}} = ?$
 A) $3\sqrt{10}$ B) $5\sqrt{10}$ C) $6\sqrt{10}$ D) $8\sqrt{10}$ E) $9\sqrt{10}$

3. $\sqrt{\frac{25}{36} + 1 + \frac{9}{25}} = ?$
 A) $\frac{25}{36}$ B) $\frac{23}{30}$ C) $\frac{43}{30}$ D) $\frac{43}{36}$ E) $\frac{47}{30}$

4. $\sqrt{1995^2 - 1994 \cdot 1996} = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

5. $\sqrt{\frac{36}{49} + \frac{1}{16} - \frac{3}{7}} = ?$
 A) $\frac{13}{28}$ B) $\frac{15}{28}$ C) $\frac{17}{28}$ D) $\frac{19}{28}$ E) $\frac{21}{28}$

6. $\sqrt{2002 \cdot 1996 + 9} = ?$
 A) 1997 B) 1998 C) 1999 D) 2000 E) 2001

7. $\sqrt{\frac{9}{25} + \frac{1}{4} - \frac{3}{5}} = ?$
 A) $\frac{1}{10}$ B) $\frac{1}{8}$ C) $\frac{1}{6}$ D) $\frac{1}{5}$ E) $\frac{1}{3}$

8. $\sqrt{999 \cdot 1001 - 1004 \cdot 996} = ?$
 A) $2\sqrt{5}$ B) $\sqrt{15}$ C) $3\sqrt{6}$ D) $2\sqrt{15}$ E) $4\sqrt{5}$

9. $\frac{\sqrt{3} + 3\sqrt{12} - 2\sqrt{48}}{\sqrt{27} - \sqrt{75}} = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 1 E) 2

10. $\sqrt{\frac{0,0108}{0,03}} - \sqrt{\frac{0,003}{0,3}} = ?$

- A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) $\frac{3}{4}$ D) $\frac{4}{5}$ E) $\frac{5}{6}$

11. $\sqrt[3]{\frac{a^2}{\sqrt{a}}} = 3 \Rightarrow a = ?$

- A) 3 B) 4 C) 5 D) 8 E) 9

12. $A = \frac{\sqrt[3]{12-x} - \sqrt{x-4} + \sqrt{4-x}}{\sqrt{x+5} + x - 5} \Rightarrow A = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $\sqrt{3x-1} + \sqrt{2y-3} = 0$

$\Rightarrow 4y - 12x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

14. $\frac{\sqrt{32^x} \cdot \sqrt{8^x}}{\sqrt{2^x}} = 2^{14} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

15. $\frac{\sqrt{3^{2a+3b}}}{\sqrt{9^{a-2b}}} = 3^7 \Rightarrow b = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

16. $\frac{7 \cdot \sqrt{243}}{\sqrt{147}} = 3^{x-4} \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	E	C	A	C	C	A	B
9	10	11	12	13	14	15	16
C	A	E	A	E	D	B	E

1. $\sqrt{2+\frac{1}{4}} + \sqrt{5+\frac{9}{8}} - \sqrt{5+\frac{1}{16}} = ?$

- A) $\frac{7\sqrt{2}-3}{4}$ B) $\frac{6\sqrt{2}-5}{2}$ C) $\frac{4\sqrt{2}-2}{3}$
 D) $\frac{7\sqrt{2}+3}{4}$ E) $\frac{7\sqrt{2}-4}{3}$

2. $\frac{\sqrt{35}+\sqrt{15}}{\sqrt{14}+\sqrt{6}} : \frac{\sqrt[3]{4}}{\sqrt[3]{25}} = ?$

- A) $\frac{1}{2}$ B) 1 C) $\frac{5}{2}$
 D) $\sqrt{\frac{5}{2}}$ E) $\frac{5}{2}\sqrt{\frac{5}{2}}$

3. $\left(\sqrt{\frac{5}{3}} + \sqrt{\frac{10}{3}} - 2\right) : (\sqrt{5} + \sqrt{10} - 2\sqrt{3}) = ?$

- A) $-\sqrt{3}$ B) 1 C) $\frac{\sqrt{3}}{3}$ D) $\sqrt{3}$ E) 3

4. $\sqrt{4+\sqrt{19-\sqrt{4^2-7}}} = ?$

- A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $3\sqrt{2}$
 D) $4\sqrt{2}$ E) $5\sqrt{2}$

5. $A = \sqrt{7} - \sqrt{2} + 1$

$B = \sqrt{7} + \sqrt{2} - 1$

$\Rightarrow A^2 + B^2 + 2AB = ?$

- A) 4 B) 12 C) 16 D) 28 E) 36

6. $\frac{\sqrt{2} \cdot \sqrt{3} \cdot \dots \cdot \sqrt{10}}{\sqrt{4} \cdot \sqrt{6} \cdot \dots \cdot \sqrt{20}} = ?$

- A) $\frac{\sqrt{2}}{64}$ B) $\frac{\sqrt{2}}{32}$ C) $\frac{\sqrt{2}}{16}$
 D) $\frac{\sqrt{2}}{8}$ E) $\frac{\sqrt{2}}{4}$

7. $\sqrt[3]{100^{2x+1}} = 10^2 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $\frac{3}{\sqrt{x}} + \frac{5}{2\sqrt{x}} + \frac{2}{\sqrt{x}} = \frac{45}{2} \Rightarrow x = ?$

- A) $\frac{1}{3}$ B) $\frac{\sqrt{3}}{3}$ C) $\sqrt{3}$ D) 3 E) $\frac{1}{9}$

9. $\sqrt{2x-8} + \sqrt{3y-9} = 0 \Rightarrow x \cdot y = ?$
 A) 2 B) 6 C) 8 D) 10 E) 12

10. $(x+y-12)^6 + \sqrt[6]{x-y-2} = 0 \Rightarrow x \cdot y = ?$
 A) 5 B) 15 C) 20 D) 30 E) 35

11. $\sqrt{a} \cdot \sqrt[3]{a^2} \cdot \sqrt[4]{a^3} = a^x \Rightarrow x = ?$
 A) $\frac{19}{12}$ B) $\frac{5}{3}$ C) $\frac{7}{4}$ D) $\frac{11}{6}$ E) $\frac{23}{12}$

12. $\sqrt{2} \cdot \sqrt{3} \cdot \dots \cdot \sqrt{x} = 6\sqrt{20} \Rightarrow x = ?$
 A) 5 B) 6 C) 7 D) 8 E) 9

13. $\frac{\sqrt{x-4\sqrt{2}} + x^2}{x - \sqrt{4\sqrt{2}-x}} = ?$
 A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $3\sqrt{2}$
 D) $4\sqrt{2}$ E) $5\sqrt{2}$

14. $\left. \begin{array}{l} x = \sqrt[3]{5} \\ y = \sqrt[4]{9} \\ z = \sqrt[6]{10} \end{array} \right\} \Rightarrow ? > ? > ?$
 A) $x > y > z$ B) $x > z > y$
 C) $y > x > z$ D) $y > z > x$
 E) $z > x > y$

15. $\left. \begin{array}{l} a = \sqrt[3]{\frac{1}{9}} \\ b = \sqrt{\frac{1}{27}} \\ c = \sqrt[4]{\frac{1}{3}} \end{array} \right\} \Rightarrow ? > ? > ?$
 A) $a > b > c$ B) $a > c > b$
 C) $b > a > c$ D) $b > c > a$
 E) $c > a > b$

16. $\left. \begin{array}{l} a = (3^{\sqrt{3}})^{2\sqrt{2}} \\ b = ((\sqrt{3})^3)^2 \\ c = (9^{\sqrt{3}})^2 \end{array} \right\} \Rightarrow ? > ? > ?$
 A) $a > b > c$ B) $a > c > b$
 C) $b > a > c$ D) $b > c > a$
 E) $c > a > b$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	E	C	B	D	B	A	E
9	10	11	12	13	14	15	16
E	E	E	B	D	C	E	E

1. $\sqrt{(-4)^2} + \sqrt[3]{8} - \sqrt{16} = ?$

- A) -4 B) -2 C) 0
D) 2 E) 4

2. $x \in \mathbb{Z}, A \in \mathbb{R},$

$$\sqrt{x+6} + \sqrt{8-x} = A \Rightarrow \sum x = ?$$

- A) 10 B) 11 C) 12 D) 14 E) 15

3. $\frac{\sqrt{4-x} + \sqrt{x}}{\sqrt{20-x} - \sqrt{x-4}} = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 4

4. $(\sqrt{100} + \sqrt[3]{125} - \sqrt[4]{16}) \cdot \sqrt{(-2)^2} = ?$

- A) 6 B) 9 C) 12 D) 13 E) 26

5. $(\sqrt{80} + \sqrt{45} - \sqrt{500}) \cdot \sqrt{20} = ?$

- A) -30 B) -25 C) -20
D) -15 E) -10

6. $(\sqrt{0,01} + \sqrt{0,04} + \sqrt{0,09}) : \sqrt{0,36} = ?$

- A) 1 B) $\sqrt{2}$ C) $\sqrt{3}$
D) 2 E) 3

7. $\left. \begin{array}{l} \sqrt[5]{8} = 2^a \\ \sqrt[3]{9} = 3^b \end{array} \right\} \Rightarrow a \cdot b = ?$

- A) $\frac{1}{5}$ B) $\frac{2}{5}$ C) $\frac{3}{5}$ D) $\frac{4}{5}$ E) 1

8. $\sqrt[4]{27^{x-1}} = \sqrt[3]{9^{x+2}} \Rightarrow x = ?$

- A) 25 B) 24 C) 23 D) 22 E) 21

$$9. \frac{\sqrt{2} + \sqrt{4} + \dots + \sqrt{28}}{\sqrt{3} + \sqrt{6} + \dots + \sqrt{42}} = \sqrt{x} \Rightarrow x = ?$$

- A) 1 B) 2 C) $\sqrt{2}$ D) $\frac{2}{3}$ E) $\frac{4}{9}$

$$10. \frac{(\sqrt{5}-1) \cdot (\sqrt{5}+1)}{\sqrt{10}-\sqrt{5}} \cdot \frac{\sqrt{2}-1}{\sqrt{5}} = ?$$

- A) $\frac{1}{5}$ B) $\frac{2}{5}$ C) $\frac{3}{5}$ D) $\frac{4}{5}$ E) 1

$$11. \frac{\sqrt{10} - \sqrt{5} + 5}{1 - \sqrt{2} - \sqrt{5}} = ?$$

- A) $-\sqrt{5}$ B) $-\sqrt{2}$ C) 2
D) $\sqrt{2}$ E) $\sqrt{5}$

$$12. \frac{a}{\sqrt{2}+1} + \frac{b}{\sqrt{2}-1} = 4\sqrt{2}+6 \Rightarrow b = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$13. \frac{\sqrt{1,69} + \sqrt{0,49}}{\sqrt{1,44} - \sqrt{0,04}} = ?$$

- A) 1 B) $\sqrt{2}$ C) 2
D) $\sqrt{3}$ E) 3

$$14. \left(\frac{1}{\sqrt{5}-2} + \frac{1}{\sqrt{5}+2} \right) \cdot \sqrt{5} = ?$$

- A) 1 B) $\sqrt{5}$ C) $2\sqrt{5}$
D) 5 E) 10

$$15. \left[\left(\sqrt{(4-\sqrt{10})^2} \right) - \left(\sqrt{(\sqrt{10}-4)^2} \right) \right] \cdot \sqrt{10} = ?$$

- A) 0 B) 1 C) $\sqrt{10}$
D) $2\sqrt{5}$ E) $2\sqrt{10}$

$$16. \frac{(\sqrt[8]{a-1} - \sqrt[8]{a+1}) (\sqrt[8]{a-1} + \sqrt[8]{a+1})}{\sqrt{a-1} - \sqrt{a+1}} = \frac{1}{\sqrt[4]{3} + \sqrt[4]{5}}$$

$$\Rightarrow a = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	E	B	E	A	A	B	A
9	10	11	12	13	14	15	16
D	D	A	E	C	E	A	C

1. $x \in \mathbb{Z}, A \in \mathbb{R},$

$$\sqrt{x+5} + \sqrt{7-x} = A \Rightarrow \sum x = ?$$

- A) 10 B) 12 C) 13 D) 15 E) 18

5. $\sqrt[3]{25^{x-2}} = \sqrt[4]{125^{x-7}} \Rightarrow x = ?$

- A) 39 B) 42 C) 45 D) 47 E) 53

بانگی انحصاری موسسه آموزشی و انتشاراتی متروپول ترکیه دارویل

دوره های آموزشی آمادگی آزمون های YÖS-SAT-ALES-TÖMER

نشانی: اردبیل-بلوار علی دایی-پلازا از میدان وصال-خیابان مدیریت-سازمان مدیریت صنعتی

۳۳۲۴۵۸۵-۲

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2. $A \in \mathbb{R},$

$$\sqrt{x-2} + \sqrt[4]{2-x} + \sqrt[3]{-8} - 3x = A \Rightarrow A = ?$$

- A) -10 B) -8 C) -6 D) 4 E) 6

6. $\sqrt{0,75} + \sqrt{0,48} - \sqrt{1,08} = ?$

- A)
- $\frac{\sqrt{3}}{10}$
- B)
- $\frac{\sqrt{3}}{5}$
- C)
- $\frac{3\sqrt{3}}{10}$
-
- D)
- $\frac{2\sqrt{3}}{5}$
- E)
- $\frac{\sqrt{3}}{2}$

3. $\sqrt{(-7)^2} + \sqrt[3]{-64} + \sqrt{(3-\pi)^2} = ?$

- A)
- $3 - \pi$
- B)
- $1 - \pi$
- C)
- $-\pi$
-
- D)
- π
- E)
- $\pi + 3$

7. $(\sqrt{48} + \sqrt{75} - \sqrt{192}) \cdot 2\sqrt{3} = ?$

- A) 6 B)
- $4\sqrt{3}$
- C)
- $6\sqrt{3}$
- D)
- $8\sqrt{3}$
- E) 16

4. $\sqrt{2^{x-1}} = \sqrt[5]{8^{x+2}} \Rightarrow x = ?$

- A) -17 B) -15 C) 13 D) 15 E) 17

8. $(\sqrt[3]{16} + \sqrt[3]{54} - \sqrt[3]{128}) \cdot \sqrt[3]{4} = ?$

- A) 1 B) 2 C)
- $\sqrt[3]{4}$
-
- D)
- $\sqrt[3]{6}$
- E)
- $2 \cdot \sqrt[3]{4}$

9. $\frac{\sqrt{3} \cdot \sqrt[3]{2}}{\sqrt[6]{3}} = ?$

- A) $\sqrt[6]{6}$ B) $\sqrt[6]{3}$ C) $\sqrt[6]{2}$
D) $\sqrt[3]{3}$ E) $\sqrt[3]{6}$

10. $\sqrt{2} \cdot (\sqrt{18} - 1) \cdot (6 + \sqrt{2}) = ?$

- A) 28 B) 30 C) 32 D) 34 E) 36

11. $\frac{\sqrt[3]{5} \cdot \sqrt{2}}{\sqrt[6]{2}} : \frac{1}{\sqrt[3]{100}} = ?$

- A) $\sqrt[6]{10}$ B) $\sqrt[3]{10}$ C) $\sqrt{10}$
D) 10 E) 100

12. $\frac{\sqrt{1,44} + \sqrt{0,25}}{\sqrt{0,9} - \sqrt{0,4}} \cdot \sqrt{10} = ?$

- A) 10 B) 17 C) $10\sqrt{10}$
D) $17\sqrt{10}$ E) $23\sqrt{10}$

13. $\frac{\sqrt{6} - \sqrt{3} + 3}{\sqrt{3} + \sqrt{2} - 1} = ?$

- A) $\sqrt{3} - 1$ B) $\sqrt{2} - 1$ C) $\sqrt{3} - \sqrt{2}$
D) $\sqrt{3}$ E) $\sqrt{2}$

14. $\frac{1}{\sqrt{3} + 1} - \frac{1}{\sqrt{3} - 1} = ?$

- A) -2 B) -1 C) $-\frac{1}{2}$ D) $\frac{1}{2}$ E) 1

15. $\frac{4}{\sqrt{2} + 1} + \frac{4}{\sqrt{2}} - \frac{6}{\sqrt{2} - 1} = ?$

- A) -10 B) -8 C) $-4\sqrt{2}$
D) $-2\sqrt{2}$ E) $-\sqrt{2}$

16. $\frac{17}{3\sqrt{2} + 1} - \frac{7}{2\sqrt{2} - 1} = ?$

- A) $\sqrt{2} - 4$ B) $\sqrt{2} - 3$ C) $\sqrt{2} - 2$
D) $\sqrt{2} - 1$ E) $\sqrt{2}$

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1	2	3	4	5	6	7	8
C	B	D	A	D	C	A	B
9	10	11	12	13	14	15	16
E	D	D	B	D	B	A	C

1. $\sqrt{3^{x-1}} = a \Rightarrow \sqrt{3^{x+3}} = ?$

- A) 3a B) 5a C) 6a D) 8a E) 9a

2. $\sqrt{\frac{3^{x+2} + 3^{x-1}}{3^{x+2} - 2 \cdot 3^x}} = ?$

- A)
- $\sqrt{3}$
- B)
- $2\sqrt{3}$
- C)
- $\frac{2\sqrt{3}}{3}$
- D)
- $\frac{3\sqrt{3}}{2}$
- E)
- $\frac{4\sqrt{3}}{3}$

3. $\sqrt[4]{3/x} = \sqrt[4]{8} \cdot \sqrt[6]{32} \Rightarrow x = ?$

- A)
- 2^{15}
- B)
- 2^{16}
- C)
- 2^{17}
- D)
- 2^{18}
- E)
- 2^{19}

4. $x^{\frac{4}{3}} + 1 = 17 \Rightarrow x = ?$

- A)
- $\frac{1}{8}$
- B)
- $\frac{1}{6}$
- C)
- $\frac{1}{4}$
- D)
- $\frac{1}{3}$
- E)
- $\frac{1}{2}$

5. $5^{a+2} = 225 \Rightarrow \sqrt{125^a} + \sqrt[3]{3 \cdot 5^a} = ?$

- A) 15 B) 20 C) 25 D) 30 E) 35

6. $\sqrt[x]{\frac{9^{x+1} - 3^{2x}}{8 \cdot 3^x}} = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

7. $x, y \in \mathbb{Z}^+$
 $\left. \begin{array}{l} \sqrt{x/2^y} = \sqrt[5]{512^x} \\ x+y=24 \end{array} \right\} \Rightarrow x = ?$

- A) 4 B) 6 C) 8 D) 12 E) 16

8. $\sqrt{a^3-8} + \sqrt{2b-16} = 0 \Rightarrow a+b = ?$

- A) 10 B) 12 C) 14 D) 16 E) 18

9. $\sqrt{x} \cdot \sqrt{x} = 125 \Rightarrow \sqrt{x+\sqrt{x}} = ?$
 A) $3\sqrt{10}$ B) $3\sqrt{13}$ C) $5\sqrt{13}$ D) $3\sqrt{26}$ E) $5\sqrt{26}$

10. $\sqrt[3]{\frac{x^2}{y} \sqrt{\frac{y}{x} \sqrt{\frac{x}{y}}}} \cdot \sqrt[12]{\frac{y^3}{x}} = ?$
 A) $\sqrt{\frac{x}{y}}$ B) $\sqrt{\frac{y}{x}}$ C) \sqrt{x} D) $\sqrt[3]{\frac{y}{x}}$ E) \sqrt{xy}

11. $\sqrt[3]{4\sqrt{2}} = \left(\frac{1}{32}\right)^x \Rightarrow x = ?$
 A) $-\frac{1}{6}$ B) $-\frac{1}{4}$ C) $-\frac{1}{2}$ D) $\frac{1}{4}$ E) $\frac{1}{6}$

12. $\sqrt[5]{3 \cdot 4\sqrt{32}} = \sqrt[5]{3} \cdot \sqrt[4]{x} \Rightarrow x = ?$
 A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 2 D) 3 E) 4

13. $\frac{2}{\sqrt{5}-\sqrt{3}} - \frac{2}{\sqrt{5}+\sqrt{3}} = ?$
 A) $\sqrt{3}$ B) $2\sqrt{3}$ C) $\sqrt{5}$ D) $2\sqrt{5}$ E) $\sqrt{5}-\sqrt{3}$

14. $\left. \begin{array}{l} \sqrt{(3-\sqrt{5})^2} = A \\ \sqrt{(\sqrt{5}-4)^2} = B \end{array} \right\} \Rightarrow B - A = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

15. $\frac{\sqrt{18}}{\sqrt{2}} + \frac{2}{2-\sqrt{5}} + \frac{8}{\sqrt{5}+1} = ?$
 A) -3 B) -2 C) $\sqrt{2}$ D) $\sqrt{3}$ E) $\sqrt{5}$

16. $\frac{5}{\sqrt{(\sqrt{2}-\sqrt{7})^2}} + \frac{14}{\sqrt{7}} - \sqrt{2} = ?$
 A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $\sqrt{7}$ D) $2\sqrt{7}$ E) $3\sqrt{7}$



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1	2	3	4	5	6	7	8
E	C	E	A	D	B	B	A
9	10	11	12	13	14	15	16
E	C	A	C	B	D	A	E

$$1. \frac{\sqrt{(-3)^2} - \sqrt[3]{(-4)^3}}{\sqrt[4]{16} - 1} = ?$$

- A) -1 B) 1 C) 2 D) 5 E) 7

$$2. \frac{\sqrt{(-2)^6} + \sqrt[3]{-2^6}}{\sqrt[4]{(-2)^4}} = ?$$

- A) 8 B) 12 C) 24 D) 36 E) 48

$$3. \sqrt{1 - \frac{5}{9}} + \sqrt{2 + \frac{7}{9}} - \sqrt{1 - \frac{17}{81}} = ?$$

- A) $\frac{7}{9}$ B) $\frac{8}{9}$ C) $\frac{10}{9}$
D) $\frac{13}{9}$ E) $\frac{14}{9}$

$$4. \left(\frac{\sqrt{15} + \sqrt{10}}{3 + \sqrt{6}} \right) : \frac{\sqrt{5}}{3} = ?$$

- A) $\sqrt{2}$ B) $\sqrt{3}$ C) $\sqrt{5}$
D) $\frac{3\sqrt{3}}{5}$ E) $\frac{5\sqrt{3}}{3}$

$$5. \frac{\sqrt{14,4} + \sqrt{6,4}}{\sqrt{12,1} - \sqrt{3,6}} = ?$$

- A) 2 B) 4 C) 5 D) 8 E) 10

$$6. \sqrt{(3 - \sqrt{7})^2} - \sqrt{(2 - \sqrt{7})^2} + \sqrt{28} = ?$$

- A) 1 B) $1 - 4\sqrt{7}$ C) $5 - \sqrt{7}$
D) $5 - 4\sqrt{7}$ E) 5

$$7. 3 \cdot \sqrt[4]{25} + \sqrt{\frac{45}{4}} - \frac{1}{2} \sqrt{20} = ?$$

- A) $\frac{3\sqrt{5}}{2}$ B) $5\sqrt{5}$ C) $\frac{7\sqrt{5}}{2}$
D) $7\sqrt{5}$ E) $\frac{9\sqrt{5}}{2}$

$$8. (\sqrt{0,39} - \sqrt{8,1}) \cdot \sqrt{10} = ?$$

- A) -9 B) -7 C) -5 D) -3 E) $-\sqrt{10}$

9. $\sqrt[3]{1+\frac{19}{8}} - \sqrt{2-\frac{2}{9}} + \sqrt{3+\frac{1}{16}} = ?$

A) $\frac{23}{12}$

B) $\frac{7}{6}$

C) $\frac{19}{12}$

D) $\frac{5}{4}$

E) $\frac{3}{2}$

10. $\frac{\sqrt[4]{16^{x+4}}}{\sqrt[3]{2^{6x+3}}} = \frac{1}{8} \Rightarrow x = ?$

A) -2

B) -1

C) 1

D) 3

E) 6

11. $\sqrt[3]{4^x} = \sqrt{\frac{8^x}{4}} \Rightarrow x = ?$

A) $\frac{6}{5}$

B) $\frac{5}{4}$

C) $\frac{4}{3}$

D) $\frac{3}{2}$

E) 1

12. $x = \sqrt[4]{5}, y = \sqrt[3]{4}, z = \sqrt[6]{12} \Rightarrow ? < ? < ?$

A) $x < z < y$

B) $x < y < z$

C) $y < x < z$

D) $y < z < x$

E) $z < x < y$

13. $x = \sqrt[3]{\frac{1}{4}}, y = \sqrt[4]{\frac{1}{32}}, z = \sqrt[5]{\frac{1}{64}} \Rightarrow ? > ? > ?$

A) $x < y < z$

B) $z < x < y$

C) $y < z < x$

D) $x < z < y$

E) $y < x < z$

14. $\frac{2}{\sqrt{3}-1} + \frac{3}{\sqrt{3}+2} + \frac{6}{\sqrt{3}} = ?$

A) 7

B) 3

D) $5\sqrt{3}$

C) $3\sqrt{3}$

E) $7\sqrt{3}$

15. $\left(\sqrt{\frac{3}{2}} - \sqrt{\frac{2}{3}} - 2\sqrt{6}\right) : \frac{1}{\sqrt{6}} = ?$

A) -18

B) -12

D) -9

C) -11

E) -8

16. $\frac{2}{\sqrt{x}} + \frac{\sqrt{x}}{2} = \sqrt{x} \Rightarrow x = ?$

A) 2

B) 4

C) 6

D) 8

E) 10



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1	2	3	4	5	6	7	8
E	C	D	B	B	E	C	B
9	10	11	12	13	14	15	16
A	E	A	A	C	A	C	B

1. $\sqrt{x} + 2\sqrt{x} + 3\sqrt{x} = 24 \Rightarrow x = ?$

- A) 2 B) 4 C) 16
D) 32 E) 64

5. $\sqrt{\sqrt{7}-\sqrt{3}} \cdot \sqrt{\sqrt{7}+\sqrt{3}} = ?$

- A) 5 B) 4 C) 3
D) 2 E) 1

2. $\frac{\sqrt[3]{3} \cdot \sqrt[6]{3} \cdot \sqrt{3}}{\sqrt[5]{3} \cdot \sqrt[5]{81}} = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

6. $\sqrt{\sqrt{6}-\sqrt{3}} \cdot \sqrt{\sqrt{6}+\sqrt{3}} \cdot \sqrt{3} = ?$

- A) 3 B) 6 C) 9
D) 12 E) 15

3. $\sqrt{x} \cdot \sqrt[3]{x} \cdot \sqrt[3]{x^2} = 8 \Rightarrow x = ?$

- A) 2 B) 4 C) 6
D) 8 E) 16

7. $\sqrt{3-2\sqrt{2}} = ?$

- A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $3\sqrt{2}$
D) $\sqrt{2}+1$ E) $\sqrt{2}-1$

4. $\sqrt{x} \cdot 2\sqrt{x} \cdot 3\sqrt{x} = 48 \Rightarrow x = ?$

- A) 1 B) 3 C) 4
D) 6 E) 8

8. $\sqrt{11-\sqrt{72}} \cdot (3+\sqrt{2}) = ?$

- A) 3 B) 5 C) 7
D) 9 E) 12

9. $\sqrt{12+8\sqrt{2}} = ?$

- A) $2\sqrt{2}$ B) $2+2\sqrt{2}$ C) $3\sqrt{2}$
 D) $3+2\sqrt{2}$ E) $5+2\sqrt{2}$

10. $\sqrt{4-\sqrt{15}} \cdot (\sqrt{5}+\sqrt{3}) = ?$

- A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $3\sqrt{2}$
 D) $4\sqrt{2}$ E) $5\sqrt{2}$

11. $\sqrt{5+\sqrt{21}} = ?$

- A) $\frac{\sqrt{7}+1}{\sqrt{2}}$ B) $\frac{\sqrt{3}+1}{\sqrt{2}}$ C) $\frac{\sqrt{2}}{\sqrt{7}+\sqrt{3}}$
 D) $\frac{\sqrt{7}-\sqrt{2}}{\sqrt{3}}$ E) $\frac{\sqrt{7}+\sqrt{3}}{\sqrt{2}}$

12. $\sqrt{20+\sqrt{20+\sqrt{20+\dots}}} = ?$

- A) 1 B) 5 C) 10
 D) 15 E) 20

13. $\sqrt{30+\sqrt{30+\sqrt{30+\dots}}} = ?$

- A) 1 B) 3 C) 5
 D) 6 E) 7

14. $\sqrt{x+\sqrt{x+\sqrt{x+\dots}}} = 6 \Rightarrow x = ?$

- A) 10 B) 20 C) 30
 D) 42 E) 50

15. $\sqrt{x-\sqrt{x-\sqrt{x-\dots}}} = 5 \Rightarrow x = ?$

- A) 10 B) 20 C) 30
 D) 40 E) 50

16. $\frac{\sqrt{9-6\sqrt{2}}}{\sqrt{3}} = ?$

- A) $6-\sqrt{2}$ B) $3-\sqrt{3}$ C) $\sqrt{6}-\sqrt{2}$
 D) $(\sqrt{2}-1)$ E) $3(\sqrt{2}-1)$

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1	2	3	4	5	6	7	8
C	A	B	C	D	A	E	C
9	10	11	12	13	14	15	16
B	A	E	B	D	C	C	D

1. $\sqrt{55 - \sqrt{38 - \sqrt{6 + \sqrt{4}}}} = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

2. $\sqrt[3]{24 + \sqrt{5 + \sqrt{18 + \sqrt[3]{-8}}}} = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

3. $\sqrt[n]{n - \sqrt{x}} = \sqrt[36]{\frac{1}{x^3}} \Rightarrow n = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

4. $a = \sqrt{x \sqrt[3]{x} \cdot \sqrt{\frac{1}{x}}}$

$b = \sqrt[3]{x^2 \cdot \sqrt{\frac{1}{x} \cdot \sqrt{x}}} \Rightarrow \frac{a}{b} = ?$

- A) 1 B)
- $x^{\frac{1}{12}}$
- C)
- $x^{\frac{1}{6}}$
-
- D)
- $x^{\frac{1}{4}}$
- E)
- $x^{\frac{1}{3}}$

5. $\sqrt{2 \cdot \sqrt[3]{4} \cdot \sqrt{\frac{1}{2}}} = 8^{x-1} \Rightarrow x = ?$

- A)
- $\frac{5}{2}$
- B)
- $\frac{5}{3}$
- C)
- $\frac{5}{4}$
-
- D) 1 E)
- $\frac{5}{6}$

6. $\sqrt[3]{\left(\frac{1}{9}\right)^{-x}} = \frac{\sqrt{27^x}}{3} \Rightarrow x = ?$

- A)
- $\frac{4}{5}$
- B) 1 C)
- $\frac{6}{5}$
-
- D)
- $\frac{7}{5}$
- E)
- $\frac{8}{5}$

7. $\sqrt{2x-3} + \sqrt{8x-12} = 21 \Rightarrow x = ?$

- A) 25 B) 26 C) 27 D) 28 E) 29

8. $x = \frac{1,96}{0,14} \Rightarrow \sqrt{x+11} = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

9. $\frac{2}{3\sqrt{2}-1} - \frac{2}{3\sqrt{2}+1} = ?$

- A) $\frac{3}{5}$ B) $\frac{4}{5}$ C) $\frac{2}{17}$
D) $\frac{3}{17}$ E) $\frac{4}{17}$

10. $\sqrt{1+\sqrt{7-2\sqrt{6}}} = A \Rightarrow A^8 = ?$

- A) $\sqrt{6}$ B) 6 C) 12 D) 36 E) 48

11. $\frac{\sqrt{2}}{\sqrt{2}+\sqrt{5}} + \frac{\sqrt{5}}{\sqrt{2}-\sqrt{5}} = ?$

- A) $-\frac{7}{3}$ B) $-\frac{5}{3}$ C) $-\frac{2}{3}$
D) $\frac{2}{3}$ E) $\frac{5}{3}$

12. $A = \sqrt{13+\sqrt{4+\sqrt{25}}}$
 $B = \frac{\sqrt{15} \cdot \sqrt{3}}{\sqrt{5}} \Rightarrow A+B = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

13. $\frac{\sqrt{10+4\sqrt{6}}}{\sqrt{2}} - \sqrt{2} = ?$

- A) $\sqrt{3}$ B) $\sqrt{2}$ C) 1 D) 2 E) 3

14. $\sqrt[4]{7+2\sqrt{12}} \cdot \sqrt{2-\sqrt{3}} = ?$

- A) $\sqrt[4]{2}$ B) $\sqrt{2}$ C) 1 D) 2 E) 4

15. $\sqrt{x+2012} + \sqrt{x-2008} = 2010$

$\sqrt{x+2012} - \sqrt{x-2008} = B$

$\Rightarrow B = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

16. $\frac{\sqrt[3]{4 \cdot \sqrt[3]{4} \cdot \sqrt[3]{4} \dots}}{\sqrt[3]{2 \cdot \sqrt{2}}} = ?$

- A) $3\sqrt{2}$ B) $\sqrt{2}$ C) $\sqrt[3]{4}$
D) $\frac{1}{2}$ E) 2


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1	2	3	4	5	6	7	8
C	B	D	A	C	C	B	C
9	10	11	12	13	14	15	16
E	D	A	D	A	C	B	B

1. $x = \frac{\sqrt{3}}{2} + 1 \Rightarrow x \cdot (x-2) = ?$

- A) $-\frac{1}{4}$ B) $-\frac{1}{2}$ C) 1 D) 2 E) 4

2. $\left. \begin{array}{l} \sqrt{a} = \sqrt{3} - 1 \\ \sqrt{b} = \sqrt{3} + 1 \end{array} \right\} \Rightarrow a + b = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

3. $a = 0, \bar{3}$ ve / and $b = 0, \bar{1}$

$$\Rightarrow \frac{\sqrt{1 + \frac{1}{a}} + \sqrt{\frac{1}{b}}}{\sqrt{3ab}} = ?$$

- A) 10 B) 12 C) 15 D) 18 E) 20

4. $\left. \begin{array}{l} x + y = 12 \\ x \cdot y = 16 \end{array} \right\} \Rightarrow \sqrt{\frac{x}{y}} - \sqrt{\frac{y}{x}} = ?$

- A) $\sqrt{2}$ B) $\sqrt{3}$ C) $\sqrt{5}$ D) $\sqrt{7}$ E) $\sqrt{10}$

5. $\frac{4\sqrt{x} - 3\sqrt{y}}{\sqrt{x} + \sqrt{y}} = 3 \Rightarrow \frac{x}{y} = ?$

- A) 12 B) 18 C) 24 D) 30 E) 36

6. $\frac{a}{b} + \frac{b}{a} = 4 \Rightarrow \sqrt{\frac{22 + a^2 + b^2}{b^2 + a^2}} = ?$

- A) 3 B) 6 C) 9 D) 12 E) 15

7. $\left. \begin{array}{l} x = \sqrt{3} + 1 \\ y = \sqrt{3} - 1 \end{array} \right\} \Rightarrow \left(\frac{x+y}{xy} \right)^2 = ?$

- A) 3 B) 4 C) 6 D) 7 E) 12

8. $\left. \begin{array}{l} \frac{a}{b} = 2 \\ a + c = 25 \\ b + c = 15 \end{array} \right\} \Rightarrow \sqrt{b^2 + a + 1} = ?$

- A) 5 B) 6 C) 9 D) 11 E) 12

9. $\frac{a+b}{\sqrt{4ab+25}} = 1 \Rightarrow |a-b| = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

10. $2^x - 2^{-x} = 4\sqrt{2}$
 $\Rightarrow \sqrt{4^x + 4^{-x} + 2} = ?$

- A) 5 B) 6 C) 9 D) 10 E) 15

11. $\left. \begin{array}{l} \sqrt[3]{b^2+11} = 3 \\ \sqrt{a^2-4} = b \end{array} \right\} \Rightarrow a^2 + b^2 = ?$

- A) 20 B) 24 C) 28 D) 32 E) 36

12. $a^x - a^{-x} = 4$
 $\Rightarrow 3\sqrt{2}\sqrt{a^{2x} + a^{-2x}} = ?$

- A) 9 B) 12 C) 16 D) 18 E) 24

13. $\left. \begin{array}{l} a > 0 \\ a + \sqrt{x} = 2 \\ b + 4\sqrt{x} = 9 \end{array} \right\} \Rightarrow (4a-b)^2 = ?$

- A) 1 B) 4 C) 9 D) 16 E) 25

14. $x - \frac{\sqrt{3}}{x} = 4 \Rightarrow 4x^2 - 16x - 2\sqrt{3} = ?$

- A) $\sqrt{3}$ B) $2\sqrt{3}$ C) $3\sqrt{3}$ D) $4\sqrt{3}$ E) $5\sqrt{3}$

15. $\frac{21 + \sqrt{4a-3}}{4a + \sqrt{3-4a}} = ?$

- A) 3 B) 5 C) 7 D) 9 E) 12

16. $a > 0,$
 $\sqrt{24+a} + \sqrt{a} = 6 \Rightarrow \sqrt{24+a} - \sqrt{a} = ?$

- A) 2 B) 3 C) 4 D) 6 E) 8



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1	2	3	4	5	6	7	8
A	D	C	C	E	B	A	D
9	10	11	12	13	14	15	16
C	B	E	D	A	B	C	C

1. $a > 2$,
 $a^2 - 4a + 2 = 0 \Rightarrow \sqrt{\frac{a^4 + 4}{12a^2}} = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
2. $a, b \in \mathbb{R}^+$,
 $\left. \begin{array}{l} \sqrt{a} - \sqrt{b} = 3 \\ a - b = 21 \end{array} \right\} \Rightarrow 2a + 3b = ?$
 A) 42 B) 48 C) 52 D) 54 E) 62
3. $\left. \begin{array}{l} \frac{a}{c} = 4 \\ \frac{a}{b} = 3 \\ \frac{b}{a} = 1 \end{array} \right\} \Rightarrow \sqrt{a^2 + c^2 + 1} = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
4. $\sqrt{4 - 2\sqrt{3}} + \sqrt{7 - 4\sqrt{3}} = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
5. $(\sqrt{3} + \sqrt{2}) \cdot \sqrt{5 - 2\sqrt{6}} = ?$
 A) 1 B) $\sqrt{2}$ C) $\sqrt{3}$ D) 2 E) $\sqrt{6}$
6. $\left. \begin{array}{l} A = \sqrt{6} + \sqrt{5} \\ B = \sqrt{6} - \sqrt{5} \end{array} \right\} \Rightarrow \frac{A}{B} + \frac{B}{A} = ?$
 A) 11 B) 14 C) 16 D) 18 E) 22
7. $\left. \begin{array}{l} x = 2 - \sqrt{3} \\ y = 2 + \sqrt{3} \end{array} \right\} \Rightarrow \sqrt{x^2 - 2xy + y^2} = ?$
 A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $\sqrt{3}$ D) $2\sqrt{3}$ E) 5
8. $\frac{\sqrt{6} - \sqrt{3}}{\sqrt{6} + \sqrt{3}} + \frac{4}{\sqrt{2}} = ?$
 A) $\sqrt{2}$ B) $\sqrt{3}$ C) 3 D) 4 E) $2\sqrt{3}$

9. $\left. \begin{array}{l} A = \sqrt{3} - \sqrt{2} \\ B = \sqrt{3} + \sqrt{2} \end{array} \right\} \Rightarrow \frac{A^2 + B^2}{A \cdot B} = ?$

- A) 6 B) 8 C) 10 D) 12 E) 14

13. $\frac{10}{\sqrt{6+1}} + \frac{4}{\sqrt{6-2}} - \frac{12}{3-\sqrt{6}} = ?$

- A) -10 B) -5 C) $-\sqrt{6}$ D) 5 E) $\sqrt{6}$

10. $\sqrt{7-\sqrt{45}} + \sqrt{7+\sqrt{45}} = ?$

- A) $2\sqrt{2}$ B) $3\sqrt{2}$ C) $2\sqrt{3}$ D) $3\sqrt{3}$ E) $4\sqrt{2}$

14. $\frac{1}{\sqrt{4+2\sqrt{3}}} - \frac{1}{\sqrt{4-2\sqrt{3}}} = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

15. $\left. \begin{array}{l} a = \sqrt[3]{3} \\ b = \sqrt[3]{4} \\ c = \sqrt[6]{6} \end{array} \right\} \Rightarrow ? < ? < ?$

- A) $c < b < a$ B) $b < c < a$ C) $c < a < b$
D) $a < c < b$ E) $a < b < c$

11. $\frac{2}{\sqrt{3+\sqrt{8}}} - \frac{2}{\sqrt{3-\sqrt{8}}} = ?$

- A) -4 B) -2 C) 0 D) 2 E) 4

16. $\frac{4}{\sqrt[3]{25} + \sqrt[3]{5} + 1} = ?$

- A) $\sqrt[3]{5}$ B) $\sqrt[3]{5}-1$ C) $\sqrt[3]{5}+1$
D) $\sqrt[3]{5}-2$ E) $\sqrt[3]{5}+2$

12. $\frac{\sqrt{3}+1}{\sqrt{15}+\sqrt{5}+\sqrt{3}+1} = ?$

- A) $\sqrt{3}+1$ B) $\sqrt{3}-1$ C) $\sqrt{5}-1$ D) $\sqrt{5}+1$ E) $\frac{\sqrt{5}-1}{4}$


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1	2	3	4	5	6	7	8
A	E	C	A	A	E	D	C
9	10	11	12	13	14	15	16
C	B	A	E	A	B	A	B

1. $\sqrt{7+\sqrt{45}} \cdot (3-\sqrt{5}) = ?$

- A)
- $\sqrt{2}$
- B)
- $2\sqrt{2}$
- C)
- $4\sqrt{2}$
- D)
- $6\sqrt{2}$
- E)
- $8\sqrt{2}$

2. $\sqrt{4-2\sqrt{3}} + \sqrt{4+2\sqrt{3}} - \sqrt{3} = ?$

- A)
- $-2\sqrt{3}$
- B)
- $-\sqrt{3}$
- C) 0 D)
- $\sqrt{3}$
- E)
- $2\sqrt{3}$

3. $\begin{cases} x = 2\sqrt{3} - 1 \\ y = 2\sqrt{3} + 1 \end{cases} \Rightarrow x^2 - y^2 = ?$

- A)
- $-8\sqrt{3}$
- B)
- $-6\sqrt{3}$
- C)
- $-4\sqrt{3}$
- D)
- $6\sqrt{2}$
- E)
- $8\sqrt{3}$

4. $\begin{cases} 4a - b = 60 \\ 2\sqrt{a} - \sqrt{b} = 6 \end{cases} \Rightarrow a + b = ?$

- A) 20 B) 30 C) 40 D) 50 E) 60

5. $\frac{\sqrt{x} + \sqrt{2x}}{\sqrt{y} + \sqrt{2y}} - \frac{y - \sqrt{xy}}{\sqrt{xy} - x} = ?$

- A)
- $\frac{x-y}{\sqrt{x-y}}$
- B)
- $\frac{x-y}{x-y}$
- C)
- $\frac{x+y}{\sqrt{x-y}}$
-
- D)
- $\frac{x+y}{x-y}$
- E)
- $\frac{\sqrt{x-y}}{x-y}$

6. $\sqrt{2-\sqrt{x}} + 1 = \sqrt{2+\sqrt{x}} \Rightarrow x = ?$

- A)
- $\frac{4}{5}$
- B)
- $\frac{4}{7}$
- C)
- $\frac{3}{7}$
- D)
- $\frac{7}{4}$
- E)
- $\frac{7}{3}$

7. $x, y \in \mathbb{R},$
 $x\sqrt{2} + y\sqrt{3} = \frac{\sqrt{6} + 1}{\sqrt{3}} \Rightarrow x + y = ?$

- A)
- $\frac{2}{3}$
- B)
- $\frac{3}{4}$
- C)
- $\frac{3}{2}$
- D)
- $\frac{4}{3}$
- E)
- $\frac{5}{2}$

8. $(\sqrt{5} + \sqrt{2})^3 \cdot (\sqrt{15} - \sqrt{6})^3 = ?$

- A)
- $9\sqrt{3}$
- B)
- $27\sqrt{3}$
- C)
- $36\sqrt{3}$
- D)
- $72\sqrt{3}$
- E)
- $81\sqrt{3}$

9. $\sqrt{3}+1=a \Rightarrow (3+\sqrt{3})^4=?$

- A) $3a^2$ B) $3a^4$ C) $9a^2$ D) $9a^4$ E) $81a^4$

10. $\sqrt{72+\sqrt{72+\sqrt{72+\dots}}}=x \Rightarrow x=?$

- A) 3 B) 4 C) 7 D) 8 E) 9

11. $\sqrt{x-\sqrt{x-\sqrt{x-\dots}}}=6 \Rightarrow x=?$

- A) 30 B) 36 C) 42 D) 48 E) 54

12. $\sqrt[3]{16 \cdot \sqrt[3]{16 \cdot \sqrt[3]{16 \cdot \dots}}}=x$

$\sqrt[4]{32 : \sqrt[4]{32 : \sqrt[4]{32 : \dots}}}=y$

$\Rightarrow \sqrt{x+y^2}=?$

- A) 3 B) 6 C) 9 D) 12 E) 15

13. $(\sqrt{6-2\sqrt{4+2\sqrt{3}}})(\sqrt{3+1})=?$

- A) $\sqrt{2}$ B) $\sqrt{3}$ C) 2 D) $\sqrt{6}$ E) 4

14. $\sqrt[3]{n \cdot \sqrt[3]{n \cdot \sqrt[3]{n \cdot \dots}}} + \sqrt{3\sqrt{3}\dots} = 5 \Rightarrow n=?$

- A) 3 B) 4 C) 5 D) 6 E) 9

15. $A = \sqrt{5\sqrt{2\sqrt{5\sqrt{2}\dots}}} \Rightarrow A=?$

- A) $\sqrt[4]{30}$ B) $\sqrt[4]{50}$ C) $\sqrt[3]{50}$ D) $\sqrt[3]{30}$ E) $\sqrt{30}$

16. $\sqrt{30+\sqrt{30+\sqrt{30+\dots}}}=x^2-x \Rightarrow \sum x=?$

- A) -2 B) -1 C) 0 D) 1 E) 2


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1	2	3	4	5	6	7	8
B	D	A	A	A	D	D	E
9	10	11	12	13	14	15	16
D	E	C	B	C	B	C	D

1. $\sqrt[3]{a^2 \cdot \sqrt{a} \cdot \sqrt{\frac{1}{a}}} = a^x \Rightarrow x = ?$

- A) $\frac{1}{4}$ B) $\frac{3}{4}$ C) 1
D) $\frac{9}{4}$ E) $\frac{11}{4}$

2. $\sqrt[3]{2 \cdot \sqrt[3]{2} \cdot \sqrt{2^x}} = 16 \Rightarrow x = ?$

- A) 8 B) 16 C) 32
D) 64 E) 128

3. $\sqrt[3]{x^2 \cdot \sqrt{x} \cdot \sqrt[3]{x^2}} = \sqrt[9]{2^{17}} \Rightarrow x = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

4. $\left(\frac{3}{\sqrt{3}} + 2\right) \cdot (\sqrt{3} - 2) = ?$

- A) -1 B) -3 C) 0
D) 1 E) 3

5. $\frac{1}{\sqrt{3} - \sqrt{2}} + \frac{1}{\sqrt{3} + \sqrt{2}} = ?$

- A) $\sqrt{3}$ B) $2\sqrt{3}$ C) $3\sqrt{3}$
D) $4\sqrt{3}$ E) $5\sqrt{3}$

6. $\frac{1}{\sqrt{4} - \sqrt{12}} + \frac{1}{\sqrt{4} + 2\sqrt{3}} = ?$

- A) $\sqrt{2}$ B) $3\sqrt{2}$ C) $\sqrt{3}$
D) $2\sqrt{3}$ E) $4\sqrt{3}$

7. $\frac{8}{\sqrt{2}} - \frac{1}{\sqrt{2}-1} + \frac{1}{\sqrt{2}+1} = ?$

- A) $4\sqrt{2} - 2$ B) $3\sqrt{2} - 2$ C) $3\sqrt{2}$
D) $4\sqrt{2}$ E) $2 - 4\sqrt{2}$

8. $\sqrt{\frac{1}{9} + \frac{1}{4} + \frac{1}{3}} = ?$

- A) $-\frac{1}{6}$ B) $-\frac{5}{6}$ C) 0
D) $\frac{1}{6}$ E) $\frac{5}{6}$

9. $\sqrt[8]{\frac{3^7+3^7+3^7}{4^3+4^3+4^3+4^3}} = ?$
 A) 1 B) $\frac{3}{2}$ C) 2
 D) $\frac{5}{2}$ E) 3

10. $\sqrt[6]{32 \cdot \sqrt[6]{32 \cdot \sqrt[6]{32 \dots}}} = ?$
 A) 1 B) 2 C) 3
 D) 4 E) 5

11. $\sqrt[3]{16 : \sqrt[3]{16 : \sqrt[3]{16 : \dots}}} = ?$
 A) 6 B) 5 C) 4
 D) 3 E) 2

12. $\sqrt[4]{32 : \sqrt[4]{32 : \sqrt[4]{32 : \dots}}} = ?$
 A) 2 B) 4 C) 6
 D) 8 E) 16

13. $\left. \begin{aligned} \sqrt{6+\sqrt{6+\sqrt{6+\sqrt{6+\dots}}} = x \\ \sqrt{27 : \sqrt{27 : \sqrt{27 : \dots}}} = y \end{aligned} \right\} \Rightarrow x+y = ?$
 A) 3 B) 6 C) 9
 D) 12 E) 15

14. $\left. \begin{aligned} \sqrt{2} = a \\ \sqrt[3]{3} = b \end{aligned} \right\} \Rightarrow a^4 b^6 = ?$
 A) 6 B) 12 C) 24
 D) 36 E) 72

15. $\frac{\sqrt{111^2+222^2+333^2}}{37\sqrt{14}} = ?$
 A) 1 B) 2 C) 3
 D) 4 E) 5

16. $\frac{2}{2-\sqrt{2}} - \frac{4}{2\sqrt{2}} = ?$
 A) 1 B) $\sqrt{2}$ C) 2 D) $\sqrt{5}$ E) 4

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1	2	3	4	5	6	7	8
B	D	D	A	B	C	A	E
9	10	11	12	13	14	15	16
B	B	E	A	B	D	C	C

1. $x \in \mathbb{Z}, A \in \mathbb{R},$

$$A = \sqrt[3]{3-|x-4|} \Rightarrow \sum x = ?$$

- A) 7 B) 14 C) 18 D) 21 E) 28

2. $\sqrt{2} = a, \sqrt{3} = b, \sqrt{5} = c \Rightarrow \sqrt{240} = ?$

- A) abc B)
- a^2bc
- C)
- ab^2c
-
- D)
- a^3bc
- E)
- a^4bc

3. $\sqrt{7+\sqrt{24}} - \sqrt{8-4\sqrt{3}} = ?$

- A)
- $1-\sqrt{2}$
- B)
- $1+\sqrt{2}$
- C)
- $\sqrt{6}$
-
- D)
- $2\sqrt{6}$
- E)
- $\sqrt{6}-\sqrt{2}$

4. $A = \sqrt{7+2\sqrt{12}} \Rightarrow A + \frac{1}{A} = ?$

- A) 2 B) 4 C)
- $2\sqrt{3}$
-
- D)
- $2+\sqrt{3}$
- E)
- $2-\sqrt{3}$

5. $\sqrt{2012 \cdot 2014 + 1} = ?$

- A) 2012 B) 2013 C) 2014
-
- D) 2015 E) 2016

6. $\sqrt{\frac{1}{144} - \frac{1}{30} + \frac{1}{25}} = ?$

- A)
- $\frac{7}{60}$
- B)
- $\frac{7}{30}$
- C)
- $\frac{7}{15}$
-
- D)
- $\frac{7}{30}$
- E)
- $\frac{7}{60}$

7. $\frac{1}{\sqrt{3} - \frac{1}{1 + \frac{1}{\sqrt{3}}}} = ?$

- A)
- $\sqrt{3}-1$
- B)
- $\sqrt{3}+1$
- C)
- $\frac{\sqrt{3}+1}{2}$
-
- D)
- $\frac{\sqrt{3}+1}{3}$
- E)
- $\frac{\sqrt{3}-1}{2}$

8. $\sqrt{\frac{\sqrt{2}-1}{\sqrt{2}+1}} - \sqrt{\frac{\sqrt{2}+1}{\sqrt{2}-1}} = ?$

- A) -2 B) -1 C)
- $-2\sqrt{2}$
- D) 2 E)
- $2\sqrt{2}$

9. $\frac{\sqrt[4]{0,0016} + \sqrt[3]{0,027}}{\sqrt{0,49} - \sqrt[5]{32 \cdot 10^{-5}}} = ?$

- A) -1 B) $-\frac{1}{2}$ C) $\frac{1}{2}$
D) 1 E) 2

10. $(3\sqrt{3})^{\sqrt{x}} = (\sqrt[3]{9})^{\sqrt{5}} \Rightarrow x = ?$

- A) $\frac{80}{81}$ B) $\frac{40}{81}$ C) $\frac{20}{9}$
D) $\frac{10}{9}$ E) $\frac{8}{9}$

11. $\begin{cases} \sqrt{x - \sqrt{x - \sqrt{x - \dots}}} = 4 \\ \sqrt{y + \sqrt{y + \sqrt{y + \dots}}} = 8 \end{cases} \Rightarrow \frac{x}{y} = ?$

- A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) $\frac{4}{7}$
D) $\frac{5}{8}$ E) $\frac{5}{14}$

12. $\begin{cases} \sqrt{2 : \sqrt{2 : \sqrt{2 : \dots}}} = A \\ \sqrt[4]{54 \cdot \sqrt[4]{54 \cdot \sqrt[4]{54 \dots}}} = B \end{cases} \Rightarrow \frac{A}{B} = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{\sqrt{2}}$
D) $\frac{1}{\sqrt{3}}$ E) $\frac{1}{\sqrt{6}}$

13. $\sqrt[3]{27x - 27} - \sqrt[3]{1 - x} = 8 \Rightarrow x = ?$

- A) 8 B) 9 C) 16 D) 27 E) 32

14. $\frac{2}{\frac{\sqrt{a}}{\sqrt{b}} - 1} - \frac{2}{1 - \frac{\sqrt{b}}{\sqrt{a}}} = ?$

- A) -2 B) -1 C) \sqrt{a}
D) \sqrt{b} E) $\sqrt{a} - \sqrt{b}$

15. $\frac{2\sqrt{2} + 2\sqrt{2}}{\sqrt[3]{4} + \sqrt[3]{4}} = A \Rightarrow A^6 = ?$

- A) 4 B) 8 C) 16 D) 32 E) 64

16. $x + \sqrt{x} = 4 \Rightarrow x + \frac{4}{\sqrt{x}} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

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1	2	3	4	5	6	7	8
E	E	B	B	B	E	D	A
9	10	11	12	13	14	15	16
D	A	E	B	B	A	D	E

1. $\frac{18 + \sqrt{3-x}}{x + \sqrt{x-3}} = ?$

- A) 1 B) 2 C) 3
D) 6 E) 8

2. $a^2 = 5 + 2\sqrt{6} \Rightarrow a \cdot (\sqrt{3} - \sqrt{2}) = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

3. $\sqrt{12 + 2\sqrt{11}} \cdot (\sqrt{11} - 1) = ?$

- A) 4 B) 6 C) 8
D) 9 E) 10

4. $4^a = 3 \Rightarrow 2^{5a} = ?$

- A) $3\sqrt{3}$ B) $5\sqrt{3}$ C) $9\sqrt{3}$
D) $12\sqrt{3}$ E) $15\sqrt{3}$

5. $\sqrt{\frac{9}{16} + \frac{1}{2} + \frac{1}{9}} = ?$

- A) $\frac{10}{9}$ B) $\frac{11}{10}$ C) $\frac{12}{11}$
D) $\frac{13}{12}$ E) $\frac{14}{13}$

6. $\sqrt{\frac{25}{144} - \frac{5}{14} + \frac{9}{49}} = ?$

- A) $\frac{1}{49}$ B) $\frac{1}{56}$ C) $\frac{1}{70}$
D) $\frac{1}{77}$ E) $\frac{1}{84}$

7. $\sqrt[6]{\sqrt{5}-1} \cdot \sqrt{\sqrt{5}+1} \cdot \sqrt[3]{\sqrt{5}-1} = ?$

- A) 2 B) 4 C) 5
D) 6 E) 7

8. $\sqrt{2} + \sqrt{4} + \sqrt{6} + \dots + \sqrt{48} + \sqrt{50} = A$
 $\Rightarrow 1 + \sqrt{2} + \sqrt{3} + \dots + \sqrt{24} + \sqrt{25} = ?$

- A) $\frac{A\sqrt{2}}{2}$ B) $A\sqrt{2}$ C) $\frac{A}{2}$
D) $\frac{A\sqrt{2}}{4}$ E) $\frac{A\sqrt{2}}{8}$

9. $\sqrt{973 \cdot 977 + 4} = ?$
 A) 675 B) 775 C) 875
 D) 975 E) 1075

13. $\frac{\sqrt{1,69} - \sqrt{0,16}}{\sqrt{0,25} + \sqrt{0,16}} = ?$
 A) 5 B) 4 C) 3
 D) 2 E) 1

10. $\frac{\sqrt{5+2\sqrt{6}}}{\sqrt{2+\sqrt{3}}} = ?$
 A) 1 B) 3 C) 5
 D) 7 E) 9

14. $x < 0 < y \Rightarrow \sqrt{(x-y)^2} + \sqrt{x^2} + \sqrt{y^2} = ?$
 A) $y-x$ B) $x-y$ C) $x+y$
 D) $2(y-x)$ E) $2(y+x)$

11. $\frac{1}{\sqrt{5-2\sqrt{6}}} - \frac{1}{\sqrt{5+2\sqrt{6}}} = ?$
 A) $\sqrt{2}$ B) $2\sqrt{2}$ C) $4\sqrt{2}$
 D) $5\sqrt{2}$ E) $6\sqrt{2}$

15. $\sqrt{\frac{1}{25} + \frac{1}{9} - \frac{2}{15}} = ?$
 A) $\frac{1}{15}$ B) $\frac{2}{15}$ C) $\frac{1}{5}$
 D) $\frac{4}{15}$ E) $\frac{2}{5}$

12. $(\sqrt{7}-1) \cdot \left(1 + \frac{3\sqrt{7}}{7} + \frac{4}{\sqrt{7}}\right) = ?$
 A) 2 B) 3 C) 4
 D) 5 E) 6

16. $x > 0$
 $\sqrt{4x^2-4} + \sqrt{x^2-1} = 9 \Rightarrow x = ?$
 A) 2 B) $\sqrt{3}$ C) 3 D) $\sqrt{5}$ E) $\sqrt{10}$

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1	2	3	4	5	6	7	8
D	A	E	C	D	E	A	A
9	10	11	12	13	14	15	16
D	A	B	E	E	D	B	E

1. $\sqrt{4\sqrt{3}-1} \cdot \sqrt{4\sqrt{3}+1} \cdot \sqrt{\sqrt{3}+1} = ?$

- A) $\sqrt{3}-1$ B) $\sqrt{3}$ C) $\sqrt{2}$
 D) 1 E) 2

2. $2 \leq x < 3,$
 $\sqrt{x^2-6x+9} - \sqrt{x^2-4x+4} = x-1$
 $\Rightarrow x = ?$

- A) 2 B) $\frac{5}{2}$ C) $\frac{5}{3}$
 D) $\frac{7}{3}$ E) $\frac{9}{4}$

3. $\sqrt{x^3\sqrt{x^2}} = 3\sqrt{x \cdot \sqrt{\left(\frac{1}{x}\right)^m}} \Rightarrow m = ?$

- A) -5 B) -3 C) -2 D) 2 E) 3

4. $\sqrt{2} + \frac{1}{\sqrt{2}-1} : \sqrt{2} - \frac{1}{\sqrt{2}+1} = ?$

- A) $2+\sqrt{2}$ B) $-\frac{\sqrt{2}}{2}$ C) $\frac{4-\sqrt{2}}{2}$
 D) $\frac{4+\sqrt{2}}{2}$ E) $\frac{6+\sqrt{2}}{2}$

5. $\sqrt{2} \cdot x - 1 = x + \sqrt{2} \Rightarrow x^2 - 6x + 9 = ?$

- A) $\sqrt{2}-1$ B) $\sqrt{2}+1$ C) $2\sqrt{2}-1$
 D) $2\sqrt{2}$ E) 8

6. $\sqrt{\frac{1}{36} + \frac{1}{4} - \frac{1}{6}} = ?$

- A) $-\frac{1}{2}$ B) $-\frac{1}{3}$ C) $\frac{1}{3}$
 D) $\frac{1}{2}$ E) $\frac{1}{6}$

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7. $\frac{2}{\sqrt{5}-\sqrt{24}} - \frac{2}{\sqrt{5}+\sqrt{24}} = ?$

- A) $-4\sqrt{3}$ B) $-2\sqrt{3}$ C) $2\sqrt{2}$
 D) $4\sqrt{2}$ E) $2\sqrt{3}-2\sqrt{2}$

8. $\sqrt{3+\sqrt{5}} - \sqrt{3-\sqrt{5}} = ?$

- A) $\frac{\sqrt{2}}{2}$ B) $\sqrt{2}$ C) $2\sqrt{2}$
 D) $3\sqrt{2}$ E) $\sqrt{2}-1$

9. $A = \sqrt{32 - \sqrt{42 + \sqrt{42 + \sqrt{42 + \dots}}}}$
 $B = \sqrt{45 + \sqrt{20 - \sqrt{20 - \sqrt{20 - \dots}}}} \Rightarrow A \cdot B = ?$
 A) 32 B) 35 C) 42 D) 45 E) 54

10. $A = \sqrt{2 \cdot \sqrt{3 \cdot \sqrt{2 \cdot \sqrt{3 \dots}}}}$
 $B = \sqrt{3 \cdot \sqrt{2 \cdot \sqrt{3 \cdot \sqrt{2 \dots}}}} \Rightarrow A \cdot B = ?$
 A) 6 B) 8 C) 9 D) 12 E) 18

11. $\frac{\sqrt{5}}{\sqrt{15} - \sqrt{10}} - \frac{\sqrt{3}}{3 + \sqrt{6}} = ?$
 A) $-2\sqrt{3}$ B) $-2\sqrt{2}$ C) 0
 D) $2\sqrt{2}$ E) $2\sqrt{3}$

12. $\frac{x-3}{\sqrt{x}+\sqrt{3}} - (\sqrt{x}+\sqrt{3}) = ?$
 A) $-2\sqrt{x}$ B) $-2\sqrt{3}$ C) $2\sqrt{x}$
 D) $\sqrt{3}$ E) $2\sqrt{3}$

13. $\sqrt{x \cdot \sqrt[3]{x} \cdot \sqrt{x}} = 8$
 $\frac{x}{y} = 2 \Rightarrow x + y = ?$
 A) 6 B) 12 C) 15 D) 18 E) 24

14. $\sqrt{3+\sqrt{x}} - \sqrt{3-\sqrt{x}} = \sqrt{2} \Rightarrow x = ?$
 A) 3 B) 4 C) 5 D) 6 E) 8

15. $a = \sqrt[4]{8}$, $b = \sqrt[3]{4}$, $c = \sqrt[12]{128}$
 $\Rightarrow ? < ? < ?$
 A) $b < a < c$ B) $a < b < c$
 C) $c < a < b$ D) $c < b < a$
 E) $b < c < a$

16. $\sqrt[3]{3 \sqrt[3]{3^{x+3}}} = 3^{x-2} \Rightarrow x = ?$
 A) 3 B) 4 C) 5 D) 6 E) 7

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1	2	3	4	5	6	7	8
C	A	B	D	E	C	D	B
9	10	11	12	13	14	15	16
B	A	D	B	E	C	D	A

1. $x = 5 + \sqrt{x} \Rightarrow x - \frac{5}{\sqrt{x}} = ?$

- A) 3 B) 2 C) 5 D) 4 E) 6

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

2. $\frac{\sqrt{x}}{\sqrt{x} + \sqrt{y}} + \frac{\sqrt{y}}{\sqrt{x} - \sqrt{y}} = \frac{3}{2} \Rightarrow \frac{x}{y} = ?$

- A) 5 B) $\frac{3}{2}$ C) 1 D) $\frac{2}{3}$ E) $\frac{1}{5}$

[HARRAN ÜNİVERSİTESİ – YÖS 2020]

3. $a = \sqrt[3]{5}, b = \sqrt[11]{625}, c = \sqrt[7]{125}$

a, b ve c sayıları için aşağıdaki sıralamalardan hangisi doğrudur?

Which of the following order is correct for numbers a, b and c?

- A) $a < c < b$ B) $c < b < a$ C) $c < a < b$
D) $a < b < c$ E) $b < a < c$

[GAZİANTEP ÜNİVERSİTESİ – YÖS 2020]

4. $\frac{10}{\sqrt{6}-1} + \frac{3}{\sqrt{2}+1} - \frac{\sqrt{6}}{2-\sqrt{3}} = ?$

- A) -1 B) $\sqrt{6} + \sqrt{2}$ C) $3\sqrt{2}$
D) $2\sqrt{6}$ E) $6\sqrt{2}$

[İSTANBUL ÜNİVERSİTESİ – YÖS 2019]

5. $x = \sqrt{11} + \sqrt{7}$
 $y = \sqrt{12} + \sqrt{6}$
 $z = \sqrt{10} + \sqrt{8}$

Aşağıdaki sıralamalardan hangisi doğrudur?

Which of the following orders is correct?

- A) $x > z > y$ B) $y > z > x$ C) $y > x > z$
D) $z > y > x$ E) $z > x > y$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2019]

6. $\sqrt{7+\sqrt{40}} - \sqrt{7-\sqrt{40}} = ?$

- A) $\sqrt{2}$ B) $5\sqrt{2}$ C) $2\sqrt{5}$
D) 0 E) $2\sqrt{2}$

[AKDENİZ ÜNİVERSİTESİ – YÖS 2019]

7. $x, y \in \mathbb{Z}$
 $x\sqrt{5} + y\sqrt{5} = 3x - 2y + 20$
 $\Rightarrow x = ?$

- A) 20 B) 10 C) 0 D) -4 E) -20

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2019]

8. $\sqrt{5} \cong 2,2$
 $\sqrt{11} \cong 3,3$
 $\Rightarrow \sqrt{44} - \frac{3\sqrt{5}}{\sqrt{11}} = ?$

- A) 2 B) 3 C) 4 D) 4,3 E) 4,6

[ANKARA ÜNİVERSİTESİ – YÖS 2018]

9. $\frac{\sqrt{7} + \sqrt{6} - 1}{\sqrt{6} - \sqrt{7} + 1}$

ifadesinin eşiti nedir?

What is the equivalent expression of the expression above?

- A) $\sqrt{6} - \sqrt{7}$ B) $\sqrt{7} - \sqrt{6}$ C) 1
D) $\sqrt{6} + \sqrt{7}$ E) -1

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

10. $\sqrt{3 + 2\sqrt{2}} + \sqrt{3 - 2\sqrt{2}} = ?$

- A) $\sqrt{2}$ B) 2 C) $2\sqrt{2}$
D) $2\sqrt{2} + 2$ E) 0

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

11. $\frac{\sqrt{3} + 1}{\sqrt{3}} - \frac{1 - \sqrt{3}}{\sqrt{3}} = ?$

- A) $\frac{2\sqrt{3}}{3}$ B) $\frac{2}{3}$ C) 0
D) 2 E) $\sqrt{3}$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

12. $\sqrt{75} + \sqrt{108} - \sqrt{48} = ?$

- A) $\sqrt{231}$ B) $\sqrt{135}$ C) $15\sqrt{3}$ D) $7\sqrt{3}$ E) 0

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

13. $a = \sqrt{2} - 1 \Rightarrow a^2 + 3a - 10 = ?$

- A) $\sqrt{2}$ B) $\sqrt{2} - 10$ C) $\sqrt{2} + 10$
D) $2\sqrt{2} - 5$ E) $\sqrt{2} + 1$

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2018]

14. $\frac{\sqrt{16} - \sqrt{9} + \sqrt{25}}{\sqrt{0,81} + \sqrt[3]{0,027}} = ?$

- A) 1 B) 2 C) 3 D) 5 E) 10

[ERCİYES ÜNİVERSİTESİ – YÖS 2017]

15. $\left. \begin{array}{l} a = \sqrt{7} - \sqrt{3} \\ b = \sqrt{7} + \sqrt{3} \end{array} \right\} \Rightarrow \frac{a}{b} + \frac{b}{a} = ?$

- A) -3 B) -1 C) 0 D) 1 E) 5

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

16. $\sqrt{2,25} + \sqrt[3]{0,027} - 6 \cdot \sqrt[4]{0,0081} = ?$

- A) 6 B) 2 C) 9 D) 0 E) 7

[SELÇUK ÜNİVERSİTESİ – YÖS 2017]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	A	D	A	E	E	D	E
9	10	11	12	13	14	15	16
D	C	D	D	B	D	E	D

BÖLÜM CHAPTER

5

TARİHSEL NOT / HISTORICAL NOTE

Atiyah, Sir Michael Francis [1929 –]

Topoloji, Geometri, Analiz, cebirsel değişimlerin transdantal teorisi, diferansiyel işlemler ve kuantum alan teorisine önemli katkıları olan İngiliz matematikçidir. 1966'da Field Medal, 2004'de Abel ödülü ile ödüllendirilmiştir.

British mathematician who made important contributions in topology, geometry, analysis, the transcendental theory of algebraic varieties, differential operators and quantum field theory. Awarded the Fields Medal in 1966 and the Abel Prize in 2004.

ÖZDEŞLİKLER ve ÇARPANLARA AYIRMA IDENTITIES and FACTORING

Bu bölüm 304 test sorusu, 16 YÖS sorusu içermektedir.

This chapter includes 304 test questions, and 16 YÖS questions.

BÖLÜM / CHAPTER 5

ÖZDEŞLİKLER ve ÇARPANLARA AYIRMA / IDENTITIES and FACTORING

- Özdeşlikler ve Çarpanlara Ayırma / Identities and Factoring..... 157 - 198

BÖLÜM
05
CHAPTER

ÖZDEŞLİKLER VE ÇARPANLARA AYIRMA
IDENTITIES AND FACTORING

Bölüm / Chapter **5**

Özdeşlikler ve Çarpanlara Ayırma / Identities and Factoring

Test **1**

1. $\left. \begin{array}{l} x^2 - y^2 = 48 \\ x - y = 4 \end{array} \right\} \Rightarrow x + y = ?$

- A) 6 B) 8 C) 10 D) 12 E) 14

2. $\left. \begin{array}{l} x^2 - y^2 = 144 \\ x + y = 16 \end{array} \right\} \Rightarrow x - y = ?$

- A) 10 B) 9 C) 8 D) 7 E) 6

3. $\left. \begin{array}{l} x^2 - y^2 = 200 \\ x - y = 10 \end{array} \right\} \Rightarrow x \cdot y = ?$

- A) 75 B) 70 C) 65 D) 60 E) 55

4. $\left. \begin{array}{l} x^2 - y^2 = 225 \\ x + y = 25 \end{array} \right\} \Rightarrow x \cdot y = ?$

- A) 120 B) 124 C) 128 D) 132 E) 136

5. $x, y \in \mathbb{N}^+$
 $x^2 - y^2 = 31 \Rightarrow x \cdot y = ?$

- A) 200 B) 205 C) 240 D) 215 E) 220

6. $a^2 + ab = 15$
 $b^2 + ab = 10$
 $\Rightarrow |a + b| = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

7. $a \cdot (a + b) + b \cdot (a + b) = 64$
 $\Rightarrow (a + b)^2 = ?$

- A) 4 B) 8 C) 16 D) 36 E) 64

8. $a^2 - ab = 74$
 $b^2 - ab = 26$
 $\Rightarrow (a - b)^2 = ?$

- A) 10 B) 20 C) 25 D) 50 E) 100

9. $\left. \begin{array}{l} x^2 - xy = 48 \\ xy - y^2 = -16 \end{array} \right\} \Rightarrow (x-y)^2 = ?$
 A) 100 B) 81 C) 64 D) 49 E) 36

10. $a(a+b) + b(a+b) = 16$
 $\Rightarrow |a+b| = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

11. $\left. \begin{array}{l} a \cdot b = 7 \\ a + b = 4 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$
 A) 2 B) 4 C) 6 D) 8 E) 12

12. $\left. \begin{array}{l} a + b = 12 \\ a \cdot b = 20 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$
 A) 90 B) 95 C) 97 D) 104 E) 144

13. $\left. \begin{array}{l} a - b = 4 \\ a \cdot b = 7 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$
 A) 10 B) 20 C) 30 D) 40 E) 50

14. $\left. \begin{array}{l} a - b = 6 \\ a \cdot b = 10 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$
 A) 16 B) 26 C) 36 D) 46 E) 56

15. $x + \frac{2}{x} = 5 \Rightarrow x^2 + \frac{4}{x^2} = ?$
 A) 15 B) 21 C) 25 D) 28 E) 35

16. $x - \frac{1}{x} = 4 \Rightarrow x^2 + \frac{1}{x^2} = ?$
 A) 12 B) 16 C) 18 D) 24 E) 28



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	B	A	E	C	E	E	E
9	10	11	12	13	14	15	16
C	D	A	D	C	E	B	C

1. $x, y \in \mathbb{Z}^+$,
 $x^2 - y^2 = 11 \Rightarrow x = ?$
 A) 3 B) 4 C) 5
 D) 6 E) 7
2. $\left. \begin{array}{l} 4^{2a} - 4^{2b} = 16 \\ 4^a + 4^b = 8 \end{array} \right\} \Rightarrow 4^a - 4^b = ?$
 A) 1 B) 2 C) 3
 D) 4 E) 5
3. $x, y \in \mathbb{R}^+$
 $4x^2 - 9y^2 = 13 \Rightarrow x = ?$
 A) $\frac{7}{2}$ B) $\frac{7}{3}$ C) $\frac{7}{4}$ D) $\frac{7}{5}$ E) $\frac{7}{6}$
4. $\left. \begin{array}{l} a + b = 6 \\ a \cdot b = 12 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$
 A) 3 B) 6 C) 9
 D) 12 E) 18
5. $\left. \begin{array}{l} a - b = 7 \\ a \cdot b = 60 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$
 A) 132 B) 144 C) 156 D) 169 E) 172
6. $\left. \begin{array}{l} x^2 + y^2 = 20 \\ x \cdot y = 8 \end{array} \right\} \Rightarrow x^4 + y^4 = ?$
 A) 180 B) 172 C) 210 D) 240 E) 272
7. $\left. \begin{array}{l} x^2 + y^2 = 13 \\ x \cdot y = 4 \end{array} \right\} \Rightarrow x^4 + y^4 = ?$
 A) 130 B) 132 C) 134 D) 137 E) 139
8. $\left. \begin{array}{l} x + y = 5 \\ x \cdot y = 2 \end{array} \right\} \Rightarrow x^4 + y^4 = ?$
 A) 407 B) 410 C) 417
 D) 425 E) 433

$$9. \left. \begin{array}{l} x^5 + y^5 = 14 \\ x \cdot y = 2 \end{array} \right\} \Rightarrow x^{10} + y^{10} = ?$$

- A) 130 B) 131 C) 132
D) 133 E) 134

$$10. x - \frac{1}{x} = 4 \Rightarrow x^2 + \frac{1}{x^2} = ?$$

- A) 4 B) 8 C) 12
D) 14 E) 18

$$11. x + \frac{1}{x} = 4 \Rightarrow \frac{x^4 + 1}{x^2} = ?$$

- A) 10 B) 12 C) 14
D) 16 E) 18

$$12. x + \frac{1}{x} = 8 \Rightarrow \frac{x^4 + 1}{x^2} = ?$$

- A) 60 B) 61 C) 62 D) 63 E) 64

$$13. 2x - \frac{1}{x} = 6$$

$$\Rightarrow 4x^2 + \frac{1}{x^2} = ?$$

- A) 40 B) 42 C) 44 D) 46 E) 48

$$14. a + \frac{1}{a} = 5 \Rightarrow \frac{a^6 + a^2}{a^4} = ?$$

- A) 23 B) 25 C) 33 D) 35 E) 43

$$15. a^2 - 5a + 1 = 0 \Rightarrow a^2 + \frac{1}{a^2} = ?$$

- A) 13 B) 15 C) 17 D) 19 E) 23

$$16. x^2 - 4x + 2 = 0 \Rightarrow x^2 + \frac{4}{x^2} = ?$$

- A) 10 B) 12 C) 14 D) 16 E) 18


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	B	A	D	D	E	D	E
9	10	11	12	13	14	15	16
C	E	C	C	A	A	E	B

1. $x^2 - y = y^2 - x \Rightarrow x + y = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

2. $\left. \begin{array}{l} a+b=12 \\ a^2+b^2=84 \end{array} \right\} \Rightarrow a \cdot b = ?$

- A) 12 B) 15 C) 20 D) 25 E) 30

3. $(3x+1)^2 = 9x^2 + 97 \Rightarrow x = ?$

- A) 16 B) 18 C) 24 D) 28 E) 32

4. $(a+b)^2 = 4ab \Rightarrow a - b + 3 = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

5. $\left. \begin{array}{l} a^2+b^2+a \cdot b=60 \\ a-b=6 \end{array} \right\} \Rightarrow a \cdot b = ?$

- A) 5 B) 6 C) 8 D) 10 E) 12

6. $\left. \begin{array}{l} \frac{x^2-y^2}{x^2y-xy^2}=4 \\ x \cdot y=3 \end{array} \right\} \Rightarrow x^2+y^2 = ?$

- A) 108 B) 116 C) 124 D) 138 E) 140

7. $x, y \in \mathbb{Z}^+$
 $4x^2 - y^2 = 23 \Rightarrow x + y = ?$

- A) 15 B) 16 C) 17 D) 18 E) 19

8. $\left. \begin{array}{l} a \neq 0, \\ 1 - \frac{b}{a} = \frac{3}{a} \\ a \cdot b = 10 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$

- A) 27 B) 29 C) 31 D) 33 E) 35

9. $\frac{a}{b} + \frac{4b}{a} = 4 \Rightarrow \frac{a+b}{a-b} = ?$

- A) 1 B) 3 C) 5 D) 7 E) 9

10. $\left. \begin{array}{l} a^2 - b^2 = 25 \\ \frac{1}{a-b} + \frac{1}{a+b} = \frac{26}{25} \end{array} \right\} \Rightarrow a - b = ?$

- A) 1 B) 2 C) 4 D) 5 E) 7

11. $\left. \begin{array}{l} b - a^2 = x \\ b^2 + a = y \\ a - b = 1 \end{array} \right\} \Rightarrow x + y = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

12. $\frac{a}{b} + \frac{b}{a} = 8 \Rightarrow \frac{(a-b)^2}{a \cdot b} = ?$

- A) 4 B) 6 C) 8 D) 10 E) 12

13. $\left. \begin{array}{l} a + b = 7 \\ a \cdot b = 8 \end{array} \right\} \Rightarrow \frac{a^2}{a-1} + \frac{b^2}{b-1} = ?$

- A) $\frac{15}{2}$ B) $\frac{17}{2}$ C) $\frac{21}{2}$ D) $\frac{23}{2}$ E) $\frac{25}{2}$

14. $\left. \begin{array}{l} a^2 - c^2 = 55 \\ c^2 - b^2 = 13 \\ a - b = 4 \end{array} \right\} \Rightarrow a + b = ?$

- A) 11 B) 14 C) 15 D) 16 E) 17

15. $\left. \begin{array}{l} a - c = c - b = 5 \\ a \cdot b = 24 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$

- A) 132 B) 144 C) 148 D) 152 E) 160

16. $\left. \begin{array}{l} a > b, \\ a^2 - ab = 75 \\ ab - b^2 = 50 \end{array} \right\} \Rightarrow a + b = ?$

- A) 15 B) 25 C) 30 D) 35 E) 40


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	E	A	C	C	D	C	B
9	10	11	12	13	14	15	16
B	A	A	B	D	E	C	B

1. $\frac{200^2 - 20^2}{50^2 - 5^2} = 8 \cdot x \Rightarrow x = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

2. $\frac{(200^2 - 25^2) - 625}{62} = x^4 \Rightarrow x = ?$

- A) 5 B) 10 C) 15 D) 20 E) 25

3. $\frac{(325^2 - 25^2) - 300 \cdot 50}{6a} = 600 \Rightarrow a = ?$

- A) 15 B) 25 C) 30 D) 50 E) 75

4. $\left. \begin{array}{l} a = 17,49 \\ b = 12,51 \end{array} \right\} \Rightarrow (a-b)^2 + 4ab = ?$

- A) 30 B) 300 C) 450 D) 600 E) 900

5. $a - b = b - c = 2$
 $\Rightarrow a^2 - 2b^2 + c^2 + 1 = ?$

- A) 7 B) 8 C) 9 D) 10 E) 11

6. $\frac{x^2 - bx - 12}{x^2 + 10x + c} = \frac{x-2}{x+4} \Rightarrow b+c = ?$

- A) 10 B) 14 C) 16 D) 20 E) 24

7. $37 \cdot 53 = a^2 - b^2$
 $\Rightarrow b = ?$

- A) 6 B) 8 C) 10 D) 12 E) 16

8. $(10002) \cdot (9998) = ?$

- A) $10^4 - 2$ B) $10^6 - 4$ C) $10^6 - 2$
D) $10^8 - 2$ E) $10^8 - 4$

9. $\frac{52^2 - 48 \cdot 104 + 48^2}{52^2 - 48^2} = ?$

- A) 0,004 B) 0,04 C) 0,4 D) 4 E) 40

10. $x = 2,998,$
 $y = 0,998$
 $\Rightarrow x^3 - 3x^2y + 3xy^2 - y^3 = ?$

- A) 2 B) 4 C) 6 D) 8 E) 12

11. $\frac{\frac{100}{99} + 1}{\left(\frac{100}{99}\right)^2 - 1} = ?$

- A) 99 B) 100 C) 101 D) 121 E) 144

12. $x = \frac{2}{5}, y = \frac{3}{5}$
 $\Rightarrow \frac{(x-y)^2 + 4xy}{x^3 + y^3} = ?$

- A) $\frac{7}{25}$ B) $\frac{7}{15}$ C) $\frac{15}{7}$ D) $\frac{25}{7}$ E) $\frac{30}{7}$

13. $a = 100002$

$\Rightarrow a^2 - 4a = ?$

- A) $10^6 - 4$ B) $10^8 - 4$ C) $10^{10} - 4$
D) $10^8 - 2$ E) $10^{10} - 2$

14. $3(a-2)^2 + 5(b+1)^2 = 0$

$\Rightarrow 5b + 3a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

15. $a, b, c \in \mathbb{R}^+,$

$\frac{a}{b} = \frac{b}{c}$

$a^2 + 9ac + 6ab = 36$

$\Rightarrow a + 3b = ?$

- A) 3 B) 6 C) 12 D) 18 E) 27

16. $a + b = 8$

$\Rightarrow 4a^2 + 4b^2 + a^2b + ab^2 = ?$

- A) 16 B) 64 C) 128 D) 256 E) 512


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	A	B	E	C	D	B	E
9	10	11	12	13	14	15	16
B	D	A	D	C	A	B	D

1. $x^2 - a^2 = 14,$
 $a^2 - y^2 = 6,$
 $x + y = 5 \Rightarrow y = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 2 E) 3

2. $\left. \begin{array}{l} a - 2b = 10 \\ a \cdot b = 48 \end{array} \right\} \Rightarrow a^2 + 4b^4 = ?$

- A) 286 B) 288 C) 290 D) 292 E) 296

3. $\left. \begin{array}{l} a - 3b = 8 \\ a \cdot b = 6 \end{array} \right\} \Rightarrow a^2 + 9b^2 = ?$

- A) 48 B) 56 C) 64 D) 72 E) 100

4. $\left. \begin{array}{l} 3a - 2b = 8 \\ a \cdot b = 5 \end{array} \right\} \Rightarrow 9a^2 + 4b^2 = ?$

- A) 120 B) 124 C) 126
 D) 128 E) 130

5. $\left. \begin{array}{l} a - b = 8 \\ a \cdot b = 9 \end{array} \right\} \Rightarrow |a + b| = ?$

- A) 6 B) 8 C) 10 D) 12 E) 18

6. $\left. \begin{array}{l} a - b = 15 \\ a \cdot b = 12 \end{array} \right\} \Rightarrow |a + b| = ?$

- A) $\sqrt{273}$ B) $9\sqrt{3}$ C) $\sqrt{91}$
 D) $2\sqrt{91}$ E) $3\sqrt{91}$

7. $\left. \begin{array}{l} x + y = 6 \\ x \cdot y = 4 \end{array} \right\} \Rightarrow |x - y| = ?$

- A) 2 B) $2\sqrt{3}$ C) 4
 D) $2\sqrt{5}$ E) 5

8. $\left. \begin{array}{l} a + b = 12 \\ a \cdot b = 11 \end{array} \right\} \Rightarrow |a - b| = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

9. $\left. \begin{matrix} x-y=6 \\ x \cdot y=7 \end{matrix} \right\} \Rightarrow x^2-y^2=?$
 A) 6 B) 12 C) 24 D) 42 E) 48

10. $\begin{matrix} x^2+y^2+z^2=65 \\ 2xy+2yz+2xz=35 \end{matrix} \Rightarrow x+y+z=?$
 A) 6 B) 7 C) 8 D) 9 E) 10

11. $\left. \begin{matrix} a-2b+c=16 \\ a^2+4b^2+c^2=180 \end{matrix} \right\} \Rightarrow ac-2ab-2bc=?$
 A) 38 B) 36 C) 24
 D) 12 E) 8

12. $\left. \begin{matrix} x^2y-y^2x=11 \\ x^3-y^3=60 \end{matrix} \right\} \Rightarrow x-y=?$
 A) 2 B) 3 C) 4 D) 5 E) 6

13. $\left. \begin{matrix} a^2(a+3b)=48 \\ b^2(b+3a)=16 \end{matrix} \right\} \Rightarrow a+b=?$
 A) 4 B) 5 C) 6
 D) 7 E) 8

14. $\left. \begin{matrix} x=4,691 \\ y=1,309 \end{matrix} \right\} \Rightarrow x^3+3x^2y+3xy^2+y^3=?$
 A) 6 B) 36 C) 72 D) 144 E) 216

15. $\left. \begin{matrix} x=\sqrt[3]{5}+4 \\ y=4 \end{matrix} \right\} \Rightarrow x^3-3x^2y+3xy^2-y^3=?$
 A) 1 B) 2 C) 3 D) 4 E) 5

16. $\left. \begin{matrix} a=2^{\frac{2}{3}}+x \\ b=x \end{matrix} \right\} \Rightarrow a^3-b^3-3ab(a-b)=?$
 A) 2 B) 4 C) 8 D) 16 E) 64

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 **YANITLAR / ANSWERS**

1	2	3	4	5	6	7	8
C	D	E	B	C	A	D	A
9	10	11	12	13	14	15	16
E	E	A	B	A	E	E	B

$$1. \begin{cases} 5x - 4y = 12 \\ 4x - 5y = 6 \end{cases} \Rightarrow x^2 - y^2 = ?$$

- A) 9 B) 12 C) 15 D) 18 E) 21

$$2. \begin{cases} x, y \in \mathbb{R}^+, \\ x^2 - xy - 6y^2 = 0 \end{cases} \Rightarrow \frac{x^2 + y^2}{x \cdot y} = ?$$

- A) $\frac{3}{10}$ B) $\frac{7}{10}$ C) $\frac{9}{10}$ D) $\frac{10}{9}$ E) $\frac{10}{3}$

$$3. \frac{a}{b} + \frac{b}{a} = 5 \Rightarrow \frac{a^4 + b^4}{a^2 \cdot b^2} = ?$$

- A) 21 B) 23 C) 25 D) 27 E) 29

$$4. \begin{cases} a^2 = 3b + 7 \\ b^2 = 3a + 7 \end{cases} \Rightarrow a + b = ?$$

- A) -3 B) -2 C) 1 D) 2 E) 3

$$5. \begin{cases} a + b = 3 \\ a \cdot b = 4 \end{cases} \Rightarrow \frac{a^3 + b^3 + a \cdot b}{a^2 + b^2} = ?$$

- A) -7 B) -5 C) -3 D) 3 E) 5

$$6. a = 3\sqrt{2} + 1 \Rightarrow a^2 - 2a + 9 = ?$$

- A) 12 B) 16 C) 18 D) 24 E) 26

$$7. \begin{cases} x = 199996, \\ x^2 + 8x = a \cdot 10^b - c \end{cases} \Rightarrow a + b + c = ?$$

- A) 10 B) 15 C) 20 D) 30 E) 35

$$8. a^2 + b^2 + 4a + 6b + 13 = 0 \Rightarrow a + b = ?$$

- A) -7 B) -6 C) -5 D) 5 E) 6

9. $\left. \begin{array}{l} 3ab^2 + a^3 = 63 \\ 3a^2b + b^3 = 62 \end{array} \right\} \Rightarrow a + b = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

10. $\left. \begin{array}{l} b = a + 4 \\ b^2 = a^2 + 8 \end{array} \right\} \Rightarrow 3a - b = ?$
 A) -6 B) -4 C) -2 D) 4 E) 6

11. $\left. \begin{array}{l} x^3 + y^3 = 45 \\ x + y = 9 \end{array} \right\} \Rightarrow 3 \cdot x \cdot y = ?$
 A) 64 B) 68 C) 72 D) 74 E) 76

12. $\frac{x}{y} - \frac{y}{x} = 2 \Rightarrow \frac{x^6 - y^6}{x^3 \cdot y^3} = ?$
 A) 10 B) 12 C) 14 D) 16 E) 18

13. $a^2 - a - 1 = 0 \Rightarrow a^3 + 1 = ?$
 A) $a + 1$ B) $a + 2$ C) $2a$ D) $2a + 1$ E) $2a + 2$

14. $\left. \begin{array}{l} a^3 - b^3 = 13 \\ b^3 - c^3 = 17 \\ a - c = 5 \end{array} \right\} \Rightarrow (a + c)^2 - ac = ?$
 A) 6 B) 8 C) 10 D) 18 E) 20

15. $\left. \begin{array}{l} a(a^2 + 3b^2) = 53 \\ b^3 + 3a^2b = -11 \end{array} \right\} \Rightarrow a - b = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

16. $x = 2\sqrt[3]{3} - 1 \Rightarrow x^3 + 3x^2 + 3x = ?$
 A) 21 B) 23 C) 25 D) 27 E) 29



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1	2	3	4	5	6	7	8
B	E	B	A	B	E	D	C
9	10	11	12	13	14	15	16
D	A	E	C	E	A	D	B

1. $x = \sqrt[3]{3} - 1 \Rightarrow x^3 + 3x^2 + 3x + 3 = ?$

- A) 3 B) 5 C) 6 D) 10 E) 12

2. $x = \sqrt[3]{5} - 1 \Rightarrow (x+2)^3 - 3(x+2)^2 + 3x + 5 = ?$

- A) 5 B) 10 C) 15 D) 20 E) 25

3. $\left. \begin{array}{l} a+b=4 \\ a \cdot b=3 \end{array} \right\} \Rightarrow \frac{a^2+b^2}{|a-b|} = ?$

- A) 1 B) 5 C) 10 D) 15 E) 25

4. $a \neq -3b,$
 $a^2 - ab = 12b^2 \Rightarrow \frac{2a^2 + 4b^2}{ab} = ?$

- A) 6 B) 8 C) 9 D) 10 E) 12

5. $x - \frac{1}{x} = 3 \Rightarrow x^3 - 4x^2 + 2x - 3 = ?$

- A) -4 B) -3 C) 3 D) 4 E) 7

6. $\frac{3a}{b} + \frac{b}{3a} = 2 \Rightarrow \frac{4a^2 + 2b^2}{a(b-a)} = ?$

- A) 9 B) 11 C) 12 D) 15 E) 18

7. $\left. \begin{array}{l} 4x - y = 32 \\ 2\sqrt{x} - \sqrt{y} = 4 \end{array} \right\} \Rightarrow x = ?$

- A) 8 B) 9 C) 12 D) 16 E) 18

8. $a, b > 0,$
 $(a+b)^2 - (a-b)^2 = 12 \Rightarrow a \cdot b = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

9. $a, b, c \in \mathbb{R}$,
 $\left. \begin{array}{l} b = a + 1 \\ 4ab + c^2 = -1 \end{array} \right\} \Rightarrow a = ?$

- A) $-\frac{1}{4}$ B) $-\frac{1}{2}$ C) $\frac{1}{2}$ D) $\frac{1}{4}$ E) $\frac{1}{6}$

10. $A = x^2 + 4y^2 + 6x - 8y + 16 \Rightarrow \min(A) = ?$

- A) 3 B) 4 C) 6 D) 8 E) 16

11. $a > 0$, $a^{\frac{1}{6}} + 1 = x \Rightarrow \frac{\left(a^{\frac{1}{12}} - 1\right) \cdot \left(a^{\frac{1}{12}} + 1\right)}{a^{\frac{1}{3}} - 1} = ?$

- A) $\frac{1}{x}$ B) $\frac{1}{\sqrt{x}}$ C) $\frac{1}{x^2}$ D) \sqrt{x} E) x^2

12. $x - \frac{2}{x+2} = 4 \Rightarrow x^2 + 4x + 4 + \frac{4}{(x+2)^2} = ?$

- A) 20 B) 28 C) 32 D) 36 E) 40

13. $\left. \begin{array}{l} a + b = 8 \\ a = 5 - bc \\ b = 5 + ac \end{array} \right\} \Rightarrow a^2 + b^2 = ?$

- A) 20 B) 25 C) 30 D) 35 E) 40

14. $a, b \in \mathbb{Z}^+$
 $a^3 - b^3 = 19 \Rightarrow a \cdot b = ?$

- A) 3 B) 6 C) 9 D) 12 E) 15

15. $a + b + c = 0$,
 $abc = 12$
 $\Rightarrow (a + b)^2 \cdot (b + c)^2 \cdot (a + c)^2 = ?$

- A) 64 B) 81 C) 100 D) 121 E) 144

16. $a + b + c = 0$,
 $a \cdot b \cdot c = -20$
 $\Rightarrow (a + b)^3 \cdot (a + c)^3 \cdot (b + c)^3 = ?$

- A) -8000 B) -1000 C) -800
D) 1000 E) 8000


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1	2	3	4	5	6	7	8
B	A	B	C	A	B	B	C
9	10	11	12	13	14	15	16
B	A	A	E	E	B	E	E

1. $x^2 + \frac{1}{x^2} = 5 \Rightarrow \left| x + \frac{1}{x} \right| = ?$

- A) $\sqrt{5}$ B) $\sqrt{7}$ C) 5 D) 7 E) 14

2. $3^x + 3^{-x} = 7 \Rightarrow 9^x + 9^{-x} = ?$

- A) 32 B) 36 C) 42 D) 47 E) 49

3. $x^2 - 4x + 1 = 0 \Rightarrow x^2 + \frac{1}{x^2} = ?$

- A) 8 B) 10 C) 12 D) 14 E) 16

4. $\begin{cases} a^2 + 2ac = 44 \\ b^2 + 2bc = 17 \\ c^2 + 2ab = 20 \end{cases} \Rightarrow |a + b + c| = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

5. $\begin{cases} x^3 + y^3 = 19 \\ xy(x + y) = -6 \end{cases} \Rightarrow x + y = ?$

- A) -2 B) -1 C) 1 D) 2 E) 3

6. $x = \sqrt[3]{7} + 1$
 $\Rightarrow x^3 - 3x^2 + 3x + 8 = ?$

- A) 9 B) 11 C) 12 D) 15 E) 16

7. $\begin{cases} a^3 - b^3 = 45 \\ a^2 + ab + b^2 = 15 \end{cases} \Rightarrow a - b = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $\begin{cases} a - b = 5 \\ a^2 + ab + b^2 = 4 \end{cases} \Rightarrow a^3 - b^3 = ?$

- A) 20 B) 21 C) 22 D) 23 E) 24

9. $\begin{cases} a+b=4 \\ a \cdot b=6 \end{cases} \Rightarrow a^3+b^3=?$
 A) -8 B) -6 C) -4 D) 6 E) 8

10. $\begin{cases} a-b=3 \\ a \cdot b=7 \end{cases} \Rightarrow a^3-b^3=?$
 A) 30 B) 60 C) 72 D) 90 E) 108

11. $\begin{cases} a+b=6 \\ a \cdot b=8 \end{cases} \Rightarrow a^3+b^3=?$
 A) 64 B) 68 C) 70 D) 72 E) 76

12. $\begin{cases} a+b=10 \\ a \cdot b=4 \end{cases} \Rightarrow a^3+b^3=?$
 A) 880 B) 860 C) 840
 D) 820 E) 800

13. $x+\frac{1}{x}=4 \Rightarrow \frac{x^6+1}{x^3}=?$
 A) 50 B) 51 C) 52 D) 53 E) 54

14. $x-\frac{2}{x}=4 \Rightarrow x^3-\frac{8}{x^3}=?$
 A) 64 B) 72 C) 88 D) 90 E) 96

15. $x^2-3x+1=0 \Rightarrow \frac{x^6+1}{x^3}=?$
 A) 6 B) 12 C) 15 D) 18 E) 24

16. $2x-\frac{1}{x}=6 \Rightarrow 8x^3-\frac{1}{x^3}=?$
 A) 216 B) 220 C) 232 D) 246 E) 252



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1	2	3	4	5	6	7	8
B	D	D	E	C	E	C	A
9	10	11	12	13	14	15	16
A	D	D	A	C	C	D	E

1. $a \cdot b = 10, \frac{1}{a} - \frac{1}{b} = \frac{7}{10} \Rightarrow a^2 + b^2 = ?$

- A) 65 B) 66 C) 67 D) 68 E) 69

2. $x^2 - 5x - 3 = 0 \Rightarrow x^2 + \frac{9}{x^2} = ?$

- A) 30 B) 31 C) 32 D) 33 E) 34

3. $A \in \mathbb{R}^+, \frac{x^2}{y^2} + \frac{y^2}{x^2} = 62 \Rightarrow A = \frac{x}{y} + \frac{y}{x} = ?$

- A) 4 B) 8 C) 12 D) 16 E) 20

4. $\left. \begin{array}{l} a + b = 4 \\ a \cdot b = 3 \end{array} \right\} \Rightarrow a^3 + b^3 = ?$

- A) 26 B) 27 C) 28 D) 29 E) 30

5. $\left. \begin{array}{l} 3^x - 3^y = 9 \\ 9^x - 9^y = 135 \end{array} \right\} \Rightarrow 3^{x+y} - 3^{x-y} = ?$

- A) 9 B) 12 C) 21 D) 32 E) 36

6. $\left. \begin{array}{l} a + 2b = 6 \\ a \cdot b = 2 \end{array} \right\} \Rightarrow a^3 + 8b^3 = ?$

- A) 180 B) 154 C) 152
D) 144 E) 120

7. $a \cdot b = a + b = 5 \Rightarrow a^3 + b^3 = ?$

- A) 25 B) 30 C) 35 D) 40 E) 50

8. $a^3 - b^3 = 387$ ve / and $a - b = 3$
 $\Rightarrow a \cdot b = ?$

- A) 30 B) 35 C) 40 D) 45 E) 50

9. $x \neq 0,$
 $x - \frac{1}{x} = 2 \Rightarrow x^3 - \frac{1}{x^3} = ?$

- A) 8 B) 10 C) 12 D) 14 E) 16

10. $\left. \begin{array}{l} x^3 + y^3 = 12 \\ x \cdot y = 2 \end{array} \right\} \Rightarrow x^6 + y^6 = ?$

- A) 100 B) 110 C) 120 D) 124 E) 128

11. $\left. \begin{array}{l} x + y = 4 \\ x^2 + y^2 = 12 \end{array} \right\} \Rightarrow x^3 + y^3 = ?$

- A) 16 B) 24 C) 36 D) 40 E) 48

12. $\left. \begin{array}{l} a^2 + b^2 = 16 \\ a - b = 2 \end{array} \right\} \Rightarrow a^3 - b^3 = ?$

- A) 22 B) 33 C) 44 D) 55 E) 64

13. $\left. \begin{array}{l} a \neq b \\ a^3 - b^3 = a^2 - b^2 \\ a + b = 3 \end{array} \right\} \Rightarrow a \cdot b = ?$

- A) 3 B) 6 C) 9 D) 12 E) 15

14. $\left. \begin{array}{l} a^6 - b^6 = 57 \\ a^4 + a^2 b^2 + b^4 = 19 \end{array} \right\} \Rightarrow a^2 - b^2 = ?$

- A) 3 B) 5 C) 7
 D) 9 E) 11

15. $x^2 = x + 1$
 $\Rightarrow \frac{x^3 + 3}{x^2 + 1} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

16. $\frac{a^{12} - 1}{a^8 + a^4 + 1} = ?$

- A) a^2 B) $a^2 - 1$ C) a^4 D) $a^4 - 1$ E) $a^3 + 1$


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1	2	3	4	5	6	7	8
E	B	B	C	D	D	E	C
9	10	11	12	13	14	15	16
D	E	D	C	B	A	B	D

1. $\frac{x^2 - y^2}{x + y} + y = ?$

- A) x B) x - y C) x + y D) y E) xy

2. $\frac{x - \frac{4}{x}}{\frac{x-2}{x}} = ?$

- A) x - 1 B) x - 2 C) x D) x + 1 E) x + 2

3. $\frac{a^3b - a^2b^2}{b^2 - a^2} \cdot \left(\frac{ab}{a+b}\right)^{-1} = ?$

- A) 1 - a B) -a C) a - 1 D) a - b E) -b

4. $\frac{x^2 - 2xy}{2y^2 - xy} = ?$

- A) -x.y B)
- $\frac{-y}{x}$
- C)
- $\frac{-x}{y}$
- D)
- $\frac{x}{y}$
- E) x.y

5. $\frac{(a^2 - a)^2}{(1 - a)^2} = ?$

- A) a B) a
- ²
- C) a - 1 D) a + 1 E) 2a

6. $x^2 - x + 1 = 0 \Rightarrow x^5 = ?$

- A) -x B) -1 C) 1 - x D) x - 1 E) 1

7. $\frac{(x+2)^2 - 5^2}{x+7} = ?$

- A) x + 7 B) x + 2 C) x - 2 D) x - 3 E) x - 7

8. $\frac{x^2 + 1 - 2x}{x^2 - 1} = ?$

- A)
- $\frac{x}{x+1}$
- B)
- $\frac{x+1}{x}$
- C)
- $\frac{x-1}{x+1}$
- D)
- $\frac{x-1}{x}$
- E)
- $\frac{x}{x-1}$

9. $\frac{4x^2 - 9y^2}{4x^2 - 12xy + 9y^2} = \frac{1}{2} \Rightarrow \frac{x}{y} = ?$
 A) $-\frac{9}{2}$ B) $-\frac{7}{2}$ C) $-\frac{5}{2}$ D) $\frac{5}{2}$ E) $\frac{9}{2}$

10. $\frac{x^2 - y^2}{x^2 + 2xy + y^2} : \frac{x - y}{x^3 + y^3} = ?$
 A) $x - y$ B) $x + y$ C) $x^2 - xy + y^2$
 D) $x^2 + xy + y^2$ E) $x^2 + y^2$

11. $\frac{(x+y)^2 - 4xy}{x^2 - xy} = 4 \Rightarrow \frac{y}{x} = ?$
 A) -3 B) $-\frac{1}{3}$ C) $\frac{1}{3}$ D) 3 E) 4

12. $\frac{(x-2) \cdot (x^2 + 2x + 4) + 7}{x^2 - 1} = \frac{3}{2} \Rightarrow x = ?$
 A) $-\frac{1}{4}$ B) $-\frac{1}{2}$ C) $\frac{1}{2}$ D) $\frac{1}{4}$ E) $\frac{1}{6}$

13. $\frac{x^2 + 2xy}{-2y^2 - xy} = ?$
 A) $-\frac{x}{y}$ B) $-\frac{y}{x}$ C) $-xy$ D) xy E) $\frac{x}{y}$

14. $\frac{x^{2a} - 1}{x^a + 1} = ?$
 A) x^a B) $x - 1$ C) $x + 1$ D) $x^a - 1$ E) $x^a + 1$

15. $\left(\frac{1}{x-y} - \frac{1}{x+y}\right) \cdot \frac{(x+y)^2}{y} = ?$
 A) 2 B) $\frac{2}{x-y}$ C) $2(x+y)$
 D) $\frac{x+y}{x-y}$ E) $\frac{2(x+y)}{x-y}$

16. $\frac{x(y^2+1) + y(x^2+1)}{x^2 \cdot y^2 - 1} = ?$
 A) $x + y$ B) $x - y$ C) $\frac{x+y}{xy-1}$
 D) $\frac{x+y}{xy+1}$ E) $\frac{x-y}{xy-1}$



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1	2	3	4	5	6	7	8
A	E	B	C	B	C	D	C
9	10	11	12	13	14	15	16
A	C	A	B	A	D	E	C

1. $\left(\frac{x+2}{2-x}\right) : \left(1 + \frac{4}{x-2}\right) = ?$

- A) -1 B) 0 C) 1
D) 2 E) 3

2. $\frac{a}{a+b} + \frac{b}{a-b} - 1 = ?$

- A) $\frac{2b^2}{a^2-b^2}$ B) $\frac{2a^2}{a^2-b^2}$ C) $\frac{a^2}{a^2-b^2}$
D) $\frac{b^2}{a^2-b^2}$ E) $\frac{1}{a^2-b^2}$

3. $\frac{mx^2 - mx}{x^2 - 1} \cdot \frac{x^2 + 2x + 1}{mx + m} = ?$

- A) m B) x C) x - 1
D) x + 1 E) mx

4. $\frac{(2a^2 - 2b^2) \cdot (4a^2 + 12ab + 9b^2)}{(a+b) \cdot (2a+3b) \cdot (4a+6b)} = ?$

- A) $\frac{1}{a+b}$ B) $\frac{1}{a-b}$ C) a + b
D) a - b E) 2a - b

5. $\frac{x+4}{x-4} : \frac{x^2-16}{x^2-8x+16} = ?$

- A) x + 4 B) x - 4 C) $\frac{1}{x-4}$
D) $\frac{1}{x+4}$ E) 1

6. $\frac{a^2b - b^2a}{a^2 - b^2} - \frac{2a}{a+b} = ?$

- A) ab + 2a B) ab - 2a C) $\frac{ab+2a}{a+b}$
D) $\frac{ab-2a}{a+b}$ E) $\frac{a+b}{ab+2a}$

7. $\left(1 - \frac{1}{x}\right) : \left(\frac{1 - \frac{1}{x^2}}{1 + \frac{1}{x}}\right) = ?$

- A) -1 B) $\frac{x+1}{x}$ C) 1
D) $\frac{x-1}{x}$ E) $\frac{x}{x-1}$

8. $\frac{2a^2 + 4a}{3a - 2} \cdot \frac{3a^2 + a - 2}{a^2 + 3a + 2} = ?$

- A) $\frac{2a}{a-2}$ B) 2a C) $\frac{2a}{a+2}$
D) -2a E) $\frac{2a}{3a-2}$

9. $\frac{a^3b - 2a^2b^2 + ab^3}{ba^3 - ab^3} = ?$

- A) $\frac{a-b}{a+b}$ B) $\frac{a+b}{a-b}$ C) $a+b$
D) $a-b$ E) $\frac{1}{a+b}$

10. $\left(\frac{x}{y} + \frac{y}{x} - 2\right) : \left(\frac{x-y}{xy}\right) = ?$

- A) $x-y$ B) $y-x$ C) $x+y$
D) $\frac{x}{y}$ E) $\frac{y}{x}$

11. $\frac{x^2+8}{x^3-8} + \frac{2}{x^2+2x+4} = ?$

- A) $\frac{1}{x^2+2x+4}$ B) $\frac{1}{x-2}$ C) $x+2$
D) $\frac{1}{x+2}$ E) $x-2$

12. $\left(\frac{2a^2+5a-3}{9-a^2}\right) \cdot \left(\frac{4a^2-1}{a^2-6a+9}\right)^{-1} = ?$

- A) $\frac{1}{3a-1}$ B) $\frac{2a+1}{a-3}$ C) $\frac{3+a}{2a+1}$
D) $\frac{3-a}{2a+1}$ E) 1

13. $\frac{a^2}{a + \frac{1}{1 - \frac{1}{a}}} = ?$

- A) a B) $a+1$ C) $a-1$
D) a^2 E) 1

14. $\frac{4a^3b - 24a^2b + 36ab}{8a^2b^2 - 72b^2} = ?$

- A) $\frac{a(a-3)}{2a+3}$ B) $\frac{a-3}{a+2}$ C) $\frac{a+3}{a-3}$
D) $\frac{a(a-3)}{a+b}$ E) $\frac{a(a-3)}{2ab+6b}$

15. $\frac{x^2-xy}{x^3+y^3} : \frac{x-y}{x^3-x^2y+xy^2} = ?$

- A) $\frac{x}{x^2+y^2}$ B) $\frac{2xy}{x+y}$ C) $\frac{x^2}{6(x+y)}$
D) $\frac{y}{x+y}$ E) $\frac{x^2}{x+y}$

16. $\frac{3x+4}{x^2-4x} = \frac{A}{x} + \frac{B}{x-4}$
 $\Rightarrow A+B = ?$

- A) 3 B) 4 C) 6 D) 8 E) 9



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1	2	3	4	5	6	7	8
A	A	B	D	E	D	C	B
9	10	11	12	13	14	15	16
A	A	B	D	C	E	E	A

$$1. \left(a + \frac{1}{a+b}\right) \cdot \left(\frac{a+b}{a(a+b)+1}\right) = ?$$

- A) 0 B) 1 C) 2 D) 3 E) 4

$$2. \left(\frac{a^3 + a^2b + b^2a}{a^2 - ab + b^2} : \frac{a^3 - b^3}{a^3 + b^3}\right) \cdot \frac{a-b}{a+b} = ?$$

- A) 1 B) a C) a + 1
D) a + b E) a - b

$$3. \frac{9x^2 - 81}{3x - 9} \cdot \frac{3}{x + 3} = ?$$

- A) 1 B) 3 C) 6 D) 9 E) 12

$$4. \frac{m^2 - n^2}{2m + 2n} : \frac{4m^2 - 8mn + 4n^2}{8(m+n)} = ?$$

- A) 1 B) m + n C) m - n
D) $\frac{m-n}{m+n}$ E) $\frac{m+n}{m-n}$

$$5. \frac{(x-y)^2 - (x+y)^2}{xy^2 - x^2y} \cdot \frac{x-y}{4} = ?$$

- A) -2 B) -1 C) 0 D) 1 E) 2

$$6. \frac{1 - \frac{1}{x}}{1 + \frac{1}{x}} - \frac{-2}{x+1} + 1 = ?$$

- A) -2 B) -1 C) 0 D) 1 E) 2

$$7. \frac{a^3b^2 + a^2b^3}{a^2b - ab^2} \cdot \frac{a-b}{ab} = ?$$

- A) a B) ab C) a - b
D) a + b E) 2

$$8. \frac{1 - \frac{1}{x^2}}{1 + \frac{1}{x}} : \frac{1-x}{x} = ?$$

- A) -2 B) -1 C) 0 D) 1 E) 2

9. $\left(\frac{a}{a-b} - \frac{b}{a+b}\right) \cdot \left(\frac{a^2-b^2}{a^2+b^2}\right) = ?$

- A) -1 B) 1 C) a
D) -a E) a - b

10. $\frac{x^2-16}{4x-16} \cdot \frac{8x}{2x+8} = ?$

- A) 1 B) 2 C) x
D) x - 1 E) x + 1

11. $\frac{2a^2+3a+1}{2a^2+a} \cdot \frac{a^2-a}{a-1} = ?$

- A) 1 B) 2 C) a
D) a - 1 E) a + 1

12. $x^2 + y^2 + 6y - 4x + 13 = 0$
 $\Rightarrow x + y = ?$

- A) -2 B) -1 C) 1 D) 2 E) 4

13. $(x + y - 24)^6 + (x - y + 10)^4 = 0$

$\Rightarrow x \cdot y = ?$

- A) 24 B) 45 C) 76 D) 98 E) 119

14. $\frac{x^2+xy^2}{xy+y^3} : \frac{x}{y} = ?$

- A) 1 B) 2 C) 3 D) x E) $\frac{1}{y}$

15. $\frac{2x^2+xy-y^2}{x^2-y^2} \cdot \frac{x-y}{4x-2y} = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1
D) x - y E) x + y

16. $\frac{3x^2-x-2}{3x+2} \cdot \frac{x}{x-1} = ?$

- A) x B) $\frac{2x-1}{x+1}$ C) $\frac{x+3}{x+1}$
D) $\frac{x-1}{x+3}$ E) -x

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1	2	3	4	5	6	7	8
B	B	D	E	D	E	D	B
9	10	11	12	13	14	15	16
B	C	E	B	E	A	B	A

1. $\sqrt{a} + \frac{1}{\sqrt{a}} = \sqrt{7} \Rightarrow a^2 + \frac{1}{a^2} = ?$

- A) 18 B) 19 C) 21
D) 23 E) 25

2. $a - 3b = m \Rightarrow a^2 + 9b^2 - 1 - 6ab = ?$

- A) $m + 2$ B) $m^2 + 2$ C) $m^2 - 1$
D) m^2 E) $m^2 - 2$

3. $\frac{\frac{9}{a^2} - 1}{1 - \frac{3}{a}} + \frac{3}{a} = ?$

- A) $\frac{3}{a}$ B) a C) -1
D) 1 E) $-a$

4. $\frac{a^2b^2 - 1}{a(b^2 + 1) + b(a^2 + 1)} = ?$

- A) $\frac{ab - 1}{a + b}$ B) $\frac{a + b + 1}{a + b}$ C) $\frac{ab - 1}{ab}$
D) $\frac{ab + 1}{ab}$ E) $\frac{a}{b}$

5. $\frac{(a^2 + ab)^2}{(a^2 - ab)^2} \cdot \frac{(a^2 - 2ab + b^2)}{(a^2 + 2ab + b^2)} = ?$

- A) $\frac{a}{b}$ B) ab C) b
D) a E) 1

6. $\frac{x^3 - y^3}{x^2 - y^2} \cdot (x + y) = ?$

- A) $\frac{-xy}{x + y}$ B) $\frac{x + 2y}{x - y}$ C) $\frac{y(x + 2y)}{x}$
D) $\frac{y(x + 2y)}{x - y}$ E) $\frac{x + y}{y}$

7. $x + y = 2 \Rightarrow x^2 + y^2 + x^2y + xy^2 = ?$

- A) 0 B) 2 C) 4
D) 6 E) 8

8. $\frac{a}{b} + \frac{b}{a} = 2 \Rightarrow \frac{a^4 + b^4}{2a^2b^2} = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

9. $\frac{x^4+4}{(x^2-2x+2) \cdot (3x^2+6x+6)} = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$
D) $\frac{1}{5}$ E) $\frac{1}{6}$

10. $a^3 - 1 = m \Rightarrow a^6 - 1 = ?$

- A) m^2 B) $m^2 + 2$ C) $m^2 + m$
D) $m^2 + 2m$ E) $m^2 + 3m$

11. $x^2 - x + 1 = 0 \Rightarrow x^3 + \frac{1}{x^3} = ?$

- A) 5 B) 3 C) -1
D) -2 E) -4

12. $a = 2, b = 3$

$$\Rightarrow \frac{a^2+a+1}{a^3-1} + \frac{ab^2-a^2b}{b^2-a^2} \cdot (a+b) = ?$$

- A) 4 B) 5 C) 6
D) 7 E) 8

13. $x+y=3 \Rightarrow \frac{x^2-y^2+6x+9}{x^2-y^2+3x+3y} = ?$

- A) 2 B) 3 C) 4
D) 5 E) 6

14. $\frac{a}{a+1} + \frac{a}{a-1} - 2 = ?$

- A) $\frac{4}{a^2-1}$ B) $\frac{2}{a^2-1}$ C) $\frac{-2}{a^2+1}$
D) $\frac{4a^2+2}{a^2+1}$ E) 2

15. $a, b \in \mathbb{N}^+$,

$$a^2 - 9b^2 = 7 \Rightarrow a^3 - 3a^2b + 3ab^2 - b^3 = ?$$

- A) 3 B) 9 C) 27
D) 64 E) 125

16. $\frac{x^2-3}{x-\sqrt{3}} + 3 - \sqrt{3} = 7 \Rightarrow x = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

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1	2	3	4	5	6	7	8
D	C	C	A	E	A	C	A
9	10	11	12	13	14	15	16
B	D	D	D	A	B	C	D

1. $2x - 3y = m$

$$\Rightarrow 4x^2 - 12xy + 9y^2 + 2x - 3y = ?$$

- A) m B) m^2 C) $m^2 + m$
 D) $m^2 + 1$ E) $m^2 + 3m$

2. $\frac{a}{b} + \frac{b}{a} = 6 \Rightarrow \frac{a^2 + b^2}{3ab} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

3. $\frac{\frac{4}{x^2} - 1}{1 - \frac{2}{x}} = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

4. $a + b = m \Rightarrow (a - b)^2 + 4ab = ?$

- A) 1 B) m C) $\frac{1}{m}$ D) m^2 E) $\frac{m}{2}$

5. $x^2 - 3x + 1 = 0 \Rightarrow x^3 + \frac{1}{x^3} = ?$

- A) 15 B) 16 C) 17 D) 18 E) 19

6. $a^2 + 1 = m \Rightarrow a^4 - 1 = ?$

- A) m B) m^2 C) $2m^2$
 D) $m^2 + 1$ E) $m^2 - 2m$

7. $x - y = 4 \Rightarrow \frac{x^2 - y^2 + 4x - 4y}{2x + 2y + 8} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $\left. \begin{array}{l} 2a - 5b = 7 \\ x + y = 4 \end{array} \right\} \Rightarrow 2ax - 5by + 2ay - 5bx = ?$

- A) 20 B) 24 C) 28 D) 32 E) 36

9. $x + y = 5$,
 $x^3 - y^3 = 4x^2 + 4xy + 4y^2 \Rightarrow x^2 - y^2 = ?$
 A) 16 B) 17 C) 18 D) 19 E) 20

10. $\left(\frac{\frac{a}{b}}{\frac{1}{c}} - \frac{\frac{c}{b}}{\frac{1}{a}}\right) \cdot \left(\frac{\frac{a}{c}}{\frac{1}{b}}\right) = ?$
 A) 0 B) 1 C) $\frac{1}{a}$ D) $\frac{b}{c}$ E) $\frac{a}{b}$

11. $x^2 + (a+1)x + a = (x+1)(x+4)$
 $\Rightarrow a = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

12. $\left(\frac{1}{a+1} + \frac{1}{a-1}\right) \cdot \left(\frac{a^2-1}{a}\right) = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

13. $x, y \in \mathbb{N}$,
 $\left. \begin{array}{l} x^2 + a = 18 \\ y^2 + a = 1 \end{array} \right\} \Rightarrow x \cdot y = ?$
 A) 69 B) 70 C) 71 D) 72 E) 73

14. $\left. \begin{array}{l} m \cdot a + m \cdot b = 8 \\ n \cdot a + n \cdot b = 14 \\ a + b = 11 \end{array} \right\} \Rightarrow m + n = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

15. $x^3 - 2x + 4 = 0 \Rightarrow x^2 + \frac{4}{x} = ?$
 A) 5 B) 4 C) 3 D) 2 E) 1

16. $(25^x + 4) \cdot (5^x - 2) \cdot (5^x + 2) = 9 \Rightarrow x = ?$
 A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) 1 D) $\frac{3}{4}$ E) $\frac{1}{2}$



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1	2	3	4	5	6	7	8
C	B	A	D	D	E	B	C
9	10	11	12	13	14	15	16
E	A	D	E	D	B	D	E

$$1. \begin{cases} x-y=6 \\ x \cdot y=7 \end{cases} \Rightarrow \frac{1}{x^2} + \frac{1}{y^2} = ?$$

- A) $\frac{5}{7}$ B) $\frac{50}{49}$ C) 36
D) 20 E) 16

$$2. \frac{1 - \frac{1}{a}}{1 + \frac{1}{a}} : \frac{a-1}{a - \frac{1}{a}} = ?$$

- A) $a-1$ B) $\frac{a-1}{a}$ C) $\frac{1}{a}$
D) $a+1$ E) a^2-1

$$3. a^2 + \frac{4}{a^2} = m \Rightarrow \left(a - \frac{2}{a}\right)^2 = ?$$

- A) $4m$ B) $2m$ C) $m+2$
D) $m+4$ E) $m-4$

$$4. a+b+c=1, \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 0 \Rightarrow a^2 + b^2 + c^2 = ?$$

- A) 4 B) 3 C) 2
D) 1 E) 0

$$5. \left(\frac{x}{y-x} + \frac{y}{x+y}\right) : \left(\frac{y^3+yx^2}{y^2x-x^3}\right) = ?$$

- A) x B) $\frac{x}{y}$ C) y
D) $\frac{y}{x}$ E) xy

$$6. \left(\frac{x+2}{x-2} - \frac{x-2}{x+2}\right) : \frac{x}{x^2+x-6} = ?$$

- A) $\frac{8(x+3)}{x+2}$ B) $\frac{2}{x+3}$ C) $\frac{x^2+3x}{x+2}$
D) $\frac{1}{x^2+5x+6}$ E) $\frac{x+3}{x^2+2x}$

$$7. y > 0,$$

$$\frac{3x^2 - 3xy + y^2}{y^2} = 7 \Rightarrow \max(x) = ?$$

- A) $\frac{y}{2}$ B) $\frac{3y}{4}$ C) y
D) $\frac{3y}{2}$ E) $2y$

$$8. m \neq n, \frac{1 + \frac{m}{x}}{\frac{n}{x} - 1} = \frac{n}{m} \Rightarrow x = ?$$

- A) $n-m$ B) $-m$ C) $-n$
D) 1 E) 0

$$9. \begin{cases} x^2 - y^2 = 12 \\ y^2 - z^2 = 4 \\ x - z = 2 \end{cases} \Rightarrow (x-z)^2 + 4xz = ?$$

- A) 4 B) 16 C) 32
D) 64 E) 144

$$10. \frac{a^2+a}{a+1} + \frac{a^2-4a+4}{a-2} = -6 \Rightarrow a = ?$$

- A) -2 B) -1 C) $-\frac{1}{2}$
D) $-\frac{1}{3}$ E) $-\frac{1}{4}$

$$11. \frac{a^2+a-5}{a-7} + \frac{8-4a}{a^2-9a+14} - \frac{a^2-2}{a-7} = ?$$

- A) $\frac{1}{a+1}$ B) $\frac{1}{a+2}$ C) $a-1$
D) $a+1$ E) 1

$$12. \frac{(x^4-1)(x^4-x^2+1)}{x^6+1} = ?$$

- A) x^2+1 B) x^4-x^2+1 C) x^2-1
D) $x-1$ E) $x+1$

$$13. \left(\frac{x^2-y^2}{2x+2y-x^2+y^2} - \frac{2}{2+y-x} \right) = ?$$

- A) $-\frac{2x}{x+y}$ B) $-x$ C) x
D) -1 E) 1

$$14. \begin{cases} x = 3,25 \\ y = 2,75 \end{cases} \Rightarrow \frac{(x-y)^2 + 4xy}{2(x+y)} = ?$$

- A) 1 B) $\frac{3}{2}$ C) 2
D) $\frac{5}{2}$ E) 3

$$15. \frac{x}{x+1} - \frac{1-x}{x^2-1} = ?$$

- A) 2 B) 1 C) 0
D) -1 E) -2

$$16. \frac{x - \frac{1}{x^2}}{1 - \frac{1}{x}} \cdot x - 1 = ?$$

- A) $x^2 - x$ B) x C) 1
D) x^2 E) $x^2 + x$



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1	2	3	4	5	6	7	8
B	B	E	D	B	A	E	A
9	10	11	12	13	14	15	16
D	A	E	C	D	E	B	E

1. $A = m^2 - 6m + 10$

$\Rightarrow \min(A) = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

2. $\frac{(3a-2b)^2 - (3a+2b)^2}{(a+b)^2 - (a-b)^2} = ?$

- A) -5 B) -6 C) -7 D) -8 E) -9

3. $\frac{mn+mk+pn+pk}{2n+2k} = 6, m-p=6 \Rightarrow m = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

4. $\frac{x^2 - (a+2)x + 2a}{x^2 - a^2} = 1 \Rightarrow a = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

5. $\frac{x+y}{xy} = \frac{1}{x-y} \Rightarrow x^2 - y^2 - xy = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

6. $\frac{x^2 - 2x - 8}{x^2 + 4x + 4} \cdot \frac{x^2 - 5x + 6}{x^2 - 7x + 12} = ?$

- A) 1 B)
- $x+2$
- C)
- $x-2$
-
- D)
- $\frac{x+2}{x-2}$
- E)
- $\frac{x-2}{x+2}$

7. $(6,102 + 2,102)^2 - 4(6,102 \cdot 2,102) = ?$

- A) 1 B) 2 C) 4 D) 16 E) 32

8. $\left. \begin{array}{l} 2a - b = 8 \\ x - 2y = 4 \end{array} \right\} \Rightarrow 2ax - 4ay - bx + 2by - 2 = ?$

- A) 30 B) 31 C) 32 D) 33 E) 34

9. $a = 2001 \Rightarrow a^2 - 2a = ?$

- A) 10^3 B) 10^6 C) $10^6 - 1$
 D) $2 \cdot 10^6$ E) $4 \cdot 10^6 - 1$

10. $\frac{x^6 - y^6}{x^2 - y^2} \cdot \frac{1}{x^2 - xy + y^2} : (x^2 + xy + y^2) = ?$

- A) 1 B) $x - y$ C) $x + y$
 D) $x^2 - xy + y^2$ E) $x^2 - y^2$

11. $\left(\frac{a^2}{4} - \frac{ab}{2} + \frac{b^2}{4}\right) \cdot \left(\frac{16}{a^2 - b^2}\right) = ?$

- A) 1 B) 2 C) 4
 D) $\frac{4}{a-b}$ E) $\frac{4(a-b)}{a+b}$

12. $x + \frac{1}{x+1} = 6 \Rightarrow (x+1)^2 + \frac{1}{(x+1)^2} = ?$

- A) 40 B) 44 C) 47 D) 49 E) 54

13. $\left. \begin{array}{l} x = \sqrt{2} - 1 \\ y = \sqrt{2} + 1 \end{array} \right\} \Rightarrow \frac{(x-y)^2 + 4xy}{x-y} = ?$

- A) -4 B) -2 C) 0 D) 2 E) 4

14. $\left. \begin{array}{l} a^2 + ab = 16 \\ ab - b^2 = 10 \end{array} \right\} \Rightarrow a^2 + b^2 = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

15. $x^2 + y^2 - 8x + 6y + 25 = 0$
 $\Rightarrow xy = ?$

- A) 12 B) 8 C) 4 D) -8 E) -12

16. $\left. \begin{array}{l} a^2 + b^2 + c^2 = 24 \\ a \cdot b + b \cdot c + a \cdot c = \frac{25}{2} \end{array} \right\} \Rightarrow |a+b+c| = ?$

- A) 3 B) 1 C) 0 D) 5 E) 7



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1	2	3	4	5	6	7	8
D	B	D	A	C	E	D	A
9	10	11	12	13	14	15	16
E	A	E	C	A	C	E	E

1. $x \neq 0,$

$$x + x^{-1} = 5 \Rightarrow \left| x - \frac{1}{x} \right| = ?$$

- A) 3 B)
- $\sqrt{15}$
- C) 4 D)
- $\sqrt{21}$
- E) 5

2. $\left(\frac{a+2}{2-a} - 1 \right) \left(1 - \frac{4}{a^2} \right) = ?$

- A)
- $\frac{a+2}{a}$
- B)
- $\frac{a-1}{a}$
- C)
- $\frac{2a-2}{a}$
-
- D)
- $\frac{-2a-4}{a}$
- E)
- $\frac{2a-4}{a}$

3. $a^2 = a + 1 \Rightarrow a^5 + 2a = ?$

- A)
- $a + 1$
- B)
- $3a + 2$
- C)
- $6a + 5$
-
- D)
- $7a + 3$
- E)
- $9a + 1$

4. $\frac{a}{a-1} - \frac{a}{1-\frac{1}{a}} = ?$

- A)
- $-2a$
- B)
- $-a$
- C)
- a
- D)
- $2a$
- E)
- $3a$

5. $\frac{1}{2^6} + 1 = a \Rightarrow \frac{\left(\frac{1}{2^{12}-1} \right) \cdot \left(\frac{1}{2^{12}+1} \right)}{\frac{1}{2^3-1}} = ?$

- A)
- $-a$
- B)
- $-\frac{1}{a}$
- C) 1
-
- D)
- $\frac{1}{a}$
- E)
- a

6. $\begin{cases} a+b=6 \\ c-a=2 \end{cases} \Rightarrow a^2 + ab - ac - bc = ?$

- A)
- -12
- B)
- -9
- C)
- -6
- D) 9 E) 12

7. $\frac{x^2-2x+a}{x^2+2x+b} = \frac{x-5}{x-1} \Rightarrow a+b = ?$

- A)
- -18
- B)
- -10
- C) 0 D) 10 E) 8

8. $\frac{2789^3 - 1}{2789^2 + 2789 + 1} = ?$

- A) 1789 B) 2780 C) 2788
-
- D) 2789 E) 2790

9. $16x^2 + 9y^2 - 40x + 12y + 29 = 0$

$\Rightarrow 4x - 6y = ?$

- A) 1 B) 3 C) 5 D) 7 E) 9

10. $x - \frac{1}{x} = 6 \Rightarrow \frac{x^6 - 1}{x^3} = ?$

- A) 200 B) 210 C) 216
D) 227 E) 234

11. $a^2 + b^2 + 6a - 6b + 18 = 0$

$\Rightarrow b - a = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

12. $\frac{ab^2 - a^2b}{a^3b - 2a^2b^2 + ab^3} = ?$

- A) $a - b$ B) $\frac{1}{a-b}$ C) $\frac{1}{b-a}$
D) $\frac{a^2}{b-a}$ E) $\frac{b^2}{a-b}$

13. $a - \frac{a+1}{\frac{1}{a}+1} = ?$

- A) $-\infty$ B) 0 C) 1
D) a E) $a + 1$

14. $x - y = 3,$
 $x + z = 5$
 $\Rightarrow x^2 - yz - xy + xz = ?$

- A) 2 B) 5 C) 7 D) 12 E) 15

15. $x, y \in \mathbb{Z},$
 $x^2 - y^2 - 2x + 1 = 13 \Rightarrow x \cdot y = ?$

- A) 4 B) 8 C) 26 D) 36 E) 48

16. $\frac{x^2 - 2xy}{x^2 + y(y-x)} : \frac{x^2 - xy - 2y^2}{x^3 + y^3} = ?$

- A) x B) x^2 C) $x - y$
D) $x + y$ E) x^2y^2



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1	2	3	4	5	6	7	8
D	D	D	B	D	A	A	C
9	10	11	12	13	14	15	16
E	E	C	C	B	E	E	A

$$1. \left(\frac{a^3 - b^3}{a - b} - \frac{a^3 + b^3}{a + b} \right) : \frac{4ab}{a^2 - b^2} = ?$$

- A) $\frac{a-b}{2}$ B) $\frac{a+b}{2}$ C) $\frac{a}{2}$
 D) $\frac{b}{2}$ E) $\frac{a^2 - b^2}{2}$

$$2. \frac{x^2y - y^2x}{y^2 - xy} : \frac{x^3 - 3x^2 + 2x}{x^2 - 4} = ?$$

- A) $\frac{x+2}{1-x}$ B) $\frac{x+2}{x-1}$ C) $\frac{x-2}{x-1}$
 D) $\frac{x-2}{1-x}$ E) $x-2$

$$3. \frac{x^4y - xy^4}{x^2y + xy^2 + y^3} \cdot \frac{1}{xy - x^2} = ?$$

- A) $x - y$ B) $x + y$ C) -1
 D) $x^2 - y^3$ E) 1

$$4. \left(7x^2 - \frac{1}{7} \right) : \left(x + \frac{1}{7} \right) = ?$$

- A) $x - 1$ B) $7x - 1$ C) $\frac{7x-1}{7}$
 D) $\frac{7x+1}{7}$ E) $-\frac{1}{7}$

$$5. \frac{3}{\frac{1}{x} - 1} + \frac{2x^2 + 2x}{x^2 - 1} = ?$$

- A) $\frac{-x}{x-1}$ B) $\frac{-x}{x+1}$ C) $\frac{x}{x-1}$
 D) $\frac{x}{x+1}$ E) $\frac{-x}{1-x}$

$$6. \frac{(a-b)^2 + ab}{a^3 + b^3} = ?$$

- A) $a + b$ B) $a - b$ C) $a \cdot b$
 D) $\frac{1}{a \cdot b}$ E) $\frac{1}{a + b}$

$$7. \frac{a^2 - 9a + 20}{a^2 + 2a - 24} : \frac{5 - a}{2a + 12} = ?$$

- A) $3 - a$ B) $2 - a$ C) -2
 D) $2 + a$ E) $3 + a$

$$8. \frac{a^2 + 2ab + b^2}{2a - 4} \cdot \frac{a^2 - 2a}{a^2 + ab} = ?$$

- A) $a - b$ B) $a + b$ C) $\frac{a-b}{2}$
 D) $\frac{a+b}{2}$ E) $a \cdot b$

9. $\left(\frac{x}{x-1} + \frac{1}{x^2-1}\right) : \frac{x^3-1}{x+1} = ?$

- A) $\frac{1}{x}$ B) $\frac{x}{x-1}$ C) $\frac{x-1}{x}$
 D) $\frac{1}{x+1}$ E) $\left(\frac{1}{x-1}\right)^2$

10. $\frac{x^{32}-1}{(x^{16}+1) \cdot (x^8+1)} = ?$

- A) x^8-1 B) x^8+1 C) $x^{16}-1$
 D) $x^{16}+1$ E) x^4-1

11. $\left(\frac{a+1}{a^2+4a+3} - \frac{a-1}{a^2+a-2}\right) : \frac{1}{a+2} = ?$

- A) $\frac{-1}{a-3}$ B) $\frac{-1}{a+3}$ C) $\frac{1}{a-3}$
 D) $\frac{1}{a+3}$ E) $\frac{a}{a+3}$

12. $\frac{(x-1) \cdot (x^2+3x+2)}{(x^2-2x+1) \cdot (x+1)} \cdot \frac{x^2-1}{3(x+1) \cdot (x+2)} = ?$

- A) $\frac{-1}{x}$ B) $\frac{-1}{3}$ C) $\frac{-3}{x}$
 D) $\frac{1}{3}$ E) $\frac{1}{x}$

13. $\frac{x^3-xy^2}{x^4-2x^3y+x^2y^2} : \frac{x^2+xy}{(xy-x^2)^2} = ?$

- A) $-xy$ B) $y-x$ C) $x-y$
 D) xy E) $x+y$

14. $\left(\frac{a^2-2a+4}{a+2} - 1\right) : \left(\frac{a-1}{a+2}\right) = ?$

- A) $a-1$ B) $a-2$ C) a
 D) $a+1$ E) $a+2$

15. $\frac{3x^2+6xy-x-2y}{9x^2-6x+1} = ?$

- A) $\frac{x-2y}{3x-1}$ B) $\frac{2y-x}{3x+1}$ C) $\frac{x+2y}{3x-1}$
 D) $\frac{x+2y}{3x+1}$ E) $\frac{x-2y}{3x+1}$

16. $\frac{x^2+\frac{1}{x}}{\frac{1}{x}-x} : \frac{x^2-x+1}{1-\frac{1}{x}} = ?$

- A) $\frac{-1}{x}$ B) $\frac{-x}{2}$ C) $\frac{x}{2}$
 D) $\frac{1}{x}$ E) $\frac{x-1}{x}$

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1	2	3	4	5	6	7	8
E	A	C	B	A	E	C	D
9	10	11	12	13	14	15	16
E	A	B	D	C	B	C	A

1. $\frac{x^2-4x}{x^3-9x} : \frac{x^2-2x-8}{x^2-x-6} = ?$

- A) $\frac{-1}{x+3}$ B) $\frac{-1}{x-3}$ C) $\frac{x-3}{x}$
 D) $\frac{1}{x-3}$ E) $\frac{1}{x+3}$

5. $\frac{y^2-x^2}{x^2y+xy^2} : \left(\frac{x-y}{x} - \frac{y-x}{y}\right) = ?$

- A) $\frac{-1}{x-y}$ B) $\frac{-1}{x+y}$ C) $\frac{1}{x-y}$
 D) $\frac{1}{x+y}$ E) $\frac{x}{x+y}$

2. $\frac{x^3+2x^2y+xy^2}{x^3-xy^2} : \frac{(x^2+xy)^2}{x^3-x^2y} = ?$

- A) $\frac{-1}{x+y}$ B) $\frac{-1}{x-y}$ C) $\frac{x+y}{x}$
 D) $\frac{1}{x+y}$ E) $\frac{1}{x-y}$

6. $\frac{a^2}{a-4} - \frac{16-8a}{4-a} = ?$

- A) $\frac{-a}{a-4}$ B) $\frac{-1}{a-4}$ C) $\frac{a}{a-4}$
 D) $\frac{1}{a-4}$ E) $a-4$

3. $\frac{x^3+y^3}{x^2-y^2} : \frac{\frac{x^2}{y} + y - x}{\frac{1}{y} - \frac{1}{x}} = ?$

- A) $\frac{-1}{y}$ B) $\frac{-1}{x}$ C) $\frac{x}{x-y}$
 D) $\frac{1}{x}$ E) $\frac{1}{y}$

7. $\frac{\frac{1}{a}-a}{a-\frac{1}{a}} : \frac{2}{1-a} = ?$

- A) $\frac{a-1}{2}$ B) $\frac{a-1}{4}$ C) $\frac{a+1}{2}$
 D) $\frac{a+1}{4}$ E) $a+1$

4. $\frac{x^2-9}{3-x} \left(1 + \frac{1-x}{x+3}\right) = ?$

- A) $x-3$ B) $x+3$ C) 3
 D) 4 E) -4

8. $\frac{x^2-4x+3}{x^2-1} : \frac{x^2-9}{x^2+4x+3} + \frac{1}{x} = ?$

- A) $\frac{-x}{x+1}$ B) $\frac{-x}{x-1}$ C) $\frac{x+1}{x}$
 D) $\frac{x}{x-1}$ E) $x+1$

9. $\frac{a^3 - 3a^2 + 2a}{a^2 - a} : \frac{4 - a^2}{2a^2 + 4a} = ?$

- A) $-2a$ B) $-a$ C) -2
D) a E) $2a$

10. $\frac{1}{a^2 - 1} + \frac{1}{\frac{1}{a^2} - 1} = ?$

- A) $a - 1$ B) $a + 1$ C) -1
D) $1 - a$ E) -2

11. $\frac{2x(y-1) - 2y}{x+y-xy} = ?$

- A) -2 B) -1 C) $x - 1$
D) $x + 1$ E) $x - y$

12. $(x^4 + 1)(x^2 + 1)(x + 1)(x - 1) = ?$

- A) $x + 1$ B) $x^2 + 1$ C) $x^2 - 1$
D) $x^4 - 1$ E) $x^8 - 1$

13. $\left(\frac{a^2 - \frac{1}{a^2}}{a - \frac{1}{a}} - \frac{1}{a} \right) : 4a = ?$

- A) $-\frac{1}{4}$ B) $-\frac{1}{2}$ C) $-\frac{a}{2}$
D) $\frac{1}{4}$ E) $\frac{a}{4}$

14. $\frac{1 + \frac{1}{a}}{1 - \frac{1}{a}} : \frac{a^2 + 2a + 1}{a^2 - 1} = ?$

- A) $-a$ B) -1 C) a
D) $\frac{1}{a}$ E) 1

15. $\left(\frac{1}{x^{16} + 1} \right) \cdot \left(\frac{1}{x^8 + 1} \right) \cdot \left(\frac{1}{x^4 + 1} \right) \cdot \left(\frac{1}{x^2 + 1} \right) = \frac{A}{x^{16} - 1}$

$\Rightarrow A = ?$

- A) $x - 1$ B) $x^2 - 1$ C) $x^4 - 1$
D) $x + 1$ E) $x^2 + 1$

16. $1 + \frac{a - \frac{1}{a}}{1 + \frac{1}{a}} = ?$

- A) $a - 1$ B) a C) -1
D) 1 E) $a + 1$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	D	D	E	B	E	A	C
9	10	11	12	13	14	15	16
A	C	A	E	D	E	A	B

1. $\frac{3}{4^x + 2^x + 1} = 2^x - 1$ ise / if $x = ?$

- A) $\frac{2}{3}$ B) $\frac{5}{6}$ C) $\frac{4}{3}$ D) $\frac{3}{2}$ E) $\frac{5}{2}$

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2020]

2. $a > 0$, $\frac{(a + \frac{1}{a})^2 + (a - \frac{1}{a})^2}{(a + \frac{1}{a})^2 - (a - \frac{1}{a})^2} = 7 \Rightarrow a + \frac{1}{a} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

[HARRAN ÜNİVERSİTESİ – YÖS 2020]

3. $(\frac{y}{a-b} - \frac{y^2-x^2}{b^2-a^2} \cdot \frac{a+b}{x-y}) \cdot \frac{b-a}{2x} = ?$

- A) $-\frac{1}{2}$ B) $\frac{1}{2}$ C) $\frac{y}{2x}$ D) $\frac{y}{2}$ E) $\frac{x-y}{a-b}$

[İSTANBUL ÜNİVERSİTESİ – YÖS 2019]

4. $x, y \in \mathbb{Z}^+$ ve $z \in \mathbb{R}$ olsun.

Let $x, y \in \mathbb{Z}^+$ and $z \in \mathbb{R}$,

$\left. \begin{array}{l} x^2 = z^2 + 5 \\ z^2 = y^2 + 12 \end{array} \right\} \Rightarrow x \cdot y = ?$

- A) 72 B) 63 C) 54 D) 45 E) 30

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2019]

5. $x \neq 0, y \neq 0$

$\frac{1}{x} - \frac{1}{y} = \frac{1}{4}, \frac{1}{x^2} - \frac{1}{y^2} = \frac{3}{16}$

$\Rightarrow x + y = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2019]

6. $\frac{2x^2 - x - 1}{x^2 - mx - n}$

ifadesinin sadeleştirilmiş hali $\frac{2x+1}{x-2}$ ise, $(m+n)$ toplamı kaçtır?

If the simplified form of the expression is $\frac{2x+1}{x-2}$, what is the value of the sum $(m+n)$?

- A) 3 B) -2 C) 2 D) 1 E) -1

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

7. $\frac{x^2 - x - 6}{2x^2 + 2x - 4} \cdot \frac{x^3 - x}{x^2 - 2x - 3} = \frac{5}{2} \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

[ANKARA ÜNİVERSİTESİ – YÖS 2018]

8. $\left. \begin{array}{l} 2x^2 + 9xy - 5y^2 = 40 \\ x + 5y = 4 \end{array} \right\} \Rightarrow y = ?$

- A) 1 B) $\frac{1}{3}$ C) $-\frac{2}{11}$ D) $\frac{3}{13}$ E) $-\frac{3}{10}$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

$$9. \frac{x^2 - 3x - 10}{\left(\frac{2}{x} + 1\right) \cdot \left(\frac{5}{x} - 1\right)} = ?$$

- A) $-3x$ B) $-x + 2$ C) $-x^2$
D) $x + 1$ E) $x - 5$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

$$10. (666)^2 - (333)^2 = (222)^2 \cdot m \Rightarrow m = ?$$

- A) 4 B) $\frac{11}{3}$ C) $\frac{9}{2}$ D) 6 E) $\frac{27}{4}$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

$$11. \left. \begin{array}{l} 2^x + 3^x = 4 \\ 4^x + 9^x = 6 \end{array} \right\} \Rightarrow 6^x = ?$$

- A) $\frac{2}{3}$ B) $2\sqrt{3}$ C) 2 D) $2\sqrt{13}$ E) 5

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

$$12. \frac{x^2 + 3x + 9}{2x + 6} \cdot \frac{4x^2 - 36}{x^3 - 27} = ?$$

- A) $\frac{1}{2}$ B) 1 C) 2 D) 3 E) 4

[ERCIYES ÜNİVERSİTESİ – YÖS 2017]

$$13. 2x - \frac{1}{x} = 6 \Rightarrow 8x^2 + \frac{2}{x^2} = ?$$

- A) 32 B) 40 C) 64 D) 72 E) 80

[ERCIYES ÜNİVERSİTESİ – YÖS 2017]

$$14. \frac{2x^2 + x - 1}{x^2 - 1} : \frac{2x^2 + 5x - 3}{x^2 + 2x - 3} = ?$$

- A) 1 B) $\frac{2x-1}{x+1}$ C) $\frac{x+3}{x+1}$
D) $\frac{x-1}{x+3}$ E) -1

[SELÇUK ÜNİVERSİTESİ – YÖS 2017]

$$15. \left(\frac{x^3 + y^3}{x^3 - y^3} : \frac{x^2 - xy + y^2}{x - y} \right) (x^2 + xy + y^2) = ?$$

- A) x B) x^2 C) $x - y$ D) $x + y$ E) $x^2 y^2$

[İSTANBUL ÜNİVERSİTESİ – YÖS 2016]

$$16. m - 2n = 2$$

$$\Rightarrow m^2 + 3m - 4mn + 4n^2 - 6n = ?$$

- A) 6 B) 8 C) 10 D) 12 E) 14

[YILDIZ ÜNİVERSİTESİ – YÖS 2015]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	D	B	A	C	D	D	C
9	10	11	12	13	14	15	16
C	E	E	C	E	A	D	C

BÖLÜM CHAPTER

6

TARİHSEL NOT / HISTORICAL NOTE

Boole, George [1815 – 1864]

İngiliz matematikçi, matematiksel mantığın babalarından birisi olarak tanınır. İlk büyük çalışması, 1854'de yayımlanan "Düşünme kurallarının incelenmesi (Investigation of the Laws of Thought)"dir. Boolean cebirleri olarak bilinen sembolik çıkarım türünü geliştirmiştir. Onun De Morgan ve diğerleri ile olan çalışması, modern cebirin gelişmesini sağlamıştır.

British mathematician who was one of the founding fathers of mathematical logic. His major work, published in 1854, is his Investigation of the Laws of Thought. The kind of Symbolic argument that he developed led to the study of so-called Boolean algebras, which are of current significance in computing and algebra. His work, together with that of De Morgan and others, helped to pave the way for the development of modern formal algebra.

ORAN ve ORANTI RATIOS and PROPORTIONS

Bu bölüm 222 test sorusu, 16 YÖS sorusu içermektedir.

This chapter includes 222 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 6

ORAN ve ORANTI / RATIOS and PROPORTIONS

- Oran ve Orantı / Ratios and Proportions 199 - 230

1. $\frac{x}{5} = \frac{2}{y} \Rightarrow x \cdot y = ?$

- A) 2 B) 5 C) 10 D) 15 E) 20

2. $\frac{a}{8} = \frac{9}{b} \Rightarrow a \cdot b = ?$

- A) 68 B) 72 C) 76 D) 80 E) 84

3. $\frac{a^2}{9} = \frac{3}{a} \Rightarrow a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

4. $\frac{a}{b} = 3 \Rightarrow \frac{3a+2b}{a-2b} = ?$

- A) 9 B) 11 C) 13 D) 15 E) 17

5. $a : 4 = b : 5, a + b = 18$
 $\Rightarrow b - a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

6. $\frac{a}{2} = \frac{b}{5} \Rightarrow \frac{4a-b}{2a-b} = ?$

- A) 2 B) 0 C) -1 D) -2 E) -3

7. $a : b = 3 : 5 \Rightarrow \frac{b^2 - a^2}{4ab} = ?$

- A) $\frac{1}{15}$ B) $\frac{2}{15}$ C) $\frac{1}{5}$ D) $\frac{4}{15}$ E) $\frac{1}{3}$

8. $\frac{a+3b}{b} = \frac{7}{2} \Rightarrow \frac{a}{b} = ?$

- A) $\frac{1}{2}$ B) 1 C) 2 D) $\frac{5}{2}$ E) 3

$$9. \left. \begin{array}{l} \frac{a+b}{2} = 7 \\ \frac{a-b}{3} = 2 \end{array} \right\} \Rightarrow a = ?$$

- A) 10 B) 9 C) 8 D) 7 E) 6

$$13. \frac{a}{b} = \frac{4}{b} \Rightarrow \frac{a-c}{2} = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$10. \frac{a+b}{9} = \frac{a-b}{3} \Rightarrow \frac{a}{b} = ?$$

- A) 1 B) $\frac{3}{2}$ C) 2 D) $\frac{5}{2}$ E) 3

$$14. \frac{a-b}{a+b} = \frac{5}{6} \Rightarrow \frac{a^2-b^2}{a^2+b^2} = ?$$

- A) $\frac{36}{25}$ B) $\frac{60}{61}$ C) $\frac{121}{61}$ D) $\frac{25}{36}$ E) $\frac{339}{20}$

$$15. \frac{a}{b} = \frac{c}{d} = 3 \Rightarrow \frac{a+b}{a-b} + \frac{c+d}{c-d} = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

$$11. \frac{x+2y}{x-y} = \frac{4}{3} \Rightarrow \frac{x}{y} = ?$$

- A) 8 B) 9 C) 10 D) 11 E) 12

$$16. \left. \begin{array}{l} a > 0, \\ \frac{a}{7} = \frac{b}{5} \\ a \cdot b = 140 \end{array} \right\} \Rightarrow a - b = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$12. \frac{x+3}{6} = \frac{y+1}{2} \Rightarrow \frac{x}{y} = ?$$

- A) 5 B) 4 C) 3 D) 2 E) 1



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	C	B	B	E	D	A
9	10	11	12	13	14	15	16
A	C	C	C	B	B	C	D

1. $\frac{a}{2} = \frac{b}{5} = 4 \Rightarrow a + b = ?$

- A) 16 B) 20 C) 24 D) 28 E) 32

3. $\frac{a}{b} = \frac{c}{d} = \frac{3}{4} \Rightarrow \frac{a+2b}{b} + \frac{2c-d}{d} = ?$

- A) $\frac{13}{4}$ B) $\frac{11}{21}$ C) $\frac{9}{4}$ D) $\frac{7}{4}$ E) $\frac{5}{4}$

2. $\frac{x}{y} = \frac{z}{t} = \frac{1}{2} \Rightarrow \frac{y}{x} + \frac{z+t}{t} = ?$

- A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) $\frac{5}{2}$ E) $\frac{7}{2}$

4. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{3}{7} \Rightarrow \left(\frac{a+b}{b}\right) \cdot \left(\frac{d}{c+d}\right) \cdot \left(\frac{f-e}{e}\right) = ?$

- A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) 1 D) $\frac{4}{3}$ E) $\frac{5}{3}$

5. $\frac{a}{3} = \frac{b}{4} = \frac{c}{5} \Rightarrow \frac{a \cdot b + b \cdot c}{a^2 + b^2 + c^2} = ?$

- A) $\frac{9}{25}$ B) $\frac{12}{25}$ C) $\frac{14}{25}$ D) $\frac{16}{25}$ E) 5

6. $\frac{a}{4} = \frac{b}{6} = \frac{c}{8} \Rightarrow \frac{a \cdot b}{c(a-b)} = ?$

- A) $-\frac{1}{2}$ B) $-\frac{1}{3}$ C) $-\frac{3}{2}$ D) $\frac{1}{3}$ E) $\frac{3}{2}$

7. $\frac{a}{3} = \frac{b}{5} = \frac{c}{7},$
 $\frac{3}{a} + \frac{5}{b} + \frac{7}{c} = \frac{1}{3} \Rightarrow a - b = ?$

- A) -6 B) -9 C) -12 D) -18 E) -36

8. $a : b : c = 3 : 5 : 8 \Rightarrow \frac{a+b}{2c} = ?$

- A) 2 B) $\frac{3}{2}$ C) 1 D) $\frac{1}{2}$ E) $\frac{1}{4}$

9. $3a = 5b \Rightarrow \frac{2a-3b}{2b-a} = ?$

- A) 1 B) $\frac{3}{2}$ C) 2 D) $\frac{5}{2}$ E) 3

10. $3a = 7b \Rightarrow \frac{a+3b}{a-b} = ?$

- A) 2 B) 4 C) 6 D) 8 E) 12

11. $\left. \begin{array}{l} a > 0, \\ 2a = 5b \\ a^2 + b^2 = 116 \end{array} \right\} \Rightarrow a = ?$

- A) 8 B) 9 C) 10 D) 11 E) 12

12. $\frac{a}{b} = \frac{3}{5}, \frac{b}{c} = \frac{5}{4} \Rightarrow \frac{a+2b}{b-c} = ?$

- A) 2 B) 3 C) 5 D) 11 E) 13

13. $\frac{a}{b} = \frac{3}{4}, \frac{b}{c} = \frac{8}{7} \Rightarrow \frac{a+b-c}{a-b+c} = ?$

- A) $\frac{4}{5}$ B) 1 C) $\frac{6}{5}$ D) $\frac{7}{5}$ E) $\frac{8}{5}$

14. $\frac{a}{b} = \frac{3}{8}, \frac{b}{c} = \frac{4}{5} \Rightarrow \frac{a}{c} = ?$

- A) $\frac{3}{5}$ B) $\frac{3}{10}$ C) $\frac{3}{11}$ D) $\frac{4}{15}$ E) $\frac{5}{16}$

15. $\frac{a}{b} = \frac{2}{5}, \frac{b}{c} = \frac{3}{4}$
 $a+b+c=82 \Rightarrow a = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

16. $\left. \begin{array}{l} \frac{a}{b} = \frac{1}{3}, \frac{b}{c} = \frac{2}{3} \\ c-a-b=4 \end{array} \right\} \Rightarrow a = ?$

- A) 8 B) 7 C) 6 D) 5 E) 4


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	A	E	D	D	C	D	D
9	10	11	12	13	14	15	16
A	B	C	E	D	B	C	A

1. $\left. \begin{array}{l} 2x = 3y \\ 6y = 7z \end{array} \right\} \Rightarrow \frac{x}{z} = ?$
 A) $\frac{7}{2}$ B) $\frac{7}{4}$ C) 1 D) $\frac{7}{10}$ E) $\frac{7}{12}$

2. $\left. \begin{array}{l} 4a = 7b \\ 3b = c \end{array} \right\} \Rightarrow a : b : c = ?$
 A) 7 : 4 : 12 B) 4 : 7 : 12
 C) 3 : 4 : 12 D) 3 : 4 : 7
 E) 12 : 7 : 4

3. $4a = 5b, 3a = 2c,$
 $2a - b + c = 54 \Rightarrow a = ?$
 A) 15 B) 20 C) 25 D) 30 E) 35

4. $\left. \begin{array}{l} 3x = 7y \\ 5y = 6z \\ x + y - z = 60 \end{array} \right\} \Rightarrow x = ?$
 A) 21 B) 35 C) 42 D) 48 E) 56

5. $a : 12 : b = 3 : 6 : 5 \Rightarrow a + b = ?$
 A) 12 B) 16 C) 20 D) 24 E) 26

6. $a : b : c = 2 : 3 : 5$
 $2a + 3b - c = 32 \Rightarrow b = ?$
 A) 12 B) 10 C) 8 D) 6 E) 4

7. $3x = 4y = 6z \Rightarrow \frac{x+y}{z} = ?$
 A) 1 B) 2 C) $\frac{5}{2}$ D) 3 E) $\frac{7}{2}$

8. $3x = 5y = 8z,$
 $x + y + z = 79 \Rightarrow x + y = ?$
 A) 40 B) 48 C) 56 D) 64 E) 72

9. $2a = 4b = 5c$,
 $2a - 3b + 4c = 63 \Rightarrow b = ?$
 A) 15 B) 12 C) 9 D) 6 E) 3

10. $x, y, z \in \mathbb{Z}^+$,
 $3x = 5y = 6z$
 $\Rightarrow \min(x + y + z) = ?$
 A) 18 B) 19 C) 20 D) 21 E) 22

11. $a, b, c \in \mathbb{Z}^-$,
 $7a = 2b = 9c$
 $\Rightarrow \max(a + b + c) = ?$
 A) -95 B) -90 C) -86 D) -82 E) -30

12. $5xy = 7xz = 12yz$
 $x + y - z = 56 \Rightarrow x = ?$
 A) 44 B) 46 C) 48 D) 50 E) 52

13. $2 \cdot a \cdot b = 3 \cdot b \cdot c = 7 \cdot a \cdot c \Rightarrow \frac{a+b}{c} = ?$
 A) 5 B) 6 C) 7 D) 8 E) 12

14. $\left. \begin{array}{l} 4xy = 5xz = 7yz \\ x + y + z = 64 \end{array} \right\} \Rightarrow x = ?$
 A) 16 B) 20 C) 24 D) 28 E) 32

15. $\left. \begin{array}{l} \frac{1}{6xy} = \frac{1}{3xz} = \frac{1}{5yz} \\ x - 2y + z = 25 \end{array} \right\} \Rightarrow x + y = ?$
 A) 40 B) 37 C) 34 D) 31 E) 28

16. $x, y, z \in \mathbb{R}^+$,
 $\frac{3}{2xy} = \frac{1}{4yz} = \frac{2}{5xz} \Rightarrow ? < ? < ?$
 A) $y < z < x$ B) $x < y < z$ C) $z < x < y$
 D) $y < x < z$ E) $z < y < x$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	A	B	E	B	A	E	D
9	10	11	12	13	14	15	16
A	D	A	C	A	D	A	E

$$1. \left. \begin{array}{l} \frac{a}{4} = \frac{b}{5} = \frac{c}{6} \\ b+c-a=14 \end{array} \right\} \Rightarrow a+c-b=?$$

- A) 3 B) 5 C) 8 D) 10 E) 13

$$2. \frac{a}{5} = \frac{b}{6} = \frac{c}{7} = 2 \Rightarrow a+b-c=?$$

- A) 16 B) 14 C) 12 D) 10 E) 8

$$3. \left. \begin{array}{l} \frac{a}{2} = \frac{b}{3} = \frac{c}{5} \\ a+b+c=100 \end{array} \right\} \Rightarrow a=?$$

- A) 20 B) 17 C) 15 D) 13 E) 11

$$4. \left. \begin{array}{l} \frac{a}{2} = \frac{b}{3} = c \\ a+b+c=30 \end{array} \right\} \Rightarrow c=?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$5. \left. \begin{array}{l} \frac{a}{4} = \frac{b}{5} = \frac{c}{6} \\ a-2b+3c=72 \end{array} \right\} \Rightarrow a=?$$

- A) 24 B) 28 C) 30 D) 36 E) 40

$$6. \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{4}{5} \Rightarrow \frac{a+c+e}{b+d+f}=?$$

- A) $\frac{1}{5}$ B) $\frac{2}{5}$ C) $\frac{3}{5}$ D) $\frac{4}{5}$ E) 1

$$7. \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 6 \Rightarrow \frac{3a+4c+2e}{3b+4d+2f}=?$$

- A) 2 B) 4 C) 6 D) 8 E) 12

$$8. \left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = k \\ \frac{2a+3c-4e}{mb+3d-4f} = k \end{array} \right\} \Rightarrow m=?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$9. \left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{1}{4} \\ a+c-e=5 \end{array} \right\} \Rightarrow b+d-f=?$$

A) 5 B) 10 C) 15 D) 20 E) 25

$$10. \left. \begin{array}{l} \frac{x}{y} = \frac{z}{t} = \frac{5}{8} \\ 2x-3z=10 \end{array} \right\} \Rightarrow 3t-2y=?$$

A) -16 B) -10 C) 10 D) 12 E) 16

$$11. \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 9 \Rightarrow \frac{a-c-3e}{2b-2d-6f} = ?$$

A) $\frac{1}{2}$ B) 1 C) $\frac{9}{2}$ D) 9 E) 18

$$12. \left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 4 \\ 3a+2c-e=84 \end{array} \right\} \Rightarrow 3b+2d-f=?$$

A) 21 B) 19 C) 17 D) 15 E) 13

$$13. \left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 3 \\ a+2c+3e=48 \\ 2d+3f=12 \end{array} \right\} \Rightarrow b=?$$

A) 1 B) 2 C) 3 D) 4 E) 5

$$14. \left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 3 \\ 2a+c-e=24 \\ f-d=-6 \end{array} \right\} \Rightarrow a=?$$

A) 1 B) 2 C) 3 D) 4 E) 5

$$15. \frac{2a-4}{a} = \frac{2b+3}{b} = \frac{2c+1}{c} = k \Rightarrow \frac{k}{2} = ?$$

A) 1 B) 2 C) 3 D) 4 E) 5

$$16. \frac{a-2}{3} = \frac{b-3}{2} = \frac{c-5}{4},$$

$$2a-b+c=22 \Rightarrow a=?$$

A) 8 B) 6 C) 3 D) 2 E) 1



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	E	A	E	A	D	C	B
9	10	11	12	13	14	15	16
D	A	C	A	D	C	A	A

1. $\frac{1}{4x} = \frac{3}{2y} = \frac{5}{6z} \Rightarrow x : y : z = ? : ? : ?$

- A) 18 : 10 : 3 B) 10 : 18 : 3 C) 3 : 10 : 18
D) 3 : 18 : 10 E) 3 : 18 : 24

2. $\frac{a+b+c}{25} = \frac{a+c}{13} = \frac{b+c}{17} \Rightarrow \frac{b}{c} = ?$

- A) $\frac{17}{5}$ B) $\frac{12}{5}$ C) $\frac{11}{5}$ D) $\frac{5}{12}$ E) $\frac{5}{11}$

3. $\frac{2a-c}{b} = \frac{2b-a}{a} = \frac{2c-b}{c} = k \Rightarrow k = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

4. $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{2}{3} \Rightarrow \frac{a}{d} = ?$

- A) $\frac{8}{27}$ B) $\frac{5}{27}$ C) $\frac{4}{27}$ D) $\frac{4}{9}$ E) $\frac{2}{3}$

5. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{7}{9} \Rightarrow \frac{a \cdot d \cdot e}{b \cdot c \cdot f} = ?$

- A) $\frac{1}{9}$ B) $\frac{1}{3}$ C) $\frac{7}{9}$ D) $\frac{49}{81}$ E) 1

6. $x, y, z, t \in \mathbb{R}^+$,
 $\frac{x}{y} = \frac{y}{z} = \frac{z}{t} = 4 \Rightarrow \frac{x}{t} = ?$

- A) 128 B) 64 C) 32 D) 16 E) 4

7. $\left. \begin{array}{l} \frac{x}{2} = \frac{y}{4} = \frac{z}{6} \\ x \cdot y \cdot z = 384 \end{array} \right\} \Rightarrow z = ?$

- A) 4 B) 8 C) 10 D) 12 E) 16

8. $\left. \begin{array}{l} a + \frac{c}{b} = 27 \\ b + \frac{c}{a} = 9 \end{array} \right\} \Rightarrow \frac{b}{a} = ?$

- A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) 1 D) 2 E) 3

$$9. \left. \begin{array}{l} a + \frac{1}{b} = 3 \\ b + \frac{1}{a} = 7 \end{array} \right\} \Rightarrow \frac{a}{b} = ?$$

- A) $\frac{3}{7}$ B) $\frac{4}{7}$ C) $\frac{5}{7}$ D) $\frac{6}{7}$ E) 1

$$10. \left. \begin{array}{l} a + \frac{2}{b} = 4 \\ 3b + \frac{6}{a} = 9 \end{array} \right\} \Rightarrow \frac{a^2 + b^2}{a \cdot b} = ?$$

- A) $\frac{1}{16}$ B) $\frac{1}{9}$ C) $\frac{25}{12}$ D) $\frac{1}{4}$ E) $\frac{25}{144}$

$$11. \left. \begin{array}{l} 2a = 3b = 5c, \\ \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{2}{5} \end{array} \right\} \Rightarrow c = ?$$

- A) 4 B) 5 C) 6 D) 7 E) 8

$$12. \left. \begin{array}{l} xa = yb = zc = \frac{1}{4} \\ x + y + z = 12 \end{array} \right\} \Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = ?$$

- A) 12 B) 24 C) 48 D) 52 E) 60

$$13. \left. \begin{array}{l} ax = by = cz = 4 \\ a + b + c = 36 \end{array} \right\} \Rightarrow \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = ?$$

- A) 4 B) 8 C) 9 D) 12 E) 16

$$14. ax = by = cz = 91,$$

$$x + y + z = 13$$

$$\Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = ?$$

- A) $\frac{1}{7}$ B) $\frac{4}{7}$ C) 2 D) 4 E) 7

$$15. \left. \begin{array}{l} \frac{a \cdot c}{b} = 3 \\ \frac{a \cdot b}{c} = 4 \\ \frac{b \cdot c}{a} = 5 \end{array} \right\} \Rightarrow a^2 + b^2 + c^2 = ?$$

- A) 45 B) 46 C) 47 D) 48 E) 49

$$16. \left. \begin{array}{l} \frac{x \cdot y}{z} = 6 \\ \frac{x \cdot z}{y} = 3 \\ \frac{y \cdot z}{x} = 8 \end{array} \right\} \Rightarrow x^2 + y^2 + z^2 = ?$$

- A) 64 B) 81 C) 90 D) 96 E) 100


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	B	A	A	C	B	D	B
9	10	11	12	13	14	15	16
A	C	B	C	C	A	C	C

1. $\frac{a+b}{b} = \frac{3}{4} \Rightarrow \frac{3a-b}{b} = ?$

- A) $-\frac{7}{4}$ B) $-\frac{4}{7}$ C) $\frac{4}{7}$ D) $\frac{7}{4}$ E) $\frac{4}{5}$

2. $\frac{a+2b}{a-2b} = 2 \Rightarrow \frac{a+b}{b-a} = ?$

- A) $-\frac{9}{5}$ B) $-\frac{7}{5}$ C) $-\frac{5}{7}$ D) $\frac{7}{5}$ E) $\frac{5}{7}$

3. $\frac{a-b}{b} = 2 \Rightarrow \frac{a^2-ab}{a^2+b^2} = ?$

- A) $\frac{1}{5}$ B) $\frac{2}{5}$ C) $\frac{3}{5}$ D) $\frac{5}{2}$ E) $\frac{5}{3}$

4. $a : b : c = 5 : 2 : 6 \Rightarrow \frac{3a-c}{4c-6b} = ?$

- A) $\frac{1}{2}$ B) $\frac{2}{3}$ C) $\frac{1}{3}$ D) $\frac{3}{4}$ E) $\frac{4}{3}$

5. $\frac{2x-y}{x+y} = \frac{3}{2} \Rightarrow \frac{x^2+xy+2y^2}{x^2-y^2} = ?$

- A) $\frac{2}{3}$ B) $\frac{3}{4}$ C) $\frac{4}{5}$ D) $\frac{3}{2}$ E) $\frac{4}{3}$

6. $\frac{x}{3} = \frac{y}{2} \Rightarrow \frac{3x+4y}{x-y} = ?$

- A) 16 B) 17 C) 18 D) 21 E) 24

7. $x = \frac{y}{3} = \frac{z}{4} \Rightarrow \frac{2x-3y+z}{z-y-2x} = ?$

- A) 2 B) 3 C) 4 D) $\frac{1}{3}$ E) $\frac{1}{4}$

8. $x : y : z = 3 : \frac{1}{2} : 4 \Rightarrow \frac{x-4y+z}{x+2y} = ?$

- A) $\frac{2}{3}$ B) $\frac{3}{4}$ C) $\frac{4}{5}$ D) $\frac{5}{4}$ E) $\frac{4}{3}$

9. $\frac{2x-3y}{x+y} = 1 \Rightarrow \frac{3x+y}{x-y} = ?$
 A) $\frac{10}{3}$ B) $\frac{13}{3}$ C) $\frac{14}{3}$ D) $\frac{16}{3}$ E) $\frac{17}{3}$

10. $\frac{a}{2} = \frac{b}{3} = \frac{c}{5} \Rightarrow \frac{2a-b+c}{2a+b-c} = ?$
 A) $\frac{1}{3}$ B) $\frac{1}{4}$ C) 3 D) 4 E) 5

11. $3a = 4b = 5c \Rightarrow \frac{a+2b-c}{2a} = ?$
 A) $\frac{13}{20}$ B) $\frac{17}{20}$ C) $\frac{19}{20}$ D) $\frac{7}{10}$ E) $\frac{7}{10}$

12. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 5 \Rightarrow \frac{a+c+e}{b+d+f} = ?$
 A) $\frac{1}{5}$ B) $\frac{1}{10}$ C) $\frac{1}{15}$ D) 5 E) 10

13. $\frac{x}{a} = \frac{y}{b} = 2$
 $\Rightarrow \left(\frac{x+a}{y}\right) \cdot \left(\frac{2b-3y}{x}\right) = ?$
 A) -3 B) -2 C) -1 D) 2 E) 3

14. $\left. \begin{array}{l} \frac{y}{x} = \frac{2}{3} \\ \frac{z}{x} = \frac{3}{5} \end{array} \right\} \Rightarrow \frac{y}{z-x} = ?$
 A) $-\frac{3}{5}$ B) $-\frac{3}{4}$ C) $-\frac{5}{3}$ D) $-\frac{4}{3}$ E) $-\frac{3}{2}$

15. $\left. \begin{array}{l} \frac{x+y}{x} = \frac{3}{2} \\ \frac{y-z}{z} = \frac{1}{2} \end{array} \right\} \Rightarrow \frac{x+3z}{7z-2x} = ?$
 A) -6 B) -4 C) 3 D) 4 E) 6

16. $\left. \begin{array}{l} a + \frac{1}{b} = 1 \\ b + \frac{1}{a} = 2 \end{array} \right\} \Rightarrow \frac{a}{a+b} = ?$
 A) $\frac{1}{6}$ B) $\frac{1}{5}$ C) $\frac{1}{4}$ D) $\frac{1}{3}$ E) $\frac{1}{2}$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	B	C	D	E	B	B	D
9	10	11	12	13	14	15	16
B	C	C	D	A	C	E	D

$$1. \left. \begin{array}{l} \frac{a}{2} = \frac{b}{3} = \frac{c}{4} \\ a+b+c=18 \end{array} \right\} \Rightarrow a+b-c=?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$5. \frac{x}{6} = \frac{4}{y} = \frac{z}{3} \Rightarrow y(x+z)=?$$

- A) 12 B) 24 C) 36 D) 48 E) 60

$$2. \left. \begin{array}{l} \frac{x}{4} = \frac{y}{5} = \frac{z}{9} \\ x+z-y=24 \end{array} \right\} \Rightarrow y=?$$

- A) 5 B) 10 C) 15 D) 20 E) 25

$$6. \frac{a}{b} = \frac{2}{5}, \frac{b}{c} = \frac{3}{8} \Rightarrow \frac{a}{c}=?$$

- A) $\frac{1}{20}$ B) $\frac{1}{10}$ C) $\frac{3}{20}$ D) $\frac{1}{5}$ E) $\frac{1}{4}$

$$3. \begin{array}{l} a:b:c=5:6:7, \\ a+b+c=36 \\ \Rightarrow a=? \end{array}$$

- A) 5 B) 10 C) 15 D) 20 E) 25

$$7. \begin{array}{l} \frac{a}{b} = \frac{3}{7}, \frac{b}{c} = \frac{7}{10} \\ a-b+c=36 \Rightarrow c=? \end{array}$$

- A) 60 B) 50 C) 40 D) 30 E) 20

$$4. \begin{array}{l} x:3=y:5, \\ y-x=8 \\ \Rightarrow x=? \end{array}$$

- A) 2 B) 4 C) 6 D) 8 E) 12

$$8. \frac{3a-2b}{a+b} = \frac{6}{5} \Rightarrow \sqrt{\frac{a}{b}}=?$$

- A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) 1 D) $\frac{4}{3}$ E) $\frac{5}{3}$

9. $\frac{x-1}{3} = \frac{y+1}{2} = \frac{z}{4}$
 $x+y+z=27 \Rightarrow x=?$
 A) 7 B) 10 C) 13 D) 16 E) 19

10. $\frac{a}{b} = \frac{c}{d} = \frac{1}{4} \Rightarrow \frac{a \cdot c}{b \cdot d} : \frac{a}{b} = ?$
 A) $\frac{1}{2}$ B) $\frac{1}{4}$ C) $\frac{1}{8}$ D) $\frac{1}{16}$ E) $\frac{1}{64}$

11. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{2}{5}$
 $\Rightarrow \left(\frac{a}{a+b}\right) \cdot \left(\frac{c+d}{d}\right) \cdot \left(\frac{e+f}{f}\right) = ?$
 A) $\frac{14}{25}$ B) $\frac{2}{5}$ C) $\frac{7}{25}$ D) $\frac{4}{25}$ E) $\frac{4}{5}$

12. $\frac{a}{b} = \frac{x}{y} = \frac{z}{c} \Rightarrow a \cdot c \cdot y \cdot z = ?$
 A) b B) $\frac{x}{b}$ C) bx D) x E) $a \cdot b \cdot x$

13. $a : b = 3 : 5$
 $\Rightarrow \frac{(a-b)^2 + 4ab}{(a+b)^2 - 4ab} = ?$

- A) 8 B) 10 C) 12 D) 14 E) 16

14. $\left. \begin{array}{l} \frac{x}{3} = \frac{2}{y} \\ x-y=6 \end{array} \right\} \Rightarrow (x+y)^2 = ?$

- A) 30 B) 40 C) 50 D) 60 E) 70

15. $\left. \begin{array}{l} a \cdot b = 64 \\ b \cdot c = 16 \\ a + c = 20 \end{array} \right\} \Rightarrow a = ?$

- A) 10 B) 11 C) 12 D) 16 E) 17

16. $x, y, z \in \mathbb{R}^+$
 $\left. \begin{array}{l} \frac{x}{2} = \frac{y}{3} = z \\ x^2 + y^2 + z^2 = 56 \end{array} \right\} \Rightarrow x+y+z = ?$

- A) 3 B) 4 C) 6 D) 9 E) 12



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	C	B	E	C	C	A	D
9	10	11	12	13	14	15	16
B	B	A	C	E	D	D	E

$$1. \left. \begin{array}{l} \frac{x}{y} = \frac{3}{4} \\ \frac{y}{z} = \frac{3}{5} \end{array} \right\} \Rightarrow \frac{x+y}{y+z} = ?$$

- A) $\frac{3}{20}$ B) $\frac{9}{20}$ C) $\frac{3}{32}$ D) $\frac{9}{32}$ E) $\frac{21}{32}$

$$2. \left. \begin{array}{l} \frac{a \cdot c}{b \cdot d} = \frac{1}{3} \\ \frac{c+d}{d} = \frac{4}{3} \end{array} \right\} \Rightarrow \frac{a+3b}{2a-b} = ?$$

- A) $\frac{1}{3}$ B) $\frac{1}{2}$ C) 2 D) 3 E) 4

$$3. \left. \begin{array}{l} x - \frac{3}{y} = 5 \\ y - \frac{3}{x} = 4 \end{array} \right\} \Rightarrow \frac{x+y}{x-y} = ?$$

- A) 3 B) 4 C) 5 D) 9 E) 20

$$4. \frac{1}{2x} = \frac{3}{4y} = \frac{2}{3z} \Rightarrow x : y : z = ?$$

- A) 8:9:6 B) 6:9:8 C) 2:3:4
D) 3:4:2 E) 2:4:3

$$5. \left. \begin{array}{l} \frac{a+b}{2} = c \\ \frac{2a-c}{b} = 3 \end{array} \right\} \Rightarrow \frac{a}{b} = ?$$

- A) $\frac{3}{7}$ B) $\frac{2}{7}$ C) $\frac{1}{7}$ D) $\frac{7}{2}$ E) $\frac{7}{3}$

$$6. \frac{x-y+z}{3} = \frac{x+y-z}{5} = \frac{y+z}{9} \Rightarrow x : y : z = ?$$

- A) 4:5:6 B) 5:4:6 C) 6:5:4
D) 4:5:4 E) 5:4:4

$$7. \frac{a}{b} = \frac{c}{d} = k, \frac{2a-3c}{2b-xd} = k \Rightarrow x = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$8. \frac{a}{b} = \frac{c}{d} = k, \frac{3a+5}{3b+xd} = k \Rightarrow x = ?$$

- A) 3 B) 5 C) $\frac{3}{c}$ D) $\frac{5}{c}$ E) $\frac{c}{5}$

9. $\frac{x}{y} = \frac{a}{b} = 3 \Rightarrow \frac{x-y}{x} \cdot \frac{a+b}{a} = ?$

- A) $\frac{4}{3}$ B) $\frac{4}{3}$ C) $\frac{8}{9}$ D) $\frac{9}{8}$ E) $\frac{4}{9}$

10. $\frac{x-y}{x} = \frac{3y+z}{y} = \frac{x+z}{z} \Rightarrow \frac{3x-3y}{z} = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) 3 D) 4 E) 6

11. $\frac{x}{y} = \frac{3}{4}, \frac{y}{z} = \frac{4}{5} \Rightarrow \frac{2x+5y}{3y-z} = ?$

- A) $\frac{22}{7}$ B) $\frac{23}{7}$ C) $\frac{24}{7}$ D) $\frac{25}{7}$ E) $\frac{26}{7}$

12. $\frac{a}{b} = \frac{1}{4}, \frac{b}{c} = \frac{2}{5} \Rightarrow \frac{3a-5b}{a+b-2c} = ?$

- A) $\frac{7}{5}$ B) $\frac{5}{14}$ C) $\frac{17}{15}$ D) $\frac{15}{14}$ E) $\frac{17}{14}$

13. $\frac{a}{b} = \frac{2}{3}, \frac{b}{c} = \frac{1}{3} \Rightarrow \frac{a^2+b^2}{b \cdot c} = ?$

- A) $\frac{8}{27}$ B) $\frac{10}{27}$ C) $\frac{13}{27}$ D) $\frac{15}{27}$ E) $\frac{16}{27}$

14. $\frac{\frac{1}{2}x + \frac{3}{4}y}{y-x} = \frac{1}{4} \Rightarrow \frac{x^2 - 3xy - 4y^2}{(x-4y) \cdot x} = ?$

- A) $-\frac{1}{4}$ B) $-\frac{1}{2}$ C) $\frac{1}{2}$ D) $\frac{1}{3}$ E) $\frac{1}{4}$

15. $\frac{3x-y}{x+2y} = 1, \frac{y+\frac{z}{4}}{2y-3z} = \frac{1}{4} \Rightarrow \frac{y-x}{z} = ?$

- A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 1 E) 2

16. $\left. \begin{array}{l} \frac{a}{4} = \frac{b}{5} \\ 5a + 4b = 15 \end{array} \right\} \Rightarrow b = ?$

- A) $\frac{8}{15}$ B) $\frac{7}{12}$ C) $\frac{12}{7}$ D) $\frac{13}{8}$ E) $\frac{15}{8}$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	E	D	B	E	D	C	D
9	10	11	12	13	14	15	16
C	E	E	C	C	B	D	E

$$1. \left. \begin{array}{l} \frac{a}{2} = \frac{b}{3} = \frac{c}{4} \\ 3a + 2b = 48 \end{array} \right\} \Rightarrow c = ?$$

- A) 8 B) 10 C) 12 D) 16 E) 18

$$2. \left. \begin{array}{l} a : b : c = 3 : 5 : 7, \\ 2a - b + c = 72 \end{array} \right\} \Rightarrow b = ?$$

- A) 15 B) 20 C) 35 D) 40 E) 45

$$3. \left. \begin{array}{l} \frac{a}{2} = \frac{b}{3} = \frac{c}{5} \\ 2c - 3a = 52 \end{array} \right\} \Rightarrow b = ?$$

- A) 13 B) 18 C) 26 D) 36 E) 39

$$4. \left. \begin{array}{l} \frac{a}{2} = \frac{b}{3} = \frac{c}{5} = k \\ 7a - b + mc = k \end{array} \right\} \Rightarrow m = ?$$

- A) -4 B) -2 C) 2 D) 3 E) 4

$$5. \left. \begin{array}{l} a, b \in \mathbb{Z}^+, \\ \frac{a}{b} = \frac{2}{3} \\ a^2 - b^2 = -125 \end{array} \right\} \Rightarrow a = ?$$

- A) 5 B) 10 C) 15 D) 20 E) 25

$$6. \left. \begin{array}{l} x, y, z \in \mathbb{N}^+, \\ \frac{x}{2} = \frac{y}{3} = \frac{z}{4} \\ x^2 + 2y^2 - z^2 = 6 \end{array} \right\} \Rightarrow y = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 6

$$7. \left. \begin{array}{l} \frac{x}{3} = \frac{y}{2} = \frac{3z}{4} \\ 3x + y - 3z = 15 \end{array} \right\} \Rightarrow z = ?$$

- A) $\frac{7}{20}$ B) $\frac{7}{10}$ C) 1 D) $\frac{10}{7}$ E) $\frac{20}{7}$

$$8. \left. \begin{array}{l} \frac{x}{2} = \frac{2y}{3} = \frac{3z}{4} \\ 2x + 2y - 3z = 21 \end{array} \right\} \Rightarrow x + 2y = ?$$

- A) 14 B) 21 C) 28 D) 35 E) 42

9. $\frac{x}{y} = 2, \frac{y}{z} = \frac{3}{2},$
 $x+z = 16$
 $\Rightarrow x+y-z = ?$

- A) 8 B) 10 C) 12 D) 14 E) 16

13. $\left. \begin{array}{l} \frac{a+3}{2} = \frac{b-3}{3} = \frac{c}{5} \\ 5a+2b-c=24 \end{array} \right\} \Rightarrow a = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

10. $\left. \begin{array}{l} \frac{a}{3} = \frac{b}{2} = c \\ 2a+c-3b=7 \end{array} \right\} \Rightarrow c = ?$

- A) 7 B) 8 C) 9 D) 10 E) 12

14. $\frac{x+y}{y} = \frac{7}{6}, \frac{y+z}{z} = \frac{5}{2},$
 $x+y+z = 55 \Rightarrow z = ?$

- A) 12 B) 14 C) 16 D) 18 E) 20

15. $\left. \begin{array}{l} \frac{2x}{3} = \frac{4y}{5} = \frac{5z}{4} \\ x \cdot y \cdot z = 12 \end{array} \right\} \Rightarrow z = ?$

- A) $\frac{5}{8}$ B) $\frac{3}{8}$ C) $\frac{8}{3}$ D) $\frac{8}{5}$ E) $\frac{8}{7}$

11. $\frac{x}{2} = \frac{y}{3}$ ve / and $\frac{y}{z} = \frac{4}{5},$
 $x+y+z = 70 \Rightarrow z = ?$

- A) 10 B) 15 C) 20 D) 25 E) 30

16. $\left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} = 4 \\ 3a+6c = 144 \end{array} \right\} \Rightarrow b+2d = ?$

- A) 12 B) 16 C) 18 D) 20 E) 24

12. $\left. \begin{array}{l} x : y : z = 4 : 5 : 8 \\ \frac{x}{2} - y + z = 15 \end{array} \right\} \Rightarrow \frac{x+z}{2} = ?$

- A) 9 B) 12 C) 15 D) 18 E) 21


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	E	E	B	B	C	E	D
9	10	11	12	13	14	15	16
D	A	E	D	B	E	D	A

1. $\frac{x}{4} = \frac{y}{3} = k, x + y = 14 \Rightarrow x = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

2. $\frac{a-b}{2} = \frac{a+b}{4} = \frac{a \cdot b}{9} \Rightarrow b = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

3. $\frac{a}{4} = \frac{b}{7} = k,$
 $a + b = 121 \Rightarrow a = ?$

- A) 28 B) 35 C) 38 D) 44 E) 52

4. $\frac{a}{4} = \frac{b}{3} = \frac{c}{10} = \frac{2a-b+3c}{4x-1}$
 $\Rightarrow x = ?$

- A) 3 B) 4 C) 6 D) 8 E) 9

5. $\left. \begin{array}{l} \frac{a}{3} = \frac{b}{2x} = \frac{x}{4} \\ a \cdot b = 24 \end{array} \right\} \Rightarrow a + b = ?$

- A) 11 B) 12 C) 13 D) 14 E) 15

6. $\frac{a-1}{b-2} = \frac{2}{3}, \frac{b+1}{c-1} = \frac{3}{4}$
 $\Rightarrow 2a - c + 10 = ?$

- A) 7 B) 8 C) 9 D) 10 E) 11

7. $\frac{a}{b} = \frac{c}{d} = k$ ve / and
 $\frac{a^2 + a \cdot c}{b^2 + b \cdot d} = 6k - 9 \Rightarrow k = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

8. $\left. \begin{array}{l} \frac{x}{a} = \frac{y}{b} = \frac{z}{c} = \frac{3}{5} \\ 10x - 3y + z = 9 \end{array} \right\} \Rightarrow 10a - 3b + c = ?$

- A) 5 B) 10 C) 15 D) 20 E) 25

$$9. \left. \begin{array}{l} ax = by = cz = 12 \\ \frac{abc}{ab+ac+bc} = 3 \end{array} \right\} \Rightarrow x+y+z = ?$$

A) 3 B) 4 C) 6 D) 8 E) 12

$$10. \left. \begin{array}{l} ax = by = cz \\ a : b : c = 4 : 3 : 2 \\ x + y = 35 \end{array} \right\} \Rightarrow z = ?$$

A) 15 B) 20 C) 25 D) 30 E) 35

$$11. \left. \begin{array}{l} \frac{a}{x} = \frac{b}{y} = \frac{c}{z} = \frac{2}{5} \\ 2a - 3b + c = 24 \\ z - 3y = 16 \end{array} \right\} \Rightarrow x = ?$$

A) 22 B) 24 C) 26 D) 28 E) 30

$$12. \left. \begin{array}{l} \frac{a}{x} = \frac{b}{y} = \frac{c}{z} = \frac{5}{7} \\ 2a - 5b + 3c = 60 \\ 2x - 5y = 24 \end{array} \right\} \Rightarrow z = ?$$

A) 20 B) 24 C) 28 D) 32 E) 36

$$13. \left. \begin{array}{l} \frac{a}{x} = \frac{b}{y} = \frac{c}{z} = \frac{1}{3} \\ 2a + 3b - c = 4 \\ 2x - z = 3 \end{array} \right\} \Rightarrow y = ?$$

A) 2 B) 3 C) 4 D) 5 E) 6

$$14. \left. \begin{array}{l} \frac{a}{d} = \frac{b}{c} = \frac{e}{f} \\ \frac{a+b+e}{d+c+f} = 3 \end{array} \right\} \Rightarrow \frac{a^2+be}{d^2+cf} = ?$$

A) 4 B) 5 C) 6 D) 8 E) 9

$$15. \frac{a}{5} = \frac{b}{4} = \frac{c}{3}, 2a - b + c = 36 \Rightarrow 3a - 2c = ?$$

A) 24 B) 30 C) 36 D) 48 E) 60

$$16. \left. \begin{array}{l} \frac{x}{a} = \frac{y}{b} = \frac{z}{c} = \frac{2}{3} \\ 2x - y + 3z = 44 \\ 2a + 3c = 23 \end{array} \right\} \Rightarrow b = ?$$

A) -43 B) -37 C) -23 D) 23 E) 37



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	D	E	A	A	C	C
9	10	11	12	13	14	15	16
B	D	A	A	B	E	C	A

1. $x, y, z \in \mathbb{Z}^+$,
 $\frac{x \cdot y}{6} = \frac{y \cdot z}{4} = \frac{x \cdot z}{3} \Rightarrow \min(x + y + z) = ?$
 A) 6 B) 9 C) 12 D) 18 E) 36

2. $a, b, c \in \mathbb{N}^+$,
 $\frac{a \cdot b}{4} = \frac{b \cdot c}{5} = \frac{a \cdot c}{6}$
 $41 < a + b + c < 8 \Rightarrow a + b + c = ?$
 A) 52 B) 56 C) 68 D) 74 E) 82

3. $\frac{a}{x} = \frac{b}{y} = \frac{c}{z} = 3$,
 $4a - 2b + 2c = 36$,
 $y - z = 2 \Rightarrow x = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

4. $\frac{1}{a} + b = \frac{1}{4}$, $a + \frac{1}{b} = 3 \Rightarrow \frac{a}{b} = ?$
 A) 3 B) 6 C) 9 D) 12 E) 15

5. $\frac{x}{5} = \frac{3}{0,2}$, $x + 3y = 3 \Rightarrow y = ?$
 A) -24 B) -18 C) -12 D) 12 E) 18

6. $\left. \begin{array}{l} \frac{a}{3} = \frac{b}{4} = \frac{c}{5} \\ \frac{a+5}{2b+3c} = \frac{33}{23} \end{array} \right\} \Rightarrow a = ?$
 A) $\frac{1}{4}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) 2 E) 4

7. $\left. \begin{array}{l} \frac{x}{m} = \frac{y}{n} = \frac{z}{p} = \frac{2}{5} \\ x + 2y - z = 16 \\ m - p = 4 \end{array} \right\} \Rightarrow n = ?$
 A) 12 B) 18 C) 24 D) 36 E) 48

8. $\left. \begin{array}{l} \frac{a}{2} = \frac{b}{3} = \frac{c}{4} \\ a \cdot b \cdot c = 192 \end{array} \right\} \Rightarrow a + b + c = ?$
 A) 6 B) 9 C) 12 D) 18 E) 24

$$9. \left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 2 \\ 2a + c - e = 14 \\ f - d = 3 \end{array} \right\} \Rightarrow b = ?$$

A) 2 B) 3 C) 4 D) 5 E) 6

$$10. a \in \mathbb{R}^+, \frac{a}{3} = \frac{b}{4} = \frac{c}{5}, b \cdot c = 180 \Rightarrow a = ?$$

A) 6 B) 9 C) 12 D) 18 E) 20

$$11. \left. \begin{array}{l} \frac{x \cdot y}{z \cdot t} = \frac{4}{3} \\ \frac{x \cdot t}{y \cdot z} = \frac{2}{3} \end{array} \right\} \Rightarrow \frac{y^2}{t^2} = ?$$

A) 2 B) 4 C) 6 D) 8 E) 10

$$12. a - b = \frac{a+b}{7} = \frac{a \cdot b}{24} \Rightarrow a - b = ?$$

A) 1 B) 2 C) 3 D) 4 E) 5

$$13. \frac{x \cdot y}{3\sqrt{2}} = \frac{y \cdot z}{5\sqrt{2}} = \frac{x \cdot z}{10} = 3 \Rightarrow x \cdot y \cdot z = ?$$

A) 30 B) 60 C) 90 D) 120 E) 180

$$14. \begin{array}{l} 2x + xy = k, \\ x = 2 \Rightarrow y = 3 \\ x = 1 \Rightarrow y = ? \end{array}$$

A) 5 B) 6 C) 7 D) 8 E) 9

$$15. \left. \begin{array}{l} \frac{x \cdot y}{z} = 4 \\ \frac{y \cdot z}{x} = 3 \\ \frac{x \cdot z}{y} = 8 \end{array} \right\} \Rightarrow x^2 + y^2 + z^2 = ?$$

A) 54 B) 68 C) 72 D) 84 E) 92

$$16. \left. \begin{array}{l} ax = by = cz = 4 \\ x + y + z = 12 \end{array} \right\} \Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = ?$$

A) 1 B) 2 C) 3 D) 4 E) 5



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1	2	3	4	5	6	7	8
B	D	C	D	A	C	B	D
9	10	11	12	13	14	15	16
D	B	A	B	C	D	B	C

$$1. \left. \begin{array}{l} 2a = 3b = 5c \\ \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = 2 \end{array} \right\} \Rightarrow a = ?$$

- A) $\frac{5}{2}$ B) 2 C) $\frac{3}{2}$ D) 1 E) $\frac{1}{2}$

$$2. \left. \begin{array}{l} 2x = 3y = 4z \\ x \cdot y \cdot z = 576 \end{array} \right\} \Rightarrow x + y + z = ?$$

- A) 20 B) 22 C) 24 D) 26 E) 28

$$3. \left. \begin{array}{l} ax = by = cz = 30 \\ \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = 3 \end{array} \right\} \Rightarrow a + b + c = ?$$

- A) 30 B) 50 C) 60 D) 80 E) 90

$$4. \left. \begin{array}{l} az = bx = cy = 4 \\ x + y + z = 16 \end{array} \right\} \Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = ?$$

- A) 2 B) 4 C) 6 D) 8 E) 10

$$5. \begin{array}{l} xy = 18, \\ yz = 12, \\ x + z = 30 \Rightarrow y = ? \end{array}$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$6. \left. \begin{array}{l} \frac{3}{x} = \frac{y}{5} = \frac{z}{2} \\ \frac{2}{x} + y - z = 22 \end{array} \right\} \Rightarrow 2x = ?$$

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 4

$$7. \begin{array}{l} x, y, z \in \mathbb{Z}^+, \\ \frac{a}{0,6} = \frac{b}{0,5} = \frac{c}{0,7} \Rightarrow ? > ? > ? \end{array}$$

- A) $c > b > a$ B) $b > a > c$ C) $a > c > b$
D) $c > a > b$ E) $b > c > a$

$$8. \frac{a}{2} = \frac{b}{5}, \sqrt{5a} + \sqrt{2b} = 16 \Rightarrow \frac{5a}{2} + b = ?$$

- A) 48 B) 52 C) 56 D) 64 E) 68

9. $2x = 3y = 6z,$
 $\frac{1}{x} + \frac{1}{y} + \frac{1}{z} = \frac{11}{36} \Rightarrow x + y - z = ?$
 A) 20 B) 22 C) 24 D) 26 E) 28

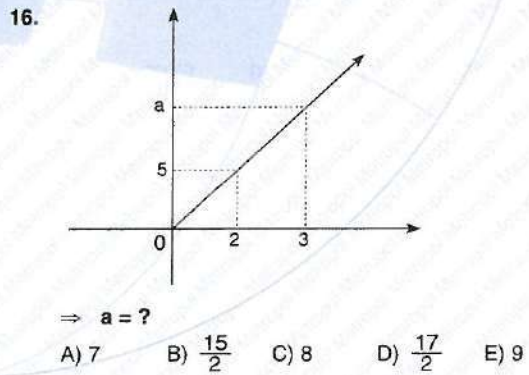
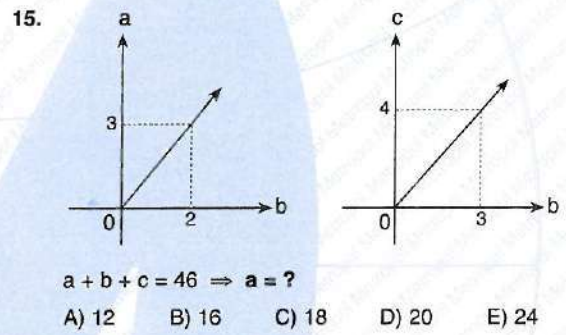
10. $x, y, z \in \mathbb{Z}^+,$
 $x : y : z = 1 : 2 : 4,$
 $x^2 + y^2 + z^2 = 21 \Rightarrow y + z - x = ?$
 A) 5 B) 6 C) 7 D) 8 E) 9

11. $ax = by = cz = \frac{2}{3}$
 $xy + xz + yz = 16xyz \Rightarrow a + b + c = ?$
 A) $\frac{22}{3}$ B) $\frac{26}{3}$ C) $\frac{28}{3}$ D) $\frac{32}{3}$ E) $\frac{34}{3}$

12. $x : y : z = 2 : 2 : 5$
 $\frac{x^2 + y^2 + z^2}{2x + y + z} = 6 \Rightarrow x \cdot y + z = ?$
 A) 22 B) 24 C) 26 D) 28 E) 30

13. $\frac{a}{5} = \frac{b}{4} = \frac{c}{3} = \frac{2a - b + kc}{12} \Rightarrow k = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

14. $\left. \begin{aligned} x - \frac{1}{y} &= 3 \\ \frac{1}{x} - y &= 4 \end{aligned} \right\} \Rightarrow \frac{x}{y} = ?$
 A) $-\frac{4}{3}$ B) $-\frac{3}{4}$ C) $\frac{3}{4}$ D) $\frac{4}{3}$ E) $\frac{3}{2}$



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1	2	3	4	5	6	7	8
A	D	E	B	A	C	B	D
9	10	11	12	13	14	15	16
C	A	D	C	A	B	C	B

1. $\frac{a}{b} = \frac{c}{d} = \frac{2}{3} \Rightarrow \frac{a \cdot c}{b \cdot d} = ?$

- A) 1 B) $\frac{2}{3}$ C) $\frac{4}{9}$ D) $\frac{3}{2}$ E) $\frac{9}{4}$

2. $\frac{a}{b} = \frac{b}{c} = \frac{c}{d} = \frac{1}{2} \Rightarrow \frac{a}{d} = ?$

- A) $\frac{1}{16}$ B) $\frac{1}{8}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) 1

3. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{4}{7} \Rightarrow \frac{a+2c-e}{b+2d-f} = ?$

- A) $\frac{3}{7}$ B) $\frac{4}{7}$ C) $\frac{5}{7}$ D) $\frac{6}{7}$ E) 1

4. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{6}{5} \Rightarrow \frac{a+c}{b+d} \cdot \frac{f}{e} = ?$

- A) 1 B) $\frac{2}{5}$ C) $\frac{3}{5}$ D) $\frac{5}{6}$ E) $\frac{6}{5}$

5. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{2}{5}$,

$$a+2c-e=10$$

$$b-f=6 \Rightarrow 2d=?$$

- A) 20 B) 19 C) 18 D) 17 E) 16

6. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 12 \Rightarrow \frac{2a-c+3e}{6b-3d+9f} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

7. $3a = 4b = 5c$,

$$\frac{1}{a} + \frac{1}{b} + \frac{1}{c} = \frac{6}{5} \Rightarrow c = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6

8. $\frac{3a-5}{a} = \frac{3b-2c-a}{b} = \frac{4c-b+5}{c} = k \Rightarrow k = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$9. \left. \begin{array}{l} \frac{a \cdot b}{c} = 6 \\ \frac{a \cdot c}{b} = 2 \\ \frac{b \cdot c}{a} = 3 \end{array} \right\} \Rightarrow a^2 + b^2 + c^2 = ?$$

A) 28 B) 32 C) 34 D) 36 E) 40

$$10. \left. \begin{array}{l} x + \frac{y}{z} = 36 \\ z + \frac{y}{x} = 9 \end{array} \right\} \Rightarrow \frac{x-z}{z} = ?$$

A) 1 B) 2 C) 3 D) 4 E) 5

$$11. \left. \begin{array}{l} a \cdot x = b \cdot y = c \cdot z = \frac{2}{3} \\ x + y + z = 18 \end{array} \right\} \Rightarrow \frac{1}{a} + \frac{1}{b} + \frac{1}{c} = ?$$

A) 6 B) 12 C) 18 D) 27 E) 36

$$12. \frac{x}{y} = \frac{3}{5} \Rightarrow \frac{x^2 - y^2}{(x+y)^2} = ?$$

A) $-\frac{1}{8}$ B) $-\frac{1}{4}$ C) $-\frac{1}{2}$ D) -1 E) 1

$$13. \begin{array}{l} x, y, z \in \mathbb{Z}^+, \\ 3x = 6y = 9z \\ \Rightarrow \min(x + y + z) = ? \end{array}$$

A) 11 B) 17 C) 22 D) 28 E) 33

$$14. \begin{array}{l} x, y, z \in \mathbb{Z}^+, \\ 6x = 8y = 10z \\ \Rightarrow \max(x + y + z) = ? \end{array}$$

A) -47 B) -60 C) -64
D) -70 E) -81

$$15. \frac{a_1}{a_2} = \frac{a_2}{a_3} = \dots = \frac{a_n}{a_{n+1}} = 4$$

$$a_1 = 16 \Rightarrow a_4 = ?$$

A) $\frac{1}{8}$ B) $\frac{1}{6}$ C) $\frac{1}{4}$ D) $\frac{1}{2}$ E) 1

$$16. \left. \begin{array}{l} a + \frac{3}{b} = 15 \\ b + \frac{3}{a} = 12 \end{array} \right\} \Rightarrow \frac{a}{b} = ?$$

A) $\frac{5}{4}$ B) $\frac{6}{5}$ C) $\frac{7}{6}$ D) $\frac{9}{8}$ E) $\frac{10}{9}$



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1	2	3	4	5	6	7	8
C	B	B	A	B	D	A	B
9	10	11	12	13	14	15	16
D	C	D	B	A	A	C	A

1. $\frac{x}{y} = \frac{4}{3} \Rightarrow \frac{2y^2 - 3x^2}{5 \cdot xy} = ?$

- A) $-\frac{1}{4}$ B) $-\frac{1}{3}$ C) $-\frac{1}{2}$ D) $\frac{1}{3}$ E) $\frac{1}{2}$

2. $x, y, z \in \mathbb{R}^+$,
 $x = \frac{y}{2} = \frac{z}{3}$, $\frac{x \cdot y \cdot z}{x+y+z} = 49$
 $\Rightarrow z - y + x = ?$

- A) 7 B) 12 C) 14 D) 18 E) 21

3. $\frac{x}{y} = \frac{m}{n} = 4 \Rightarrow \frac{y}{x} \cdot \left(\frac{y-x}{3 \cdot y}\right) \cdot \frac{m+n}{n} = ?$

- A) $-\frac{4}{5}$ B) $-\frac{5}{4}$ C) $\frac{4}{5}$ D) $\frac{5}{4}$ E) $\frac{3}{4}$

4. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 5$, $3a - 2c + e = 40$,

$2d - f = 1 \Rightarrow b = ?$

- A) -3 B) -2 C) 1 D) 2 E) 3

5. $\frac{x}{y} = \frac{z}{v} = k$, $\frac{4x-5z}{4y+3} = k \Rightarrow v = ?$

- A) $-\frac{5}{3}$ B) $-\frac{3}{5}$ C) $-\frac{3}{4}$ D) $\frac{3}{5}$ E) $\frac{5}{3}$

6. $x - \frac{1}{y} = 15$, $y - \frac{1}{x} = 3 \Rightarrow \frac{y}{x} = ?$

- A) $\frac{1}{5}$ B) $\frac{1}{3}$ C) $\frac{2}{5}$ D) $\frac{2}{3}$ E) $\frac{3}{5}$

7. $x \neq y$
 $\frac{x^2}{2y} = \frac{y^2}{2x} = 3 \Rightarrow x + y = ?$

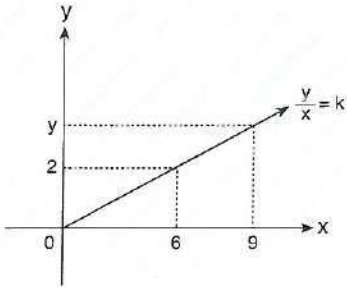
- A) -6 B) -3 C) -1 D) 3 E) 6

8. $3x = 4y = 5z$,

$x + y + z = 141 \Rightarrow y = ?$

- A) 30 B) 32 C) 36 D) 45 E) 48

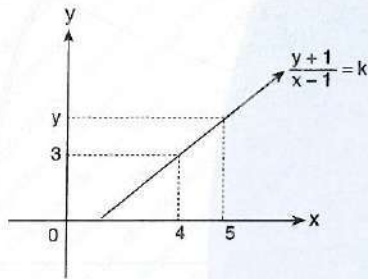
9.



$\Rightarrow y = ?$

- A) $\frac{5}{2}$ B) 3 C) $\frac{7}{2}$ D) 4 E) $\frac{9}{2}$

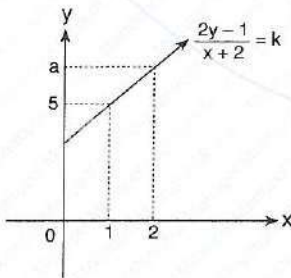
10.



$\Rightarrow y = ?$

- A) 4 B) $\frac{13}{3}$ C) $\frac{14}{3}$ D) 5 E) $\frac{16}{3}$

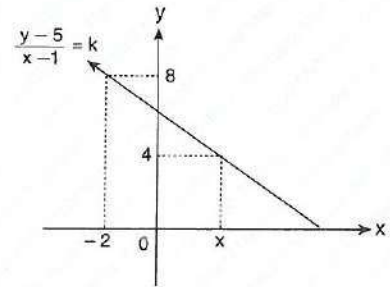
11.



$\Rightarrow a = ?$

- A) $\frac{11}{2}$ B) 6 C) $\frac{13}{2}$ D) 7 E) $\frac{15}{2}$

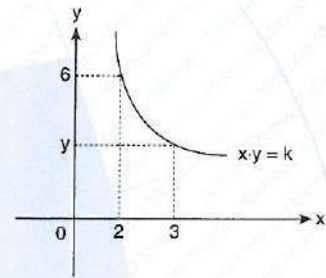
12.



$\Rightarrow x = ?$

- A) 1 B) $\frac{3}{2}$ C) 2 D) $\frac{5}{2}$ E) 4

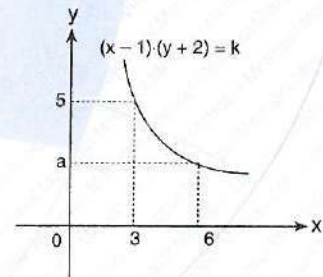
13.



$\Rightarrow y = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

14.



$\Rightarrow a = ?$

- A) $\frac{4}{5}$ B) 1 C) $\frac{3}{2}$ D) 2 E) $\frac{5}{2}$

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1	2	3	4	5	6	7	8
C	C	B	E	B	A	A	D
9	10	11	12	13	14		
B	B	C	C	D	A		

$$1. \frac{3x+12}{y-5} = \frac{5y-z}{x+3} = -\frac{2y-4z}{z+6} = k \Rightarrow k = ?$$

- A) 5 B) 3 C) 1 D) -1 E) -3

[ANKARA ÜNİVERSİTESİ - YÖS 2020]

$$2. \text{ x ve y sayıları sırasıyla 5 ve 7 ile ters orantılı ve } 3x+9y=99 \Rightarrow x-y=?$$

x and y are inversely proportional with 5 and 7, respectively and $3x+9y=99 \Rightarrow x-y=?$

- A) 7 B) $\frac{12}{5}$ C) 5 D) $\frac{8}{3}$ E) 3

[HARRAN ÜNİVERSİTESİ - YÖS 2020]

$$3. \left. \begin{array}{l} \frac{x}{y+z} = \frac{2}{3} \\ \frac{y}{x+z} = \frac{3}{7} \end{array} \right\} \Rightarrow \frac{x}{z} = ?$$

- A) $\frac{1}{3}$ B) $\frac{4}{3}$ C) $\frac{5}{3}$ D) $\frac{3}{5}$ E) $\frac{3}{4}$

[GAZİANTEP ÜNİVERSİTESİ - YÖS 2020]

$$4. \left. \begin{array}{l} \frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{1}{2} \\ 2a+3c-2e=7 \\ 2b-2f=5 \end{array} \right\} \Rightarrow d=?$$

- A) -2 B) -1 C) 1 D) 2 E) 3

[DUMLUPINAR ÜNİVERSİTESİ - YÖS 2019]

$$5. \left. \begin{array}{l} ax=by=cz=8 \\ a+b+c=24 \end{array} \right\} \Rightarrow \frac{1}{x} + \frac{1}{y} + \frac{1}{z} = ?$$

- A) 3 B) 4 C) 6 D) 8 E) 9

[GAZİANTEP ÜNİVERSİTESİ - YÖS 2019]

$$6. \left. \begin{array}{l} x - \frac{3}{y} = 4 \\ y - \frac{3}{x} = 6 \end{array} \right\} \Rightarrow \frac{x}{y} + \frac{y}{x} = ?$$

- A) 1 B) $\frac{2}{3}$ C) $\frac{13}{6}$ D) $\frac{3}{2}$ E) $\frac{6}{11}$

[GAZİANTEP ÜNİVERSİTESİ - YÖS 2019]

$$7. a:b:c=2:3:4 \text{ ve / and } 2a+3b-c=27 \Rightarrow a \cdot b = ?$$

- A) 30 B) 36 C) 42 D) 48 E) 54

[YÜZÜNCÜ YIL ÜNİVERSİTESİ - YÖS 2019]

$$8. \frac{x}{y} = \frac{z}{t} = \frac{k}{p} = 3 \Rightarrow \frac{x+y}{y} \cdot \frac{z+t}{t} \cdot \frac{k-p}{p} = ?$$

- A) 64 B) 32 C) 27 D) 9 E) 3

[KARADENİZ TEKNİK ÜNİVERSİTESİ - YÖS 2018]

9. $x + \frac{1}{y} = 3, y + \frac{1}{x} = 5$
 $\Rightarrow \frac{x-3y}{3x+y} = ?$

- A) $-\frac{6}{7}$ B) $-\frac{2}{9}$ C) $-\frac{1}{2}$ D) $\frac{2}{9}$ E) $\frac{6}{7}$

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2018]

10. $\frac{x}{z+5} = \frac{y}{x+1} = \frac{z}{y-2} = \frac{3}{5} \Rightarrow x+y+z = ?$

- A) 6 B) 10 C) 12 D) 16 E) 20

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2018]

11. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = 3 \Rightarrow \frac{a^3 \cdot f^2 \cdot d^2}{e^2 \cdot b^3 \cdot c^2} = ?$

- A) $\frac{1}{9}$ B) $\frac{1}{3}$ C) 1 D) 3 E) 9

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2018]

12. $\frac{a}{b} = \frac{c}{d} = \frac{e}{f} = \frac{1}{4}$
 $2a - 3c + e = 5$

$3d - f = 16 \Rightarrow a = ?$

- A) $\frac{9}{2}$ B) $\frac{15}{2}$ C) 9 D) 15 E) 18

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2018]

13. $\frac{x}{a} = \frac{y}{b} = \frac{z}{c} = 2$

$a \cdot x + b \cdot y + c \cdot z = 5$

$\Rightarrow a^2 + b^2 + c^2 = ?$

- A) $\frac{2}{5}$ B) 1 C) $\frac{5}{2}$ D) 7 E) 29

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

14. $x + \frac{1}{y} = 2$ ve / and $y + \frac{1}{x} = 5$

$\Rightarrow \frac{x+2y}{x-2y} = ?$

- A) -1,5 B) -1 C) 0 D) 1 E) 1,5

[ANADOLU ÜNİVERSİTESİ – YÖS 2017]

15. $\left. \begin{array}{l} \frac{xy}{3} = \frac{xz}{4} = \frac{yz}{5} \\ x - y + z = 34 \end{array} \right\} \Rightarrow x = ?$

- A) 12 B) 16 C) 24 D) 27 E) 29

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2016]

16. $\frac{a}{-2} = \frac{b}{-3} = \frac{c}{-4}$

$a - b + c = 3 \Rightarrow \frac{b \cdot c}{a} = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2016]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	E	E	E	A	C	E	B
9	10	11	12	13	14	15	16
A	A	B	A	C	A	C	B

BÖLÜM CHAPTER

7

TARİHSEL NOT / HISTORICAL NOTE

Abel, Niels Henrik [1802 – 1829]

Norveçli matematikçi, 19 yaşında dörtten büyük dereceli denklemlerin çözülemeyeceğini göstermiştir. Başka bir deyişle, bu denklemlerin ikinci dereceden denklemler gibi formülünün olmadığını kanıtlamıştır. Aynı zamanda cebirsel fonksiyonlar teorisindeki temel gelişmeleri yanıtlamıştır.

Norwegian mathematician who at the age of 19, proved that the general equation of degree greater than 4 cannot be solved algebraically. In other words, there can be no formula for the roots of such an equation similar to the familiar formula for the quadratic equation. He was also responsible for fundamental developments in theory of algebraic functions.

BİRİNCİ DERECEDEN DENKLEMLER FIRST DEGREE EQUATIONS

Bu bölüm 192 test sorusu, 16 YÖS sorusu içermektedir.

This chapter includes 192 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 7

BİRİNCİ DERECEDEN DENKLEMLER / FIRST DEGREE EQUATIONS

- Birinci Dereceden Denklemler / First Degree Equations 231 - 258



BÖLÜM
07
CHAPTER

BİRİNCİ DERECEDEN DENKLEMLER
FIRST DEGREE EQUATIONS

Bölüm / Chapter **7**

Birinci Dereceden Denklemler / First Degree Equations

Test **1**

1. $-3x + 12 = 6 \Rightarrow x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

2. $2x + 1 = x + 6 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

3. $4x - 11 = 2x + 4 \Rightarrow x = ?$

- A) $\frac{15}{2}$ B) 7 C) $\frac{13}{2}$ D) 6 E) $\frac{11}{2}$

4. $3x - 2 = 5x + 4 \Rightarrow x = ?$

- A) 1 B) 0 C) -1 D) -2 E) -3

5. $2(x + 3) - 2 = 3x + 1 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {1} B) {3} C) {4} D) {5} E) {7}

6. $4(x - 2) + 2x = 2(x + 6) - 13 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\left\{\frac{7}{4}\right\}$ B) $\left\{\frac{7}{3}\right\}$ C) $\left\{\frac{7}{2}\right\}$
D) {7} E) {5}

7. $2x + 3(x + 2) = 6(x - 4) - 3x \Rightarrow x = ?$

- A) -9 B) -11 C) -13 D) -15 E) -17

8. $4x + \frac{1}{3}(2x - 4) = 8 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

9. $\frac{x-4}{3} + \frac{x-2}{2} = \frac{2x-4}{4} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

10. $\frac{2x+3}{5} - \frac{x-1}{2} = \frac{12}{5} \Rightarrow x = ?$

- A) -15 B) -13 C) -11 D) -9 E) -7

11. $\frac{2x}{x+2} = 0,1\bar{6} \Rightarrow x = ?$

- A) $\frac{1}{11}$ B) $\frac{2}{11}$ C) $\frac{3}{11}$ D) $\frac{4}{11}$ E) $\frac{5}{11}$

12. $3 + \frac{4}{2 + \frac{1}{x}} = 4 \Rightarrow x = ?$

- A) 1 B) $\frac{1}{2}$ C) $\frac{1}{3}$ D) $\frac{1}{4}$ E) $\frac{1}{5}$

13. $\frac{x}{x+2} - \frac{2}{1 + \frac{3}{x-1}} = 1 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {4} B) {3} C) {2} D) {0} E) {-3}

14. $\frac{1}{x-2} + \frac{4}{x+1} + \frac{x-3}{x-2} = \frac{4}{5} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {-3} B) {-7} C) {-9} D) {-17} E) {-21}

15. $\frac{2}{x} + \frac{x}{x-2} - \frac{x+2}{x} = \frac{2}{5} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {5} B) {7} C) {9} D) {11} E) {13}

16. $\frac{1}{1 + \frac{1}{1+x}} = \frac{4}{5} \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	E	A	E	B	A	D	B
9	10	11	12	13	14	15	16
D	B	B	B	D	E	B	B

1. $\frac{3}{5} + 2x = 2\frac{3}{5} \Rightarrow x = ?$

- A)
- $\frac{1}{5}$
- B)
- $\frac{1}{2}$
- C) 1 D)
- $\frac{3}{2}$
- E)
- $\frac{3}{5}$

2. $2x(x-2) - x(2x-1) - x + 1 = 13$
 $\Rightarrow x = ?$

- A) -3 B) -2 C) 1 D) 2 E) 3

3. $x - (1 - 2x) - x - 2 = -(3x - 2)$
 $\Rightarrow x = ?$

- A) -6 B) -5 C) 0 D) 2 E) 4

4. $3x + 5[2 - (3 + x)] = 9 \Rightarrow x = ?$

- A) -10 B) -8 C) -7 D) 7 E) 10

5. $a(5 - x) = 2ax + 3,$

$x = 2 \Rightarrow a = ?$

- A) -5 B) -3 C) 3 D) 4 E) 5

6. $2 - [-2[x - (2x - 3)] + 4] = 2(5 - x) + 3x$
 $\Rightarrow x = ?$

- A) -10 B) -8 C) -7 D) -6 E) -2

7. $m \neq n,$

$2m + n(x - 3) = 2n + m(x - 3)$

$\Rightarrow x = ?$

- A) -5 B) -3 C) 1 D) 3 E) 5

8. $m \neq 1,$

$m(x + 5) = x + 5$

$\Rightarrow x = ?$

- A) -7 B) -5 C) -3 D) 3 E) 5

9. $\frac{x+1}{3} - \frac{3x-1}{5} = x-2 \Rightarrow x = ?$

- A) -3 B) -2 C) 1 D) 2 E) 3

10. $\frac{3x-1}{2} - \frac{2x-5}{3} = 2 \Rightarrow x = ?$

- A) -4 B) -1 C) 0 D) 1 E) 4

11. $\frac{1-2x}{4} - \frac{x-2}{2} = 3 \Rightarrow x = ?$

- A) $-\frac{7}{4}$ B) $-\frac{5}{4}$ C) $\frac{1}{4}$ D) $\frac{5}{4}$ E) $\frac{7}{4}$

12. $\frac{3x-1}{2} = 2 - \frac{2x+3}{2} + \frac{x+3}{6} \Rightarrow x = ?$

- A) $\frac{7}{12}$ B) $\frac{5}{12}$ C) $\frac{9}{14}$ D) $\frac{5}{14}$ E) $\frac{7}{14}$

13. $\frac{5}{2} - \frac{x-1}{3} - \frac{x-2}{4} + x = 5 \Rightarrow x = ?$

- A) $\frac{5}{12}$ B) $\frac{11}{12}$ C) 1 D) 3 E) 4

14. $\frac{2x+5}{3} - \frac{3x+1}{2} + 3 = 0 \Rightarrow x = ?$

- A) $\frac{5}{6}$ B) $\frac{7}{6}$ C) 3 D) 5 E) 7

15. $\frac{3x-10}{2} - \frac{3-5x}{3} = \frac{1}{3} \Rightarrow x = ?$

- A) $-\frac{5}{6}$ B) $-\frac{1}{6}$ C) 0 D) 1 E) 2

16. $\frac{4x-3}{3} - \frac{x+1}{2} = \frac{2x-1}{5} - \frac{x-3}{6} \Rightarrow x = ?$

- A) $\frac{2}{15}$ B) $\frac{5}{12}$ C) $\frac{7}{15}$ D) 1 E) 3



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	A	B	C	B	E	E	B
9	10	11	12	13	14	15	16
D	D	A	C	E	D	E	E

1. $2(x-1) + x + 6 = 25 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {4} B) {5} C) {6} D) {7} E) {8}

2. $\frac{x-1}{3} + \frac{x+1}{2} = 6 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {5} B) {6} C) {7} D) {8} E) {9}

3. $\frac{3}{x} + 8 = \frac{2}{x} + 10 \Rightarrow x = ?$

- A)
- $\frac{1}{3}$
- B)
- $\frac{1}{2}$
- C) 1 D) 2 E) 3

4. $\frac{5}{2x-4} - \frac{2}{x+1} = 0 \Rightarrow x = ?$

- A) -10 B) -11 C) -12 D) -13 E) -14

5. $\frac{x-1}{2} + \frac{2x-1}{3} + \frac{3x}{4} = 2x+1 \Rightarrow x = ?$

- A) -20 B) -21 C) -22
-
- D) -23 E) -24

6. $-2(1-x) + 3(x-2) - (2x+1) = 3 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

7. $\frac{x^2-8}{x-3} + \frac{1}{3-x} = 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {-3, 3} B) {0} C) {-3}
-
- D) {3} E)
- \emptyset

8. $x \neq 2$

$(2x-4) \cdot 2 = (x-2) \cdot 4 \Rightarrow x = ?$

- A)
- \emptyset
- B) 1 C) 2 D) R E) R - {2}

9. $\frac{4}{x-1} + \frac{6}{x+2} + \frac{3+x}{1-x} = 3 \Rightarrow x = ?$

- A) $-\frac{1}{4}$ B) $-\frac{1}{2}$ C) 0 D) $\frac{1}{2}$ E) $\frac{1}{4}$

10. $\frac{x^2-x-12}{x+3} = 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {1} B) {-3, 4} C) {-3}
D) R E) {4}

11. $\frac{x}{2} + \frac{x}{3} + \frac{x}{4} - \frac{5x}{12} = \frac{4}{3} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {1} B) {2} C) {3}
D) {4} E) {5}

12. $3x + 3(1-x) = 3 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {0} B) {-1, 0} C) \emptyset
D) R E) {3}

13. $\frac{3x}{x-1} + \frac{2x+1}{1-x} - 1 = 1 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {0} B) {-1, 1} C) \emptyset
D) R E) {1}

14. $a(x-2) + 2(x+b) = 0,$

$\text{Ç.K(S.S)} = R \Rightarrow a+b = ?$

- A) -4 B) -2 C) 0
D) 2 E) 4

15. $\text{Ç.K(S.S)} = R,$
 $\frac{ax-1}{3} - \frac{4x-b}{4} = \frac{5}{6} \Rightarrow a+b = ?$

- A) $\frac{20}{3}$ B) 7 C) $\frac{22}{3}$
D) $\frac{23}{3}$ E) 8

16. $\frac{2 + \frac{1}{x}}{2 - \frac{1}{x}} = -3 \Rightarrow x = ?$

- A) $\frac{1}{6}$ B) $\frac{1}{4}$ C) $\frac{1}{2}$
D) 1 E) 2



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1	2	3	4	5	6	7	8
D	C	B	D	C	D	C	E
9	10	11	12	13	14	15	16
B	E	B	D	C	A	D	B

1. $\frac{3x}{2} + 3 = \frac{2x}{3} - 2 \Rightarrow x = ?$

- A) -6 B) -3 C) -2 D) 2 E) 6

2. $\frac{x}{3} - 2 = \frac{x+2}{6} + 1 \Rightarrow x = ?$

- A) -20 B) -10 C) 5 D) 10 E) 20

3. $\frac{x-2}{3} - \frac{x-1}{5} = 2 - \frac{2x-3}{15} \Rightarrow x = ?$

- A) 3 B) 5 C) 8 D) 10 E) 12

4. $\frac{1}{x-a} + \frac{1}{x-3} + \frac{1}{x-2} = 1,$
Ç.K(S.S) = 5 $\Rightarrow a = ?$

- A) -3 B) -1 C) 1 D) 4 E) 5

5. $\frac{1 + \frac{x}{2}}{1 - \frac{x}{2}} - \frac{5}{x-2} = 8 \Rightarrow x = ?$

- A) -6 B) -1 C) 1 D) 3 E) 4

6. $\frac{x}{3} - \frac{x - \frac{1}{3}}{2} + 1 = x \Rightarrow x = ?$

- A) -3 B) -2 C) 1 D) 2 E) 3

7. $\frac{-3x+2}{4} - \frac{x-3}{8} = 7 \Rightarrow x = ?$

- A) -7 B) -5 C) -3 D) 5 E) 7

8. $5x - \frac{4}{3}(5x-4) = 9 \Rightarrow x = ?$

- A)
- $-\frac{11}{5}$
- B)
- $-\frac{9}{5}$
- C)
- $-\frac{11}{3}$
- D) -3 E) -1

9. $\frac{2x-3}{2} - \frac{x+1}{4} = \frac{1}{8} \Rightarrow x = ?$

- A) $\frac{5}{4}$ B) $\frac{3}{4}$ C) $\frac{1}{2}$ D) $\frac{3}{2}$ E) $\frac{5}{2}$

10. $3(x+1) - 2(2x-1) = 3 - 3x \Rightarrow x = ?$

- A) -3 B) -2 C) -1 D) 1 E) 2

11. $-2(1-x) + 2 - x - (2-x) = 24 \Rightarrow x = ?$

- A) 7 B) 9 C) 11 D) 13 E) 15

12. $\frac{1-\frac{3}{2}}{1+\frac{1}{2}} - \frac{x}{x-\frac{1}{2}} = -1 \Rightarrow x = ?$

- A) -5 B) -4 C) -3 D) -1 E) 3

13. $\frac{0,5 \cdot x - 0,5}{0,1} + \frac{0,2 \cdot x}{0,01} = 5 \Rightarrow x = ?$

- A) 0,1 B) 0,2 C) 0,3 D) 0,4 E) 0,5

14. $\frac{1}{x-3} + \frac{1}{x-4} = \frac{1}{x-a} + 1,$
 $\text{Ç.K(S.S)} = \{6\} \Rightarrow a = ?$

- A) 4 B) 7 C) 10 D) 12 E) 15

15. $\frac{2-2(x-3)}{-x+4} + x = 4 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

16. $x > 0,$

$$\frac{\frac{1}{x} + 4 + 4x}{\frac{1}{2x} + 1} = 4 \Rightarrow x = ?$$

- A) $\frac{1}{4}$ B) $\frac{2}{3}$ C) $\frac{1}{2}$ D) $\frac{3}{2}$ E) $\frac{5}{4}$



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1	2	3	4	5	6	7	8
A	E	D	B	C	C	A	A
9	10	11	12	13	14	15	16
E	C	D	D	D	D	B	C

1. $3(2x - 1) - 4(x + 3) = 13 \Rightarrow \text{Ç.K(S.S)} = ?$
 A) {7} B) {12} C) {13} D) {14} E) {16}

2. $\frac{x+2}{4} - \frac{x-3}{3} = 5 \Rightarrow \text{Ç.K(S.S)} = ?$
 A) {-42} B) {-38} C) {-28} D) {28} E) {38}

3. $2(3x - 7) = 3(2x + 4) - 26 \Rightarrow \text{Ç.K(S.S)} = ?$
 A) \emptyset B) R C) {0} D) {4} E) {17}

4. $4(2x + 3) + x = 3(3x - 2) + 5 \Rightarrow \text{Ç.K(S.S)} = ?$
 A) {13} B) {10} C) {0} D) R E) \emptyset

5. $\frac{x-2}{2} - \frac{x+5}{3} + \frac{2x-4}{4} = x-1 \Rightarrow x = ?$
 A) -8 B) -6 C) 1 D) 6 E) 8

6. $\frac{3}{2x+1} - \frac{4}{3x-5} = 0 \Rightarrow x = ?$
 A) 15 B) 16 C) 17 D) 18 E) 19

7. $\frac{2}{x} + 7 = \frac{1}{x} - 1 \Rightarrow x = ?$
 A) $-\frac{1}{8}$ B) $-\frac{1}{4}$ C) $-\frac{1}{2}$
 D) $\frac{1}{4}$ E) $\frac{1}{8}$

8. $\frac{2-3x}{6} - \frac{x-3}{3} = -7 \Rightarrow x = ?$
 A) -15 B) -10 C) 5 D) 10 E) 15

9. $\frac{x^2-1}{x-2} + \frac{3}{2-x} = 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-2\}$ B) $\{2\}$ C) $\{0\}$
D) $\{-2, 2\}$ E) \emptyset

10. $\frac{2}{x} + \frac{4}{x-2} - \frac{x+2}{x} = 3 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

11. $\frac{3}{2x-3} = \frac{1}{x-2} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{3\}$ B) $\{2\}$ C) $\{1\}$
D) $\{-2\}$ E) $\{-3\}$

12. $m(x-1) + 3(x+2n) + 15 = 0$

$\text{Ç.K(S.S)} = R \Rightarrow m+n = ?$

- A) -6 B) -1 C) 0 D) 1 E) 6

13. $m \neq n,$
 $\frac{x+m}{n} + \frac{x-n}{m} = 0 \Rightarrow x = ?$

- A) n B) m C) $m-n$
D) $n-m$ E) $m \cdot n$

14. $\frac{x^2-2x-15}{x+3} = 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{3\}$ B) $\{5\}$ C) $\{3, 5\}$
D) $\{-3\}$ E) $\{-5\}$

15. $\frac{3}{x-2} - \frac{1}{x+1} = \frac{9}{x^2-x-2} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) \emptyset B) $\{-1\}$ C) $\{2\}$ D) $\{3\}$ E) $\{4\}$

16. $\left. \begin{array}{l} x+2y+3z=3 \\ 3x+2y+z=13 \\ x-y-z=6 \end{array} \right\} \Rightarrow x = ?$

- A) 0 B) 1 C) 4 D) 5 E) 10


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1	2	3	4	5	6	7	8
D	A	B	E	A	E	A	D
9	10	11	12	13	14	15	16
A	C	A	A	D	B	A	D

1. $\frac{3x-2}{3} + \frac{5-4x}{6} = 1 \Rightarrow x = ?$

- A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) 2 E) $\frac{5}{2}$

2. $\frac{18}{4 + \frac{8}{1+x}} = 3 \Rightarrow x = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

3. $\frac{1 + \frac{x+1}{4}}{3} + 3 = 6 \Rightarrow x = ?$

- A) 30 B) 31 C) 32
D) 33 E) 34

4. $\frac{x^2}{1-2x} + 1 = x - 1 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\left\{\frac{2}{3}, 1\right\}$ B) $\left\{-1, \frac{1}{3}\right\}$ C) $\{-1, 1\}$
D) $\left\{\frac{4}{3}, 1\right\}$ E) \emptyset

5. $\begin{cases} x-2y = -11 \\ x+y = 7 \end{cases} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{(-1, 1)\}$ B) $\{(1, 2)\}$ C) $\{(1, 3)\}$
D) $\{(2, 5)\}$ E) $\{(1, 6)\}$

6. $\begin{cases} -2x+y = 14 \\ x+2y = 8 \end{cases} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{(-4, 6)\}$ B) $\{(-3, 5)\}$ C) $\{(-1, 1)\}$
D) $\{(-5, 7)\}$ E) $\{(-4, 0)\}$

7. $\begin{cases} \frac{1}{2}x - 2y = -4 \\ 2x + 3y = 6 \end{cases} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{(-2, 0)\}$ B) $\{(0, 2)\}$ C) $\{(-2, 2)\}$
D) $\{(-3, 0)\}$ E) $\{(-1, 1)\}$

8. $\begin{cases} \frac{3}{4}x + \frac{1}{2}y = \frac{13}{4} \\ \frac{5}{4}x + \frac{3}{2}y = \frac{1}{4} \end{cases} \Rightarrow x+y = ?$

- A) 7 B) $\frac{7}{2}$ C) $\frac{7}{4}$ D) $\frac{7}{6}$ E) $\frac{7}{8}$

$$9. \begin{cases} 5x - 3y = 6 \\ -10x + 6y = -12 \end{cases} \Rightarrow \text{Ç.K(S.S)} = ?$$

- A) $\{(1, 2)\}$ B) $\{(-1, 2)\}$ C) $\{(-2, 2)\}$
D) \emptyset E) R

$$10. \begin{cases} (a-1)x + by = 4, \\ (a+1)x + (b-1)y = 8 \end{cases} \Rightarrow \text{Ç.K(S.S)} = R \Rightarrow a + b = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$11. \begin{cases} 6x + 5y = 8 \\ 18x + 15y = 26 \end{cases} \Rightarrow \text{Ç.K(S.S)} = ?$$

- A) $\{(-2, 2)\}$ B) $\{(2, -2)\}$ C) $\{(0, 2)\}$
D) \emptyset E) R

$$12. \begin{cases} ax + by - y = 12, \\ 3ax + by = 8, \end{cases} \text{Ç.K(S.S)} = \emptyset \Rightarrow b = ?$$

- A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$
D) 2 E) $\frac{5}{2}$

$$13. \begin{cases} (a+2)x - 3y = 9 \\ (a-1)x + 6y = 12 \end{cases} \Rightarrow a = ?$$

- A) -2 B) -1 C) 0
D) 1 E) 2

$$14. \begin{cases} \frac{1}{x} - \frac{2}{y} = \frac{7}{3} \\ \frac{3}{x} - \frac{1}{y} = -\frac{1}{2} \end{cases} \Rightarrow x = ?$$

- A) -2 B) $-\frac{3}{2}$ C) -1
D) 1 E) 2

$$15. \begin{cases} \frac{2}{x} + \frac{3}{y} = \frac{13}{2} \\ \frac{3}{x} - \frac{1}{y} = \frac{3}{2} \end{cases} \Rightarrow \text{Ç.K(S.S)} = ?$$

- A) $\{(1, -1)\}$ B) $\{(1, \frac{1}{3})\}$ C) $\{(1, \frac{2}{3})\}$
D) $\{(-1, -\frac{1}{3})\}$ E) $\{(-\frac{2}{3}, 1)\}$

$$16. \begin{cases} a + b = 5 \\ 2b - c = 5 \\ c - a = 2 \end{cases} \Rightarrow a \cdot b \cdot c = ?$$

- A) 12 B) 14 C) 15
D) 18 E) 24



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1	2	3	4	5	6	7	8
E	C	B	A	E	A	B	C
9	10	11	12	13	14	15	16
E	B	D	C	B	B	C	A

1. $\frac{4x}{0,4} + \frac{5x}{0,5} = \frac{x}{0,1} + 10 \Rightarrow x = ?$

- A) $\frac{1}{10}$ B) $\frac{1}{5}$ C) $\frac{1}{2}$ D) 1 E) 0

2. $\frac{4-x}{3} - \frac{x-5}{4} = \frac{5}{6} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

3. $a \in \mathbb{R}$,
 $\frac{x-3}{2} + \frac{x-5}{3} - \frac{x-a}{5} = \frac{1}{3}$, Ç.K(S.S) = 3 $\Rightarrow a = ?$

- A) 8 B) 7 C) 6 D) 5 E) 4

4. $5 - [-3 - (1 - x)] = x - [2x - (3x + 3)] \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {1} B) {2} C) {3} D) {4} E) \emptyset

5. $4 + \frac{12}{2 - \frac{3}{x-1}} = 8 \Rightarrow x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

6. $\frac{0,17}{x} = \frac{0,51}{0,3} \Rightarrow x = ?$

- A) -0,1 B) -0,2 C) -1
 D) 0,1 E) 10

7. $\frac{2x+1}{3x-2} - \frac{x+1}{2-3x} = 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-\frac{2}{3}\}$ B) $\{-\frac{1}{3}\}$ C) {0} D) $\{\frac{3}{2}\}$ E) {6}

8. $\left. \begin{array}{l} a+b+c=2 \\ 2a=3b \\ \frac{a+c}{6}=1 \end{array} \right\} \Rightarrow c = ?$

- A) -12 B) -8 C) 8 D) 12 E) 14

9. $\begin{cases} 2x+3y=10 \\ 3x+2y=4 \end{cases} \Rightarrow x^2-y^2=?$
 A) $-\frac{84}{5}$ B) -12 C) -8 D) -6 E) $-\frac{8}{5}$

10. $\begin{cases} \frac{2}{2a-b+3}=1 \\ \frac{1}{2+b-2a+x}=\frac{1}{2} \end{cases} \Rightarrow x=?$
 A) 2 B) 1 C) -1 D) -2 E) -3

11. $\begin{cases} x+y=10 \\ y+z=24 \\ x+z=16 \end{cases} \Rightarrow x=?$
 A) 1 B) 2 C) 7 D) 8 E) 9

12. $\begin{cases} x+y-z=27 \\ x-y+z=9 \end{cases} \Rightarrow 2x+4y-4z=?$
 A) 18 B) 36 C) 72 D) 82 E) 92

13. $(x-3)^2 + (3y+15)^2 = 0 \Rightarrow x-y=?$
 A) 1 B) 2 C) 4 D) 8 E) 16

14. $\frac{3}{3-a} + \frac{3a-6}{a^2-5a+6} = 0 \Rightarrow \text{Ç.K(S.S)}=?$
 A) \emptyset B) {3} C) {0} D) R E) $R - \{2, 3\}$

15. $\left(\frac{a-3}{4} + 2\right) x - 2 = 2, \text{Ç.K(S.S)} = \{1\} \Rightarrow a=?$
 A) 6 B) 4 C) 2 D) -2 E) -4

16. $\begin{cases} 2a+b-c=-7 \\ a+b-2c=-6 \\ 3a-2b+c=-9 \end{cases} \Rightarrow a=?$
 A) -3 B) -2 C) 1 D) 2 E) 3



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	C	A	B	A	D	A	D
9	10	11	12	13	14	15	16
A	C	A	C	D	E	A	A

1. $\frac{x-3}{2} - \frac{x-1}{3} = \frac{2x+7}{6} \Rightarrow x = ?$

- A) -18 B) -14 C) -8 D) -7 E) -3

2. $x^2 + \frac{1}{3-x} = 9 - \frac{1}{x-3} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {-3} B) {3} C) {-3, 3} D) \emptyset E) R

3. $\frac{3x-1}{6} - \frac{2x+1}{8} = \frac{3-x}{12} \Rightarrow x = ?$

- A) $\frac{9}{8}$ B) $\frac{11}{8}$ C) $\frac{13}{8}$ D) $\frac{15}{8}$ E) $\frac{17}{8}$

4. $\frac{6}{1 - \frac{5}{1 - \frac{2}{x+1}}} = 3 \Rightarrow x = ?$

- A) $-\frac{4}{3}$ B) $-\frac{2}{3}$ C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $\frac{4}{3}$

5. $\frac{6}{2 + \frac{3}{1 + \frac{x}{2}}} = 2 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

6. $\frac{\frac{x}{2}-1}{\frac{2}{3}+1} + 2 = 4 \Rightarrow x = ?$

- A) 18 B) 20 C) 22 D) 24 E) 26

7. $\left. \begin{array}{l} x-3y=4 \\ 2x+y=8 \end{array} \right\} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {(4, 0)} B) {(0, 4)} C) {(3, 1)} D) {(1, 3)} E) {4}

8. $\left. \begin{array}{l} 2x-3y=9 \\ x+2y=1 \end{array} \right\} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {(1, 3)} B) {(-2, 3)} C) {(-1, 3)} D) {(3, 0)} E) {(3, -1)}

$$9. \begin{cases} 2x - 3y = 8 \\ 3x + 4y = 12 \end{cases} \Rightarrow x \cdot y = ?$$

- A) -2 B) -1 C) 0 D) 2 E) 4

$$10. \begin{cases} 3x - 2y = 4 \\ -6x + 4y = 12 \end{cases} \Rightarrow \text{Ç.K(S.S)} = ?$$

- A) $\{(0, 0)\}$ B) $\{(1, 2)\}$ C) $\{(1, 1)\}$
D) \emptyset E) R

$$11. \begin{cases} 4x + 2y = 3 \\ 8x + 4y = 6 \end{cases} \Rightarrow \text{Ç.K(S.S)} = ?$$

- A) \emptyset B) R C) $\{(0, 0)\}$
D) $\{(-1, -1)\}$ E) $\{(1, 1)\}$

$$12. \begin{cases} (m-2)x + 4y = 2, \\ 6x - (n+1)y = 3, \\ \text{Ç.K(S.S)} = R \Rightarrow m+n = ? \end{cases}$$

- A) -2 B) -1 C) 0 D) 1 E) 2

$$13. \begin{cases} (m+1)x - 3y = 4 \\ (3-2m)x + 5y = 12 \end{cases} \Rightarrow m = ?$$

- Ç.K(S.S) = \emptyset
A) 3 B) 6 C) 7 D) 10 E) 14

$$14. \begin{cases} \frac{x-1}{4} + \frac{y}{2} = 2 \\ \frac{x}{3} - \frac{y-1}{2} = \frac{7}{6} \end{cases} \Rightarrow x = ?$$

- A) 4 B) 5 C) 6 D) 7 E) 8

$$15. \begin{cases} \frac{1}{x} + \frac{1}{y} = 3 \\ \frac{3}{x} - \frac{2}{y} = 4 \end{cases} \Rightarrow x = ?$$

- A) $-\frac{1}{2}$ B) $-\frac{1}{3}$ C) $\frac{1}{2}$
D) $\frac{1}{3}$ E) $\frac{1}{4}$

$$16. \begin{cases} \frac{2}{x} - \frac{3}{y} = -4 \\ \frac{-5}{x} + \frac{2}{y} = \frac{9}{2} \end{cases} \Rightarrow x \cdot y = ?$$

- A) -9 B) -5 C) -2 D) 4 E) 6


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	A	C	B	D	C	A	E
9	10	11	12	13	14	15	16
C	D	B	B	E	B	C	C

1. $a(x-2) = 4(x-a) + 5,$
 $\text{Ç.K(S.S)} = \emptyset \Rightarrow a = ?$
 A) 1 B) 2 C) 4 D) 6 E) 12

2. $\left. \begin{array}{l} 7x+9y+5z=44 \\ x+3y-z=-22 \end{array} \right\} \Rightarrow x+y+z = ?$
 A) 10 B) 11 C) 12
 D) 13 E) 14

3. $x, y \in \mathbb{Z}^+, x \neq y \neq z,$
 $x+y+z=11,$
 $x+y-z=3 \Rightarrow \sum x = ?$
 A) 14 B) 16 C) 17 D) 21 E) 23

4. $\left. \begin{array}{l} 3x+y+3z=17 \\ x-y+z=5 \end{array} \right\} \Rightarrow x+y+z = ?$
 A) 12 B) 11 C) 6 D) 5 E) 4

5. $\left. \begin{array}{l} 3a+2b-c=6 \\ a-5b-2c=10 \\ 4a+11b+11c=8 \end{array} \right\} \Rightarrow a+b+c = ?$
 A) 4 B) 3 C) 2
 D) -2 E) -3

6. $\frac{1}{x^2-y^2} = \frac{1}{x-y} = \frac{1}{6} \Rightarrow x = ?$
 A) 5 B) $\frac{9}{2}$ C) 4 D) $\frac{7}{2}$ E) $\frac{5}{2}$

7. $\left. \begin{array}{l} x-\frac{3}{y}=4 \\ y-\frac{3}{x}=6 \end{array} \right\} \Rightarrow \frac{x}{y} = ?$
 A) 3 B) 2 C) $\frac{3}{2}$ D) $\frac{2}{3}$ E) $\frac{1}{2}$

8. $\left. \begin{array}{l} (m-1)x+(n+3)y+6=0 \\ 2x+3y-3=0 \\ \text{Ç.K(S.S)} = \mathbb{R} \end{array} \right\} \Rightarrow \frac{m}{n} = ?$
 A) 2 B) 3 C) $\frac{1}{3}$ D) $-\frac{1}{3}$ E) -3

$$9. \begin{cases} 3x - 2y = 15 \\ -x - 3z = 1 \\ 2y + z = 6 \end{cases} \Rightarrow x + z = ?$$

- A) 4 B) 5 C) 6 D) 8 E) 10

$$10. \begin{cases} 3x - y - 2z = 14 \\ x - 2y + z = 8 \end{cases} \Rightarrow x - y = ?$$

- A) 2 B) 4 C) 6 D) 8 E) 10

$$11. \begin{cases} x \cdot y = \frac{1}{2} \\ y \cdot z = \frac{1}{3} \\ x \cdot y \cdot z = 2 \end{cases} \Rightarrow x \cdot z = ?$$

- A) 4 B) 6 C) 8 D) 12 E) 24

$$12. \begin{cases} 3a - b + c = 8 \\ a - 2b - c = -6 \\ a + 2b + c = 4 \end{cases} \Rightarrow a + b + c = ?$$

- A) 6 B) 5 C) 1 D) -5 E) -6

$$13. \begin{cases} -x - 2y + 3z = -2 \\ -3x + 2y + z = 8 \end{cases} \Rightarrow x - 2y + z = ?$$

- A) 5 B) 4 C) -3 D) -4 E) -5

$$14. \begin{cases} a, b, c \in \mathbb{Z} \\ a + b = 6 \\ a + c = 5 \\ 3b + c = 3 \end{cases} \Rightarrow 2a + 3b - c = ?$$

- A) 5 B) 7 C) 13 D) 15 E) 17

$$15. \begin{cases} \frac{3a}{2} - \frac{2b}{3} = \frac{1}{6} \\ \frac{2a}{3} - \frac{3b}{2} = -\frac{7}{3} \end{cases} \Rightarrow b \cdot a = ?$$

- A) 4 B) 2 C) 1 D) -1 E) -2

$$16. \begin{cases} \frac{3}{x} + \frac{2}{y} = 2 \\ \frac{1}{x} - \frac{1}{y} = 4 \end{cases} \Rightarrow x = ?$$

- A) 2 B) $\frac{3}{2}$ C) 1 D) $\frac{1}{2}$ E) $-\frac{1}{4}$


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	A	C	B	D	D	C
9	10	11	12	13	14	15	16
B	C	E	A	E	C	B	D

1. $\frac{2-x}{4} + \frac{3x-1}{2} = \frac{x+1}{6} + 2 \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

2. $\frac{x+1}{x-1} - \frac{1}{2x-2} = 1 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {-2} B) {-1} C) {0} D) \emptyset E) R

3. $x - y = 8 \Rightarrow 2x + 4(2y - x) - 3[y - (2x - 3y)] = ?$

- A) 16 B) 24 C) 32 D) 40 E) 48

4. $m \neq 3,$

$4x - m = mx - 3 + x \Rightarrow x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

5. $\frac{12}{3 + \frac{11}{1 - \frac{1}{x}}} = 3 \Rightarrow x = ?$

- A) $-\frac{1}{2}$ B) $-\frac{1}{4}$ C) $-\frac{1}{6}$ D) $-\frac{1}{8}$ E) $-\frac{1}{10}$

6. $\frac{3}{1 - \frac{2}{a-1}} = 1 \Rightarrow a = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

7. $\left. \begin{array}{l} mx - 3y + 6 = 0 \\ 4x + y + n = 0 \end{array} \right\} \Rightarrow m + n = ?$
Ç.K(S.S) = R

- A) -18 B) -14 C) -12 D) -8 E) -6

8. $x = 24 + z + y,$

$3x + y + z = 0 \Rightarrow x = ?$

- A) 4 B) 6 C) 8 D) 10 E) 12

9. $3mx - 6m = 4 - 9x,$

$\text{Ç.K(S.S)} = \emptyset \Rightarrow m = ?$

- A) -3 B) -2 C) $\frac{2}{3}$ D) $\frac{3}{2}$ E) 3

10. $\left. \begin{array}{l} x \cdot y = \frac{5}{4} \\ x - y = 5 \end{array} \right\} \Rightarrow \frac{x}{y} + \frac{y}{x} = ?$

- A) $\frac{5}{11}$ B) $\frac{38}{11}$ C) 9 D) 19 E) 22

11. $\left. \begin{array}{l} x - y = 6 \\ z - m = 8 \end{array} \right\} \Rightarrow (x + z) - (y + m) = ?$

- A) 12 B) 14 C) 16 D) 24 E) 36

12. $\left. \begin{array}{l} x^2 = 3y - 16 \\ y^2 = 3x - 16 \\ x - y = 7 \end{array} \right\} \Rightarrow x \cdot y = ?$

- A) -10 B) -8 C) -6 D) 6 E) 10

13. $\frac{x+1}{x-2} + \frac{x+1}{x+2} + \frac{2x-3}{x+1} = \frac{3-2x}{x-1} \Rightarrow x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

14. $\left. \begin{array}{l} a = 2, b = 5 \\ ax + by = 3 \\ -by + ax = 5 \end{array} \right\} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{(4, -\frac{1}{2})\}$ B) $\{(2, -\frac{1}{5})\}$ C) $\{(4, 3)\}$

- D) $\{(2, 3)\}$ E) $\{(2, -\frac{1}{2})\}$

15. $\frac{3-x}{2} + 3 = \frac{x-3}{2} \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 6 E) 9

16. $2a + 3 = \frac{a-5x}{x+2}, \text{Ç.K(S.S)} = \emptyset \Rightarrow a = ?$

- A) -4 B) -2 C) 0 D) 2 E) 4



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	D	C	B	E	C	B	B
9	10	11	12	13	14	15	16
A	E	B	A	C	B	D	A

1. $\left. \begin{array}{l} x+my=3 \\ x-y=3 \\ \text{Ç.K(S.S)=R} \end{array} \right\} \Rightarrow m=?$
 A) -3 B) -2 C) -1 D) 1 E) 3

2. $\left. \begin{array}{l} a \neq 2 \\ (a-1)x-y=1 \\ ax-2y=a \end{array} \right\} \Rightarrow x=?$
 A) -3 B) -1 C) 0 D) 1 E) 3

3. $\left. \begin{array}{l} (a+c)x-by=b \cdot c \\ x+y=a+b \end{array} \right\} \Rightarrow (x,y)=?$
 A) (-a, b) B) (-b, a) C) (a, b)
 D) (b, a) E) (3, a)

4. $\left. \begin{array}{l} 2x+1=3y \\ x-y=2 \end{array} \right\} \Rightarrow x+y=?$
 A) 6 B) 8 C) 9 D) 10 E) 12

5. $\frac{6}{1-\frac{1}{2+\frac{a+5}{2}}}=3 \Rightarrow a=?$
 A) -4 B) -6 C) -8 D) -10 E) -11

6. $\frac{5}{3+\frac{2}{1+\frac{x+1}{5}}}=1 \Rightarrow x=?$
 A) -3 B) -1 C) 1 D) 2 E) 3

7. $x < 0,$
 $\frac{x}{1+\frac{1}{x}} - \frac{1-2x}{1+x} = 2 \Rightarrow x=?$
 A) $-\sqrt{5}$ B) -2 C) $-\sqrt{3}$ D) $-\sqrt{2}$ E) -1

8. $2 - \frac{2-\frac{x}{3}}{3} = 2 \Rightarrow x=?$
 A) -12 B) -6 C) -4 D) 4 E) 6

9. $\frac{x+2}{x-2} - \frac{1}{x} = \frac{2}{x^2-2x} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {-3} B) {-1} C) {1} D) {3} E) {5}

10. $3 - \frac{15}{2 - \frac{x}{3x-1}} = 3 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) \emptyset B) {1} C) {2} D) {3} E) R

11. $\frac{x+3}{x^2-1} - \frac{1}{x-1} - \frac{2}{x^2-1} = 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) \emptyset B) {-1} C) {1} D) {-1,1} E) R-{-1,1}

12. $(x-y+1)^4 + (x+y+3)^8 = 0 \Rightarrow x-y = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $4x^2 - 12x + 9 + (2x+3y)^2 = 0 \Rightarrow y = ?$

- A) -3 B) -1 C) 0 D) 1 E) 3

14. $a \neq b,$
 $\frac{ax+2b}{b} - \frac{bx+2a}{a} = \frac{1}{a} - \frac{1}{b} \Rightarrow x = ?$

- A) $\frac{-2}{a+b}$ B) $\frac{-1}{a+b}$ C) $\frac{-2}{a-b}$
 D) $\frac{-1}{a-b}$ E) $\frac{-1}{b-a}$

15. $\frac{1}{a} - \frac{2}{x} = \frac{1}{x} - \frac{1}{b} \Rightarrow x = ?$

- A) $\frac{ab}{a+b}$ B) $\frac{2ab}{a+b}$ C) $\frac{3ab}{a+b}$
 D) $\frac{a+b}{ab}$ E) $\frac{a+b}{2ab}$

16. $\left. \begin{array}{l} \frac{a+b}{2} + a = 10 \\ \frac{a-b}{2} + b = 3 \end{array} \right\} \Rightarrow b = ?$

- A) -5 B) -3 C) -1 D) 3 E) 5



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	D	E	E	B	C	A
9	10	11	12	13	14	15	16
B	A	E	B	B	B	C	C

1. $\begin{cases} x-y=2 \\ x+3y=10 \end{cases} \Rightarrow y=?$
A) 1 B) 2 C) 3 D) 4 E) 5

2. $\begin{cases} 2x+y=6 \\ x-3y=3 \end{cases} \Rightarrow x=?$
A) 1 B) 2 C) 3 D) 4 E) 5

3. $\begin{cases} \frac{x}{2} + \frac{2y}{3} = 3 \\ x-4y=10 \end{cases} \Rightarrow y=?$
A) $-\frac{1}{2}$ B) $-\frac{3}{4}$ C) $-\frac{5}{6}$ D) $\frac{1}{2}$ E) $\frac{3}{4}$

4. $\begin{cases} x+ny=3 \\ nx-my=-1 \end{cases}, (x,y)=(2,-1) \Rightarrow m \cdot n=?$
A) -4 B) -3 C) -2 D) -1 E) 0

5. $\begin{cases} -3x+2y=0 \\ 2x+y=7 \end{cases} \Rightarrow x+y=?$
A) 5 B) 6 C) 7 D) 8 E) 9

6. $\begin{cases} \frac{3}{x} - \frac{5}{y} = \frac{20}{6} \\ \frac{2}{x} + \frac{1}{y} = \frac{5}{12} \end{cases} \Rightarrow x+y=?$
A) -2 B) 0 C) 1 D) 2 E) 3

7. $a \in \mathbb{R}^-, \begin{cases} 3x+2ay=-5 \\ ax+6y=4 \end{cases} \Rightarrow a=?$
 $\text{Ç.K(S.S)} = \emptyset$
A) -7 B) -6 C) -5 D) -4 E) -3

8. $\begin{cases} \frac{x}{a} + \frac{y}{b} = 2 \\ bx-ay=0 \end{cases} \Rightarrow x=?$
A) a.b B) $\frac{a}{2}$ C) $\frac{b}{2}$ D) a E) b

$$9. \left. \begin{array}{l} \frac{2}{x} - \frac{3}{y} = 13 \\ \frac{5}{x} + \frac{2}{y} = 4 \end{array} \right\} \Rightarrow x \cdot y = ?$$

- A) $-\frac{5}{6}$ B) $-\frac{1}{6}$ C) $\frac{1}{6}$ D) $\frac{2}{3}$ E) $\frac{5}{6}$

$$10. \left. \begin{array}{l} \frac{1}{x} + \frac{1}{y} = 5 \\ \frac{3}{y} + \frac{2}{x} = 7 \end{array} \right\} \Rightarrow y = ?$$

- A) $-\frac{2}{3}$ B) $-\frac{1}{3}$ C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $\frac{4}{3}$

$$11. \left. \begin{array}{l} x + 3y = 11 \\ x - y + \frac{1}{x+3y} = \frac{56}{11} \end{array} \right\} \Rightarrow x + y = ?$$

- A) 10 B) 9 C) 8 D) 7 E) 6

$$12. \left. \begin{array}{l} x^2 - y^2 = 12 \\ \frac{1}{x-y} + \frac{1}{x+y} = x+5 \end{array} \right\} \Rightarrow x = ?$$

- A) -12 B) -9 C) -8 D) -6 E) -5

$$13. \left. \begin{array}{l} x+z=4 \\ y+z=5 \\ x-y=2z \end{array} \right\} \Rightarrow x = ?$$

- A) $\frac{11}{2}$ B) $\frac{9}{2}$ C) $\frac{7}{2}$ D) $\frac{5}{2}$ E) $\frac{3}{2}$

$$14. \left. \begin{array}{l} a+b=4 \\ b+c=8 \\ a+c=6 \end{array} \right\} \Rightarrow b = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

$$15. \left. \begin{array}{l} a+2b+c=8 \\ a-2b+c=0 \end{array} \right\} \Rightarrow a+b+c = ?$$

- A) 5 B) 6 C) 7 D) 8 E) 9

$$16. \left. \begin{array}{l} 2a+b=c \\ a+c=3b \\ a+b+c=12 \end{array} \right\} \Rightarrow c = ?$$

- A) 3 B) 5 C) 7 D) 9 E) 11


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	C	B	D	A	B	E	D
9	10	11	12	13	14	15	16
B	B	C	D	B	C	B	C

$$1. \frac{x-1}{3} - \frac{3-x}{4} = \frac{1-2x}{8} - 1$$

$$x \in \mathbb{R} \Rightarrow x = ?$$

- A) $\frac{1}{2}$ B) $\frac{3}{8}$ C) $\frac{1}{4}$ D) $\frac{3}{4}$ E) $\frac{1}{8}$

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

$$2. (m \neq 4)$$

$$\frac{4-x}{m} - \frac{m-x}{4} = 1 - \frac{m}{4} \Rightarrow x = ?$$

- A) 4 B) -4 C) 0 D) -1 E) 1

[KARABÜK ÜNİVERSİTESİ – YÖS 2020]

$$3. \left. \begin{array}{l} \sqrt{3}x - y = 1 \\ x + y = 2 + \sqrt{3} \end{array} \right\} \Rightarrow x \cdot y = ?$$

- A) $2\sqrt{3}$ B) $\sqrt{3}$ C) 1 D) $-\sqrt{3}$ E) -3

[İSTANBUL ÜNİVERSİTESİ – YÖS 2019]

$$4. \frac{a}{c-b} = \frac{4}{5}$$

$$\frac{b-a}{c} = \frac{2}{5}$$

$$a+b=28 \Rightarrow c = ?$$

- A) 18 B) 19 C) 20 D) 30 E) 40

[İSTANBUL ÜNİVERSİTESİ – YÖS 2019]

$$5. \sqrt{\underbrace{6^2+6^2+\dots+6^2}_{k \text{ tane / k times}}} = k+9 \Rightarrow k = ?$$

- A) 6 B) 7 C) 8 D) 9 E) 10

[KARADENİZ ÜNİVERSİTESİ – YÖS 2019]

$$6. 4x + 2y - z = 36$$

$$3x + 5y + 2z = 46$$

$$x + y - z = 14$$

yukarıda verilen eşitliklere göre z'nin değeri nedir?

According to the equations given above, what is the value of z?

- A) -2 B) -3 C) -5 D) -1 E) -4

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

$$7. \frac{1}{1 - \frac{1}{x-3}}$$

ifadesini tanımsız yapan x'in değerlerinin toplamı nedir?

What is the sum of x values which make the expression undefined?

- A) 5 B) 4 C) 7 D) 6 E) 3

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

$$8. \frac{xy}{x+y} = \frac{1}{9}$$

$$\frac{xz}{x+z} = \frac{1}{12}$$

$$\frac{yz}{y+z} = \frac{1}{15}$$

yukarıda verilen eşitliklere göre $\frac{1}{z} \left(\frac{1}{x} - \frac{1}{y} \right)$ değeri kaçtır?

According to the equations given above, what is the value

of $\frac{1}{z} \left(\frac{1}{x} - \frac{1}{y} \right)$?

- A) -27 B) 16 C) 36 D) -20 E) 12

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

$$9. \begin{cases} \frac{1}{x} + \frac{2}{y} = 3 \\ \frac{6}{y} - \frac{2}{x} = 2 \end{cases} \Rightarrow y = ?$$

- A) $\frac{4}{5}$ B) $\frac{5}{4}$ C) 1 D) $\frac{5}{2}$ E) 2

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

$$10. 3 + \frac{10}{2 + \frac{6}{5-x}} = 9 \Rightarrow x = ?$$

- A) 22 B) 23 C) 24 D) 25 E) 26

[İSTANBUL ÜNİVERSİTESİ – YÖS 2017]

$$11. \frac{1}{x-5} + \frac{1}{3-2y} = 0 \Rightarrow x-2y = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2017]

$$12. \begin{cases} \frac{3}{x} + \frac{2}{y} = 2 \\ \frac{1}{x} - \frac{1}{y} = 4 \end{cases} \Rightarrow x = ?$$

- A) 2 B) $\frac{3}{2}$ C) 1 D) $\frac{1}{2}$ E) $-\frac{1}{4}$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

$$13. \begin{cases} x+2y=7 \\ 2x-2y=5 \end{cases} \Rightarrow x \cdot y = ?$$

- A) 1 B) 2 C) 3 D) 5 E) 6

[SELÇUK ÜNİVERSİTESİ – YÖS 2017]

$$14. x \neq -2, x \neq -\frac{2}{3}$$

$$3 - \frac{2}{2 + \frac{4x}{x+2}} = 1 \Rightarrow x = ?$$

- A) 2 B) -1 C) $-\frac{2}{5}$ D) $-\frac{1}{5}$ E) 0

[BALIKESİR ÜNİVERSİTESİ – YÖS 2017]

$$15. \begin{cases} 3x-7y=7 \\ 2y-x=-4 \end{cases} \Rightarrow x+y = ?$$

- A) 10 B) 11 C) 13 D) 17 E) 19

[İSTANBUL ÜNİVERSİTESİ – YÖS 2016]

$$16. \begin{cases} a+b+c=7 \\ 2a+c-b=4 \\ 3a-2b+c=3 \end{cases} \Rightarrow \frac{c-a}{b+1} = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

[İSTANBUL ÜNİVERSİTESİ – YÖS 2015]

 YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	A	A	D	D	A	C	A
9	10	11	12	13	14	15	16
B	B	B	D	E	C	E	A

BÖLÜM CHAPTER

8

TARİHSEL NOT / HISTORICAL NOTE

Aristarchus of Samos [about 270 BC]

Yunan gökbilimci. Dünya'nın Güneş etrafındaki dönüşünü açıklayan ilk astronomlardan biridir. Güneş ve Ay'ın Dünya'ya olan uzaklıklarını bulmak için geometrik yöntemleri kullanmıştır.

Greek astronomer, noted for being the first to affirm that the Earth rotates and travels around the Sun. He treated astronomy mathematically and used geometrical methods to calculate the relative sizes of the Sun and Moon and their relative distances from the Earth.

BİRİNCİ DERECEDEN EŞİTSİZLİKLER FIRST DEGREE INEQUALITIES

Bu bölüm 112 test sorusu, 16 YÖS sorusu içermektedir.

This chapter includes 112 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 8

BİRİNCİ DERECEDEN EŞİTSİZLİKLER / FIRST DEGREE INEQUALITIES

- Birinci Dereceden Eşitsizlikler / First Degree Inequalities 259 - 276



BÖLÜM
08
CHAPTER

BİRİNCİ DERECE DEN EŞİTSİZLİKLER
FIRST DEGREE INEQUALITIES

Bölüm / Chapter 8

Birinci Dereceden Eşitsizlikler / First Degree Inequalities

Test 1

1. $x \in \mathbb{Z}$,
 $\frac{x}{3} - 2x + 15 < 5 \Rightarrow \min(x) = ?$
A) 5 B) 6 C) 7 D) 8 E) 9
2. $x \in \mathbb{Z}$,
 $x + 4 \leq 3x - 2 < 13 \Rightarrow \sum x = ?$
A) 5 B) 7 C) 9 D) 12 E) 14
3. $\frac{4x-3}{3} + 2 \leq 2x - \frac{x+4}{4} - \frac{x}{6}$
 $\Rightarrow \text{Ç.K(S.S)} = ?$
A) $(-\infty, 6]$ B) $(-\infty, 8]$ C) $[6, \infty)$ D) $[8, \infty)$ E) $[9, \infty)$
4. $x, y \in \mathbb{Z}$
 $\left. \begin{array}{l} -4 < x < 3 \\ -5 < y < 7 \end{array} \right\} \Rightarrow \max(3x - 2y) = ?$
A) 10 B) 11 C) 12 D) 13 E) 14
5. $x, y, z \in \mathbb{R}$
 $x^4 \cdot y < 0,$
 $y \cdot z < 0,$
 $x \cdot z^3 > 0$
 $\Rightarrow x, y, z = ?, ?, ?$
A) +, -, + B) -, -, + C) -, +, +
D) +, +, + E) +, -, -
6. $x, y \in \mathbb{Z}$
 $\left. \begin{array}{l} -2 \leq x < 4 \\ -3 < y \leq 2 \end{array} \right\} \Rightarrow \min(x^2 - 2y) = ?$
A) -5 B) -4 C) -3 D) -2 E) -1
7. $x, y \in \mathbb{R}$,
 $(3y - 2x) \in \mathbb{Z},$
 $-3 < x < 4,$
 $-2 < y < 3$
 $\Rightarrow \min(3y - 2x) = ?$
A) -14 B) -13 C) -12 D) -11 E) -10
8. $(x^2 + y^2) \in \mathbb{Z}$,
 $-5 < x < 4,$
 $-5 < y < -2$
 $\Rightarrow \max(x^2 + y^2) = ?$
A) 16 B) 25 C) 36 D) 40 E) 49

9. $x \in \mathbb{Z}$,
 $-1 \leq \frac{5-3x}{4} < 3 \Rightarrow \sum x = ?$

- A) 3 B) 7 C) 12 D) 18 E) 25

10. $\left. \begin{array}{l} 2x-8 < 0 \\ 3x+9 \geq 0 \end{array} \right\} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(-\infty, 4)$ B) $(-\infty, -3)$ C) $(-\infty, -3]$
 D) $(-\infty, 4]$ E) $[-3, 4)$

11. $x-2 \leq -3x+4 < x+4 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(0, \frac{1}{2})$ B) $(0, \frac{1}{2}]$ C) $(0, \frac{3}{2})$
 D) $(0, \frac{3}{2}]$ E) $(\frac{1}{2}, \frac{3}{2}]$

12. $x, y \in \mathbb{Z}$, $a \in \mathbb{Z}$,
 $\left. \begin{array}{l} -9 \leq x-y < 15 \\ \frac{y-x}{a} = 3 \end{array} \right\} \Rightarrow \sum a = ?$

- A) -4 B) -3 C) 1 D) 4 E) 6

13. $\left. \begin{array}{l} -1 < x-1 < 6 \\ 0 < x+2 \leq 6 \end{array} \right\} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(-\infty, 0)$ B) $(-\infty, 4)$ C) $(-\infty, 4]$
 D) $(-2, 4]$ E) $(0, 4]$

14. $\frac{5}{x-1} \geq \frac{1}{2} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) (0, 5) B) (1, 5) C) (1, 5]
 D) (1, 11] E) [1, 5]

15. $x \in \mathbb{Z}$,
 $-15 < 2(x-1) < 6 \Rightarrow \max(x) + \min(x) = ?$

- A) -5 B) -3 C) 2 D) 5 E) 7

16. $5^{4-x} < 1 \leq 7^{7-x}$
 $x \in \mathbb{Z} \Rightarrow \sum x = ?$

- A) 16 B) 18 C) 20 D) 24 E) 28



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	D	E	A	B	B	E
9	10	11	12	13	14	15	16
A	E	D	A	E	D	B	B

1. $x \in \mathbb{Z}$,

$3x - 1 < 11 \Rightarrow \max(x) = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

2. $x \in \mathbb{Z}$,

$\frac{2x-1}{5} > 5 \Rightarrow \min(x) = ?$

- A) 13 B) 14 C) 15 D) 16 E) 17

3. $x \in \mathbb{N}$,

$\frac{3x-2}{2} < 5 \Rightarrow \sum x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

4. $x, y \in \mathbb{Z}$,

$\left. \begin{array}{l} -4 \leq x < 5 \\ 3 < y < 8 \end{array} \right\} \Rightarrow \max(x-2y) + \min(x+y) = ?$

- A) -4 B) -2 C) 2 D) 4 E) 8

5. $x \in \mathbb{Z}, y \in \mathbb{R}$,

$\left. \begin{array}{l} -1 < y \leq 3 \\ x+2y=4 \end{array} \right\} \Rightarrow \sum x = ?$

- A) 8 B) 10 C) 12 D) 14 E) 16

6. $x, y \in \mathbb{Z}$,

$\left. \begin{array}{l} 4 \leq x \leq 12 \\ -2 < -y < 6 \end{array} \right\} \Rightarrow \max(2x+y) = ?$

- A) 26 B) 29 C) 23
D) 24 E) 25

7. $y \in \mathbb{Z}$,

$x > x^2$

$3x - 2y = 6$

$\Rightarrow y = ?$

- A) -3 B) -2 C) -1 D) 0 E) 1

8. $4x - 8 \geq x + 4 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(-\infty, -4)$ B) $(-\infty, -4]$ C) $(4, \infty)$
D) $[4, \infty)$ E) $[3, \infty)$

9. $x \in \mathbb{Z}$,
 $-4 \leq \frac{4x+4}{6} \leq 8 \Rightarrow \sum x = ?$
 A) 35 B) 36 C) 37 D) 38 E) 39

10. $x \in \mathbb{Z}$,
 $7 < 2x + 1 < 17 \Rightarrow \sum x = ?$
 A) 20 B) 21 C) 22 D) 23 E) 24

11. $x \in \mathbb{Z}$,
 $\frac{1}{4} < \frac{2x-1}{12} < \frac{2}{3} \Rightarrow \sum x = ?$
 A) 1 B) 3 C) 5 D) 7 E) 9

12. $x \in \mathbb{Z}$,
 $\frac{2}{7} < \frac{6}{x+2} < \frac{3}{5} \Rightarrow \max(x) - \min(x) = ?$
 A) 5 B) 6 C) 7 D) 8 E) 9

13. $x, y \in \mathbb{R}$, $(2x - y) \in \mathbb{Z}$,
 $\left. \begin{array}{l} 3 \leq x < 8 \\ -4 < y < 12 \end{array} \right\} \Rightarrow \max(2x - y) = ?$
 A) 20 B) 19 C) 18 D) 17 E) 16

14. $x, y \in \mathbb{R}$, $(2y - x) \in \mathbb{Z}$,
 $\left. \begin{array}{l} -8 \leq x \leq 10 \\ -6 \leq y \leq 12 \end{array} \right\} \Rightarrow \min(2y - x) = ?$
 A) -18 B) -19 C) -20
 D) -21 E) -22

15. $x \in \mathbb{Z}$,
 $3x - 6 < -x + 8 < x + 10$
 $\Rightarrow \sum x = ?$
 A) 4 B) 5 C) 6 D) 7 E) 8

16. $(4x + 3) \in \mathbb{Z}$
 $x^2 < x \Rightarrow \max(4x + 3) = ?$
 A) -4 B) -2 C) 2 D) 4 E) 6



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	E	A	C	E	B	D
9	10	11	12	13	14	15	16
D	C	D	E	B	E	C	E

1. $\frac{x-1}{2} - 2 < 1 + \frac{x}{2} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-1\}$ B) $\{1\}$ C) $\{0\}$
D) \emptyset E) \mathbb{R}

2. $\frac{x}{3} - 2 > \frac{x+1}{3} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-1\}$ B) $\{-1, 1\}$ C) $\{2\}$
D) \emptyset E) \mathbb{R}

3. $\left. \begin{array}{l} a \in \mathbb{Z}, \\ a - 3b = 8 \\ -1 < b < 2 \end{array} \right\} \Rightarrow \max(a) = ?$

- A) 11 B) 12 C) 13 D) 14 E) 15

4. $\left. \begin{array}{l} (x^2 - 2y) \in \mathbb{Z}, \\ -6 < x \leq 8 \\ -2 \leq y < 4 \end{array} \right\} \Rightarrow \max(x^2 - 2y) = ?$

- A) 63 B) 64 C) 65
D) 67 E) 68

5. $\left. \begin{array}{l} (a^2 - b^2) \in \mathbb{Z}, \\ -4 \leq a \leq 6 \\ -5 \leq b \leq 8 \end{array} \right\} \Rightarrow \min(a^2 - b^2) = ?$

- A) -64 B) -36 C) -32 D) -24 E) 0

6. $\left. \begin{array}{l} (x \cdot y) \in \mathbb{Z}, \\ -10 \leq x < 8 \\ -9 < y \leq -2 \end{array} \right\} \Rightarrow \max(x \cdot y) = ?$

- A) 90 B) 89 C) 88
D) 87 E) 86

7. $\left. \begin{array}{l} 2 \leq a \leq 12 \\ -2 \leq b \leq 8 \end{array} \right\} \Rightarrow ? < a \cdot b < ?$

- A) $-2 < a \cdot b < 8$ B) $-4 < a \cdot b < 24$
C) $-24 < a \cdot b < 24$ D) $-24 \leq a \cdot b \leq 96$
E) $-2 < a \cdot b < 77$

8. $x, y \in \mathbb{R}, A \in \mathbb{Z},$
 $-3 \leq x < 3, -1 < y \leq 4$
 $A = x^2 - y \Rightarrow \sum A = ?$

- A) 25 B) 28 C) 30 D) 33 E) 35

9. $x \in \mathbb{Z}$,
 $\frac{4x+7}{6} < \frac{x-1}{3} \Rightarrow \max(x) = ?$
 A) -5 B) -4 C) -3 D) -2 E) -1

10. $x \in \mathbb{Z}$,
 $3 < 2 - \frac{2-x}{2} < 5 \Rightarrow \sum x = ?$
 A) 11 B) 14 C) 15 D) 18 E) 21

11. $x \in \mathbb{Z}$,
 $-3x + 4 < 3x - 2 < 2x + 8$
 $\Rightarrow \sum x = ?$
 A) 11 B) 22 C) 33 D) 44 E) 55

14. $a, b, c \in \mathbb{R}$, $A \in \mathbb{Z}$,
 $4a + 3b - 2c < 4$,
 $3a + 3b - 3c > 4$,
 $a + c = A \Rightarrow \max(A) = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

13. $A = x^2 - 2x + 3$,
 $-4 < x < 3 \Rightarrow ? < A < ?$
 A) $2 \leq A < 27$ B) $2 < A < 27$ C) $3 \leq A \leq 27$
 D) $3 < A < 27$ E) $4 \leq A < 27$

14. $a < b < 0 < c$
 $\Rightarrow \frac{1}{?} < \frac{1}{?} < \frac{1}{?}$
 A) $\frac{1}{a} < \frac{1}{b} < \frac{1}{c}$ B) $\frac{1}{b} < \frac{1}{a} < \frac{1}{c}$
 C) $\frac{1}{c} < \frac{1}{a} < \frac{1}{b}$ D) $\frac{1}{a} < \frac{1}{c} < \frac{1}{b}$
 E) $\frac{1}{c} < \frac{1}{b} < \frac{1}{a}$

15. $a > a^2$,
 $x = \frac{1}{a}$, $y = \frac{1}{a^2}$, $z = \frac{1}{a^3} \Rightarrow ? > ? > ?$
 A) $x > y > z$ B) $x > z > y$
 C) $z > x > y$ D) $y > z > x$
 E) $z > y > x$

16. $x \in \mathbb{Z}$,
 $\left(\frac{2}{3}\right)^{2x-3} < \left(\frac{2}{3}\right)^{3x+2} \Rightarrow \max(x) = ?$
 A) -6 B) -5 C) -4 D) -3 E) -2

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 **YANITLAR / ANSWERS**

1	2	3	4	5	6	7	8
E	D	C	E	A	B	D	E
9	10	11	12	13	14	15	16
A	D	D	B	A	B	E	A

1. $3(x-2) + 2 \leq 17 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(-\infty, -7]$ B) $(-\infty, 7)$ C) $(-\infty, 7]$
 D) $(-7, \infty)$ E) $(7, \infty)$

2. $x \in \mathbb{R}^+$,

$4(x-2) + 6 < 34 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(-\infty, 9]$ B) $(9, \infty)$ C) $[0, 9)$
 D) $(0, 9)$ E) $(0, 9]$

3. $x \in \mathbb{Z}$,

$4(x-3) > 3x + 5 \Rightarrow \min(x) = ?$

- A) 17 B) 18 C) 19 D) 20 E) 21

4. $\frac{2x+1}{3} - \frac{x+2}{4} \geq 4 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(10, \infty)$ B) $[-10, \infty)$ C) $(-\infty, 10]$
 D) $[10, \infty)$ E) $(0, \infty)$

5. $(x+4)^2 \geq 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) \emptyset B) $[-4, \infty)$ C) $(-4, \infty)$
 D) $(4, \infty)$ E) \mathbb{R}

6. $(x+4)^2 \leq 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) \mathbb{R} B) $\{-4\}$ C) $(-2, \infty)$
 D) $[-2, \infty)$ E) $(-\infty, -2]$

7. $x \in \mathbb{Z}$,

$\frac{x}{x-3} > 1 \Rightarrow \min(x) = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

8. $x \in \mathbb{Z}$,

$3x-5 < x+5 < 2x+3 \Rightarrow \sum x = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

9. $x \in \mathbb{Z}$,
 $2x + 3 < x + 12 < 3x + 2$
 $\Rightarrow \max(x) + \min(x) = ?$
 A) 14 B) 13 C) 12 D) 11 E) 10

10. $\frac{x-3}{3} + \frac{x+2}{6} < \frac{2x+5}{2} \Rightarrow \text{Ç.K(S.S)} = ?$
 A) $(-\frac{19}{3}, \infty)$ B) $(-\frac{19}{3}, 0)$ C) $(-\infty, -\frac{19}{3})$
 D) $(\frac{19}{3}, \infty)$ E) $(-\infty, \frac{19}{3})$

11. $x \in \mathbb{Z}$,
 $2 < \frac{3x+2}{4} < 8 \Rightarrow \sum x = ?$
 A) 38 B) 40 C) 42 D) 44 E) 46

12. $a \in \mathbb{Z}$,
 $\left. \begin{array}{l} a+b > 5 \\ b+c < 3 \\ a+c > 2 \end{array} \right\} \Rightarrow \min(a) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

13. $y \in \mathbb{Z}$,
 $2y = 2x + 3, -2 < x < 3 \Rightarrow \sum y = ?$
 A) 8 B) 10 C) 11 D) 12 E) 13

14. $x + 3y = 15$,
 $3 < y < 6$
 $\Rightarrow ? < x < ?$
 A) $-3 < x < 6$ B) $3 < x < 6$ C) $0 < x < 3$
 D) $-3 < x < 3$ E) $-2 < x < 4$

15. $\left. \begin{array}{l} -3 < x < 7 \\ -5 < y < 10 \end{array} \right\} \Rightarrow ? < x \cdot y < ?$
 A) $-15 < x \cdot y < 30$ B) $-30 < x \cdot y < 30$
 C) $-30 < x \cdot y < 70$ D) $-35 < x \cdot y < 70$
 E) $-35 < x \cdot y < 30$

16. $x, y \in \mathbb{Z}$
 $\left. \begin{array}{l} -3 \leq x < 5 \\ -2 < y < 4 \end{array} \right\} \Rightarrow \min(2x - 3y) = ?$
 A) -17 B) -15 C) -13 D) 13 E) 15



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	D	B	D	E	B	C	D
9	10	11	12	13	14	15	16
A	A	C	C	B	A	D	B

1. $x \in \mathbb{Z}$,
 $\frac{3-2x}{5} < -3 \Rightarrow \min(x) = ?$

- A) 8 B) 9 C) 10 D) 11 E) 12

2. $x \in \mathbb{N}$,
 $\frac{x}{3} - \frac{x}{2} > -1 \Rightarrow \sum x = ?$

- A) 9 B) 10 C) 12 D) 15 E) 21

3. $x, y \in \mathbb{Z}$,
 $-3 < x < 7, -2 < y \leq 6$
 $\Rightarrow \max(x - 2y) = ?$

- A) 7 B) 8 C) 11 D) 12 E) 30

4. $x \in \mathbb{Z}$,
 $2 \leq y < 4$
 $2y - x = 6 \Rightarrow \sum x = ?$

- A) -2 B) 0 C) 1 D) 2 E) 3

5. $2^x = 18, 3^y = 64, 5^z = 117$
 $\Rightarrow ? < ? < ?$

- A) $x < y < z$ B) $x < z < y$
 C) $z < y < x$ D) $z < x < y$
 E) $y < z < x$

6. $x, y, z \in \mathbb{R}^+$,
 $x \cdot y = \frac{3}{5}, y \cdot z = \frac{13}{15}, x \cdot z = \frac{7}{10}$
 $\Rightarrow ? < ? < ?$

- A) $x < y < z$ B) $y < z < x$
 C) $z < y < x$ D) $z < x < y$
 E) $y < x < z$

7. $y \in \mathbb{Z}$,
 $x \geq x^2, 4x - y = 5 \Rightarrow \sum y = ?$

- A) -15 B) -14 C) -13 D) -12 E) -11

8. $y \in \mathbb{Z}$,
 $x^2 < x, 3x - y = 6 \Rightarrow \sum y = ?$

- A) -10 B) -9 C) -7 D) -6 E) -5

9. $3x - 5 > x + 17 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(-\infty, 11)$ B) $(-\infty, 11]$ C) $(11, \infty)$
 D) $[11, \infty)$ E) $(11, 17)$

10. $-3 \leq \frac{2x-3}{5} \leq 7 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(-6, 19)$ B) $[-6, 19)$ C) $[-6, 19]$
 D) $[-3, 7)$ E) $(-3, 5)$

11. $x \in \mathbb{Z},$

$5 < 3 - 2x \leq 9 \Rightarrow \sum x = ?$

- A) -2 B) -5 C) -6 D) -8 E) -10

12. $x, y \in \mathbb{Z},$

$-4 < x < 5, -2 < y < 6,$

$x - 2y = A \Rightarrow \min(A) + \max(A) = ?$

- A) -6 B) -7 C) -8 D) -9 E) -10

13. $\frac{1}{6} < \frac{2}{x-3} < \frac{1}{3} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) (3, 5) B) (3, 15) C) (5, 6)
 D) (6, 15) E) (9, 15)

14. $-\frac{1}{2} < \frac{3}{x+1} < -\frac{1}{8} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $-25 < x < -7$ B) $-23 < x < -6$
 C) $-21 < x < -7$ D) $-21 < x < -5$
 E) $-25 < x < -9$

15. $x \in \mathbb{Z},$

$-9 \leq -2x + 5 < 7 \Rightarrow \sum x = ?$

- A) 25 B) 26 C) 27 D) 28 E) 29

16. $x \in \mathbb{Z},$

$x - 5 < 2x + 3 \leq x + 11 \Rightarrow \sum x = ?$

- A) -8 B) -2 C) 0 D) 2 E) 8



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	D	B	A	C	C	A	B
9	10	11	12	13	14	15	16
C	C	B	B	E	A	D	E

1. $x \in \mathbb{Z}^+$,

$2(x-3) < x+4 \Rightarrow \max(x) + \min(x) = ?$

- A) 2 B) 3 C) 5 D) 10 E) 13

2. $x \in \mathbb{Z}$,

$\frac{x+1}{4} - \frac{x-2}{2} < \frac{2x-3}{6} \Rightarrow \min(x) = ?$

- A) 1 B) 3 C) 4 D) 6 E) 8

3. $3x+1 \leq x+7 < 2x+6 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) (1, 3) B) (0, 4) C) [1, 4]
-
- D) [1, 3] E) (1, 3]

4. $\left. \begin{array}{l} (x^2-3) \in \mathbb{Z} \\ -3 < x < 4 \end{array} \right\} \Rightarrow \max(x^2-3) = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

5. $(x^2 + y) \in \mathbb{Z}$,

$-5 \leq x < 3, -3 \leq y < 5 \Rightarrow \max(x^2 + y) + \min(x^2 + y) = ?$

- A) 28 B) 27 C) 26 D) 25 E) 24

6. $x, y \in \mathbb{Z}$,

$\left. \begin{array}{l} -3 \leq x < 4 \\ -1 \leq y < 2 \end{array} \right\} \Rightarrow \max(3x-2y) = ?$

- A) 9 B) 10 C) 11 D) 12 E) 13

7. $x, y \in \mathbb{R}, (3x-2y) \in \mathbb{Z}$,

$\left. \begin{array}{l} -3 \leq x < 4 \\ -1 \leq y < 2 \end{array} \right\} \Rightarrow \max(3x-2y) = ?$

- A) 9 B) 10 C) 11 D) 12 E) 13

8. $x, y \in \mathbb{R}, (3x+2y) \in \mathbb{Z}$,

$\left. \begin{array}{l} 2 < x < 5 \\ -4 < y < 3 \end{array} \right\} \Rightarrow \min(2x+3y) = ?$

- A) -10 B) -7 C) -4 D) 2 E) 4

9. $x, y \in \mathbb{Z}$,
 $\left. \begin{array}{l} -4 < x \leq 3 \\ 0 \leq y < 5 \end{array} \right\} \Rightarrow \max(2x - y) = ?$
 A) 6 B) 8 C) 10 D) 12 E) 14

10. $x > 0$,
 $\frac{3x-5}{x} > 2 \Rightarrow \text{Ç.K(S.S)} = ?$
 A) (0, 5) B) (5, ∞) C) [5, ∞)
 D) \mathbb{R}^+ E) (0, 5]

11. $x, y, z \in \mathbb{R}$,
 $\left. \begin{array}{l} x^2 \cdot y > 0 \\ y^2 \cdot z < 0 \\ 2x = 3z \end{array} \right\} \Rightarrow ? < ? < ?$
 A) $y < z < x$ B) $y < x < z$
 C) $x < z < y$ D) $x < y < z$
 E) $z < y < x$

12. $a < 0 < c < b \Rightarrow ? < ? < ?$
 A) $\frac{1}{a} > \frac{1}{c} > \frac{1}{b}$ B) $\frac{1}{b} > \frac{1}{c} > \frac{1}{a}$
 C) $\frac{1}{a} > \frac{1}{b} > \frac{1}{c}$ D) $\frac{1}{c} > \frac{1}{b} > \frac{1}{a}$
 E) $\frac{1}{c} > \frac{1}{a} > \frac{1}{b}$

13. $0 < x < y < 1 \Rightarrow ? < \frac{y}{x} < ?$
 A) $0 < \frac{y}{x} < 1$ B) $1 < \frac{y}{x} < 2$
 C) $0 < \frac{y}{x} < 2$ D) $0 < \frac{y}{x} < \infty$
 E) $1 < \frac{y}{x} < \infty$

14. $\left. \begin{array}{l} 1 \leq 2x + 1 \leq 5 \\ -2 \leq 3x - 5 \leq 4 \end{array} \right\} \Rightarrow \max(x) = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4

15. $(x + y), (x - y) \in \mathbb{Z}$,
 $-5 < x + y < 3$,
 $-4 < x - y < 2$
 $\Rightarrow \max(x^2 - y^2) = ?$
 A) 12 B) 11 C) 10 D) 9 E) 8

16. $x + y - 5 = 0$
 $2 < x < 4 \Rightarrow ? < y < ?$
 A) $1 < y < 3$ B) $0 < y < 3$ C) $2 < y < 3$
 D) $3 < y < 4$ E) $3 < y < 5$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	C	E	C	C	C	E	B
9	10	11	12	13	14	15	16
A	B	C	D	E	C	A	A

1. $x \in \mathbb{N}$,

$3x + 7 < 2x + 1 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $(-\infty, 0)$ B) $(0, \infty)$ C) $[-6, \infty)$
 D) $(-\infty, -6)$ E) \emptyset

2. $\frac{x}{2} - 3 < \frac{x+1}{2} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{0\}$ B) $\{1\}$ C) \emptyset
 D) \mathbb{R} E) $\mathbb{R} \setminus \{0\}$

3. $\left. \begin{array}{l} x^2 < x \\ a = x^4 \\ b = x^{-2} \\ c = \frac{1}{x^3} \end{array} \right\} \Rightarrow ? > ? > ?$

- A) $a > b > c$ B) $a > c > b$
 C) $c > b > a$ D) $b > c > a$
 E) $c > a > b$

4. $(x^2 - 4x + 5) \in \mathbb{Z}$,
 $-2 < x \leq 4 \Rightarrow \max(x^2 - 4x + 5) = ?$

- A) 20 B) 19 C) 18 D) 17 E) 16

5. $(2x - y) \in \mathbb{Z}$,

$-3 \leq x < 0, 0 \leq y < 3 \Rightarrow \sum(2x - y) = ?$

- A) -35 B) -36 C) -37
 D) -38 E) -39

6. $(a^2 - b^2) \in \mathbb{Z}$,

$\left. \begin{array}{l} -1 < a < 1 \\ -2 < b \leq 2 \end{array} \right\} \Rightarrow \sum(a^2 - b^2) = ?$

- A) -9 B) -10 C) -11
 D) -12 E) -13

7. $(a \cdot b) \in \mathbb{Z}$,
 $\left. \begin{array}{l} -5 \leq a < 6 \\ -3 \leq b \leq 2 \end{array} \right\} \Rightarrow \max(a \cdot b) = ?$

- A) -18 B) -10 C) 12 D) 15 E) 18

8. $b \in \mathbb{N}$,
 $\left. \begin{array}{l} a + b < 4 \\ b + c < 3 \\ a + c > 2 \end{array} \right\} \Rightarrow \sum b = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

9. $a, b, c \in \mathbb{R}, x \in \mathbb{Z},$

$$3a + 2b - c < 0,$$

$$-2a - b + c < 0,$$

$$a - c = x \Rightarrow \min(x) = ?$$

- A) -4 B) -3 C) 0 D) 1 E) 4

10. $x \in \mathbb{Z},$

$$\frac{5x+3}{4} < \frac{x-1}{2} \Rightarrow \max(x) = ?$$

- A) -4 B) -3 C) -2 D) 1 E) 0

11. $x \in \mathbb{Z},$

$$2 < 1 - \frac{x-1}{2} \leq 5 \Rightarrow \sum x = ?$$

- A) -28 B) -27 C) -24 D) -23 E) -21

12. $x \in \mathbb{Z},$

$$-2x < 2x + 4 < 6 + x \Rightarrow \sum x = ?$$

- A) -4 B) -3 C) 0 D) 1 E) 3

13. $x, y \in \mathbb{R}, A \in \mathbb{Z},$

$$-4 < x < 2, \quad -2 < y < 3,$$

$$A = 4x - 3y \Rightarrow \max(A) + \min(A) = ?$$

- A) -7 B) -8 C) -11 D) -12 E) -13

14. $x, y \in \mathbb{R}, A \in \mathbb{Z},$

$$-2 < x < 3, \quad -3 \leq y < 4$$

$$A = x^2 - 3y \Rightarrow \sum A = ?$$

- A) -42 B) -30 C) -21 D) 87 E) 96

15. $x \in \mathbb{Z}$

$$4 \leq x^2 \leq 16 \Rightarrow \sum x = ?$$

- A) 0 B) 2 C) 4 D) 6 E) 8

16. $\left. \begin{array}{l} -2 < x < 5 \\ -8 < y < 3 \end{array} \right\} \Rightarrow ? < x \cdot y < ?$

A) $-40 < x \cdot y < 16$

B) $-18 < x \cdot y < 36$

C) $-6 < x \cdot y < 18$

D) $12 < x \cdot y < 18$

E) $12 < x \cdot y < 36$

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YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	D	C	E	B	B	D	C
9	10	11	12	13	14	15	16
D	C	B	D	C	D	A	A

1. $-1 \leq x \leq 4$

$\Rightarrow \max(x^2 - 5x + 4) = ?$

- A) 0 B) 10 C) 4 D) 5 E) 1

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

2. $x^2 < x, xy > y$ olsun.

Aşağıdakilerden hangisi kesinlikle doğrudur?

Which of the following is exactly correct?

- A)
- $y - x > 0$
- B)
- $2x + y > 0$
- C)
- $2xy < 0$
-
- D)
- $x^2y > 0$
- E)
- $3x - 5y > 0$

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2020]

3. $\left. \begin{array}{l} -4 \leq x \leq 3 \\ -3 \leq y < 4 \end{array} \right\} \Rightarrow \max(x^2 - 2y) = ?$

- A) 24 B) 22 C) 17 D) 15 E) 3

[GAZİANTEP ÜNİVERSİTESİ – YÖS 2019]

4. $x, y \in \mathbb{Z},$
 $\left. \begin{array}{l} -2 \leq x < 7 \\ -5 < y \leq 13 \end{array} \right\} \Rightarrow \max(2x - 3y) = ?$

- A) 17 B) 7 C) 32 D) 9 E) 24

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2018]

5. $\frac{4}{9} < x < \frac{5}{8}$ olduğuna göre x aşağıdakilerden hangisidir?

Provided that $\frac{4}{9} < x < \frac{5}{8}$, which of the following is the value of x ?

- A)
- $\frac{8}{9}$
- B)
- $\frac{1}{2}$
- C)
- $\frac{1}{3}$
- D)
- $\frac{2}{3}$
- E)
- $\frac{1}{4}$

[HARRAN ÜNİVERSİTESİ – YÖS 2018]

6. $a < 0 < b < 1$

aşağıdakilerden hangisi doğrudur?

Which one of the following is true?

- A)
- $a^2 < b^2$
- B)
- $a + 1 > b$
- C)
- $a \cdot b < b^2$
-
- D)
- $a^2 < a \cdot b$
- E)
- $a = b + 1$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

7. $a, b, c \in \mathbb{Z}, b \in \mathbb{Z}$

$$\left. \begin{array}{l} a^3 \cdot b^2 < 0 \\ b^3 \cdot c^3 > 0 \\ c^5 \cdot a^4 < 0 \end{array} \right\} \Rightarrow a, b, c = ?, ?, ?$$

- A)
- $-,-,-$
- B)
- $-,-,+$
- C)
- $+,+,+$
-
- D)
- $+,+,-$
- E)
- $+,-,-$

[SELÇUK ÜNİVERSİTESİ – YÖS 2017]

8. $a \cdot |a| < 0,$
 $b \cdot |b| > 0$

ise aşağıdakilerden hangisi doğrudur?

Which one of the following is true?

- A)
- $a^3 \cdot b^3 > 0$
- B)
- $a^{15} \cdot b^{15} > 0$
- C)
- $a^7 \cdot b^4 > 0$
-
- D)
- $a^4 \cdot b^7 > 0$
- E)
- $a^{10} \cdot b^{10} < 0$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2016]

9. $x, y \in \mathbb{Z}^+$,
 $\left. \begin{array}{l} 2x + y < 39 \\ y > 5 \end{array} \right\} \Rightarrow \max(x - y) = ?$
 A) 4 B) 8 C) 10 D) 11 E) 12
 [YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2016]

10. $x, y, z \in \mathbb{R}$,
 $\left. \begin{array}{l} x^2 \cdot y^3 \cdot z^4 > 0 \\ x^5 \cdot y^2 \cdot z^6 < 0 \\ x \cdot y \cdot z > 0 \end{array} \right\} \Rightarrow x, y, z = ?, ?, ?$
 A) -, +, - B) -, -, - C) +, -, -
 D) -, -, + E) +, +, +
 [EGE ÜNİVERSİTESİ – YÖS 2016]

11. $\frac{2}{7} < x < \frac{3}{7} \Rightarrow x = ?$
 A) $\frac{1}{14}$ B) $\frac{5}{14}$ C) $\frac{5}{6}$ D) $\frac{1}{4}$ E) $\frac{1}{2}$
 [AFYON KOCATEPE ÜNİVERSİTESİ – YÖS 2016]

12. $a < 0, b < 0, c < 0$,
 $\frac{a}{2} = \frac{b}{3} = 4c \Rightarrow ? < ? < ?$
 A) $c < b < a$ B) $b = c < a$ C) $b < c < a$
 D) $c < a < b$ E) $b < a < c$
 [YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2015]

13. $\frac{2}{5} < x < \frac{3}{4} \Rightarrow x = ?$
 A) $\frac{3}{10}$ B) $\frac{1}{3}$ C) $\frac{1}{2}$ D) $\frac{4}{5}$ E) $\frac{5}{6}$
 [İSTANBUL ÜNİVERSİTESİ – YÖS 2013]

14. $x, y \in \mathbb{Z}$,
 $\left. \begin{array}{l} -3 < x < 6 \\ -5 < y < 1 \end{array} \right\} \Rightarrow \max(x - y) = ?$
 A) 11 B) 9 C) 5 D) -2 E) -8
 [YÖS 2005]

15. $\left. \begin{array}{l} a < 0, \\ a = 2b \\ b = \frac{c}{3} \end{array} \right\} \Rightarrow ? < ? < ?$
 A) $a < b < c$ B) $a < c < b$ C) $b < a < c$
 D) $c < a < b$ E) $c < b < a$
 [YÖS 2003]

16. $a, b, c \in \mathbb{R}^+$,
 $\left. \begin{array}{l} \frac{3a+b}{b} = 2 \\ \frac{b+2c}{c} = 4 \end{array} \right\} \Rightarrow ? < ? < ?$
 A) $a < c < b$ B) $b < c < a$ C) $b < a < c$
 D) $b < c < a$ E) $c < a < b$
 [YÖS 1998]

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1	2	3	4	5	6	7	8
B	C	B	E	B	C	A	D
9	10	11	12	13	14	15	16
C	A	B	E	C	B	D	A

BÖLÜM CHAPTER

9

TARİHSEL NOT / HISTORICAL NOTE

Banach Stefan [1892 - 1945]

Leh matematikçi, fonksiyonel analiz konusuna katkıları olan ilk kişilerdendir.

Polish mathematician who was a major contributor to the subject known as functional analysis.

MUTLAK DEĞER ABSOLUTE VALUE

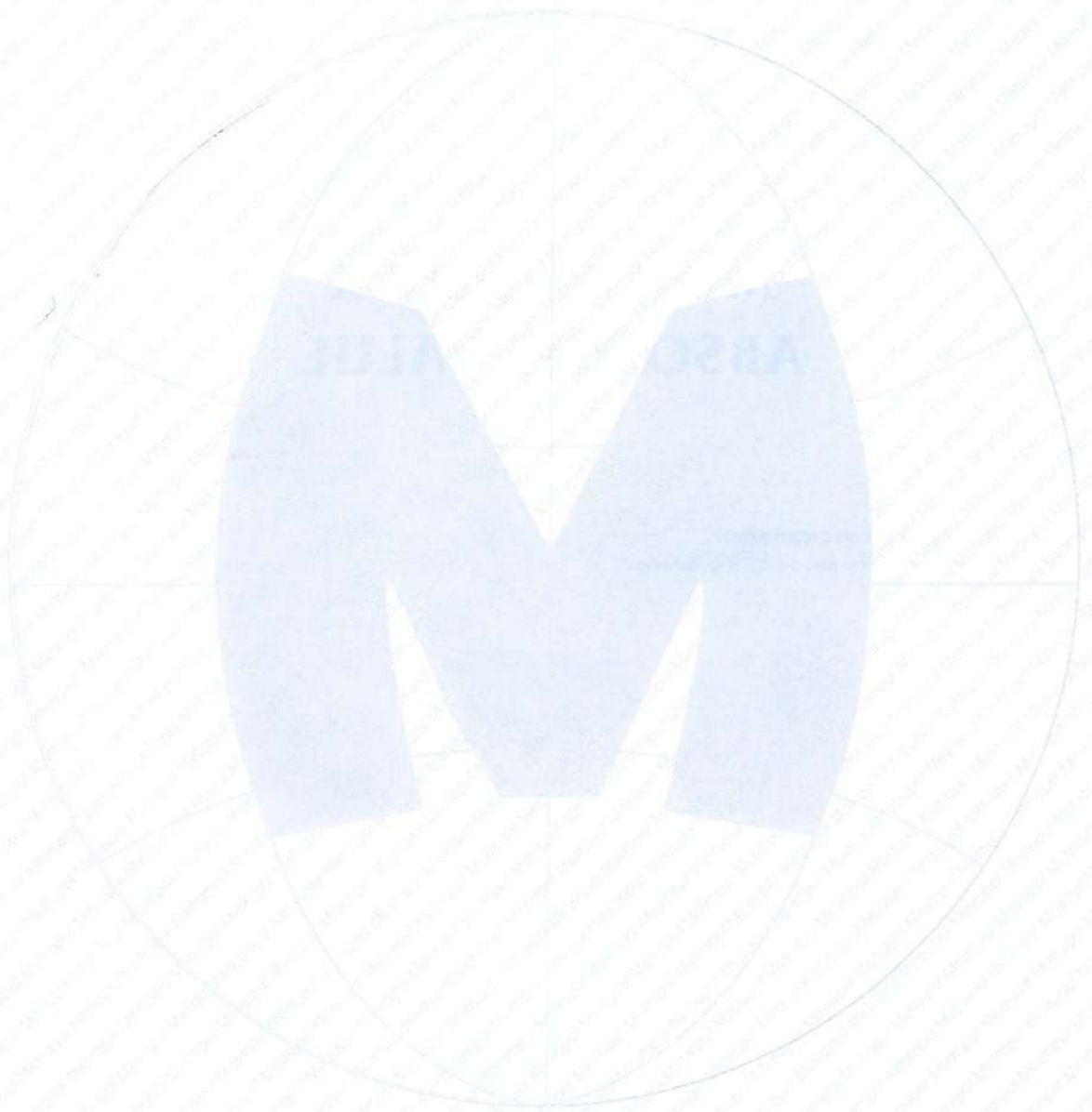
Bu bölüm 176 test sorusu ve 16 YÖS sorusu içermektedir.

This chapter includes 176 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 9

MUTLAK DEĞER / ABSOLUTE VALUE

- Mutlak Değer / Absolute Value 277 - 302



1. $x < 5$

$\Rightarrow |x - 5| + x = ?$

A) $-2x + 5$

B) -5

C) $2x$

D) $2x + 5$

E) 5

2. $1 < x < 4$

$\Rightarrow |x - 1| + |x - 4| = ?$

A) $-2x + 5$

B) -5

C) 5

D) 3

E) $2x - 5$

3. $a < 0 < b < c$

$\Rightarrow |b - c| + |b - a| - |a - c| = ?$

A) $2b - 2c$

B) $2a - 2b$

C) 0

D) $2c - 2a$

E) $2a + 2b$

4. $x > x^2$

$\Rightarrow |x - 1| + |-x| = ?$

A) -1

B) $-2x$

C) 1

D) $2x - 1$

E) $2x + 1$

5. $2^x = 35$

$\Rightarrow |x - 7| - |8 - x| = ?$

A) -1

B) $-2x - 5$

C) 15

D) $2x - 15$

E) $2x + 1$

6. $x < x^3 < 0$

$\Rightarrow \left| x - \left| x - \frac{|x|}{2} \right| \right| = ?$

A) $-5x$

B) $-\frac{5x}{2}$

C) 0

D) $\frac{5x}{2}$

E) $5x$

7. $\left. \begin{array}{l} 3^x = 10 \\ 5^y = \frac{1}{10} \end{array} \right\} \Rightarrow |x - y| - |y + 1| + |x + y| = ?$

A) $x + y$

B) $x + 2y + 1$

C) $2x + y + 1$

D) 1

E) $x - y - 1$

8. $a < |a|$

$\Rightarrow |-a - |a|| - |a| = ?$

A) $-2a$

B) $-a$

C) a

D) $2a$

E) $3a$

9. $|x+y-8| + |x-y-2| = 0$
 $\Rightarrow x \cdot y = ?$

- A) 5 B) 7 C) 9 D) 12 E) 15

10. $\sqrt[4]{2x-8} + |-y-2| + (z+5)^2 = 0 \Rightarrow x+y+z = ?$

- A) -5 B) -3 C) -1 D) 1 E) 3

11. $0 < x < y < z$

$\Rightarrow |x-z| + \sqrt{x^2 - 2xy + y^2} + |y-z| = ?$

- A) -2x B) -2x - 2y C) -2x - 2z
 D) 2z - 2x E) 2y - 2x

12. $a < -3$

$\Rightarrow \sqrt{a^2 + 3a + 4} + \sqrt{a^2 + 6a + 9} = ?$

- A) -a - 3 B) -a - 1 C) a - 1
 D) 1 - a E) 3 - a

13. $x < 0, y > 0$

$\Rightarrow \sqrt{x^2 - 2xy + y^2} + \sqrt[4]{x^4} + \sqrt[4]{y^4} = ?$

- A) 2x - 2y B) 2y - 2x C) 0
 D) 2x + 2y E) -2x - 2y

14. $a, b, c \in \mathbb{Z}^+$,

$\frac{1}{a} < \frac{1}{b} < \frac{1}{c} \Rightarrow |a-b| - |b-c| + |a-c| = ?$

- A) 2a - 2b B) 2a - 2c
 C) 2a + 2b - c D) 2c - 2b
 E) 2b + 2c - 2a

15. $|\sqrt{48} - 5| - |\sqrt{75} - 6| + |\sqrt{12} - 3| = ?$

- A) $-\sqrt{3} - 2$ B) $-2\sqrt{3} - 4$
 C) $\sqrt{3} - 2$ D) $2 - 2\sqrt{3}$
 E) $4\sqrt{3} - 4$

16. $x < 0 \Rightarrow \sqrt{x^2 - 2x + 1} - \sqrt{x^2 - 10x + 25} = ?$

- A) -6 B) -4 C) -2x - 4
 D) -2x - 6 E) 2x - 5



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	D	C	C	A	B	C	C
9	10	11	12	13	14	15	16
E	B	D	B	B	A	C	B

1. $x < 0 < y,$

$$\Rightarrow x + y + \sqrt{x^2 - 2xy + y^2} = ?$$

- A) 0 B) 2x C) 2y D) x + y E) 2x + 2y

5. $a < b < 0$

$$\Rightarrow \left| \frac{a-b}{b-a} \right| + \left| \frac{a^2-b^2}{a+b} \right| = ?$$

- A)
- $-a + 1$
- B)
- $-a + b$
- C)
- $a + b$
-
- D)
- $-a - b + 1$
- E)
- $-a + b + 1$

2. $\left. \begin{array}{l} |x| > x \\ x^3 \cdot y < 0 \end{array} \right\} \Rightarrow \sqrt[3]{(x-y)^3} + |x-y| = ?$

- A)
- $-x$
- B)
- $-y$
- C) 0 D) x E) y

6. $\left. \begin{array}{l} a + b < b \\ ab < 0 \end{array} \right\}$ ve / and $|a-2| - |3+b| - |a| - |2b| = -10$

$$\Rightarrow b = ?$$

- A)
- $2a + 1$
- B)
- $2a + 2$
- C) 1
-
- D) 2 E) 3

3. $a < 0 < b < c,$

$2b = |a|$

$$\Rightarrow \frac{|a-b| - |b-c| - |a|}{|a| - |c|} = ?$$

- A)
- -2
- B)
- -1
- C) 0 D) 1 E) 2

7. $\sqrt{y^2 + 4y + 4} + |2x - 3y| = 0 \Rightarrow x + y = ?$

- A)
- -7
- B)
- -5
- C)
- -3
- D) 3 E) 5

4. $a, b \in \mathbb{R}^+, 2 < \frac{a}{b} < 3$

$$\Rightarrow |a + |a - 3b|| = ?$$

- A) a B) 3a C) b D) 2b E) 3b

8. $|3a - b| + \sqrt{9a^2 - 6a + 1} = 0 \Rightarrow a + b = ?$

- A)
- $\frac{1}{2}$
- B)
- $\frac{2}{3}$
- C)
- $\frac{3}{4}$
- D)
- $\frac{3}{2}$
- E)
- $\frac{4}{3}$

9. $|a - 2b| + |b - 3c| + |c - 2a| = 0$

$\Rightarrow 3a + 4b + 2c = ?$

- A) 48 B) 52 C) 60 D) 64 E) 72

10. $\left. \begin{array}{l} a - b < 2c \\ |a - b - 2c| = 3b - a \end{array} \right\} \Rightarrow \frac{2c - b}{c + b} = ?$

- A) $-\frac{2}{3}$ B) $-\frac{1}{2}$ C) $\frac{1}{2}$ D) $\frac{2}{3}$ E) $\frac{3}{4}$

11. $a > 0,$

$a + b < 0,$

$b \cdot |a| - a \cdot |b| - |a - b| = -6 \Rightarrow a \cdot b = ?$

- A) -4 B) -2 C) 2 D) 3 E) 4

12. $a, b, c \in \mathbb{R}^+, \frac{1}{c} < \frac{1}{b} < \frac{1}{a}$

$|a - c| + |b - a| + |c - b| = ?$

- A) $2a - 2c$ B) $2a + 2c$ C) $2c - 2a$
D) $c - a$ E) $c - 2a$

13. $|2x - 1| = 7 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-5, 3\}$ B) $\{-3, 4\}$ C) $\{-5, 4\}$
D) $\{3, 4\}$ E) $\{4, 5\}$

14. $|x - 2a| = 5, \text{Ç.K(S.S)} = \{x_1, x_2\}$

$x_1 + x_2 = 24 \Rightarrow a = ?$

- A) 3 B) 4 C) 5 D) 6 E) 8

15. $|x - a| = a + 3, \text{Ç.K(S.S)} = \{x_1, x_2\}$

$x_1 \cdot x_2 = -21 \Rightarrow a = ?$

- A) -2 B) -1 C) 1 D) 2 E) 3

16. $|a - b| = 3,$

$|x - a + b| = 7 \Rightarrow \sum x = ?$

- A) -3 B) -2 C) 0 D) 2 E) 3


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	C	D	E	E	E	B	E
9	10	11	12	13	14	15	16
D	C	B	C	B	D	D	C

1. $|2x + 4| + |8 - y| = A \Rightarrow \min(A)$ için / for $x + y = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

2. $\frac{48}{|x-1|+|2x-4|} = A \Rightarrow \max(A) = ?$
 A) 48 B) 36 C) 24 D) 12 E) 16

3. $||x - 6| - 4| = 7 \Rightarrow \sum x = ?$
 A) 5 B) 7 C) 10 D) 12 E) 16

4. $x \in \mathbb{R}$,
 $|x + 1| + |x + 2| + |x + 3| = A \Rightarrow \min(A) = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4

5. $|2x - 13| = 3x - 8 \Rightarrow \text{Ç.K(S.S)} = ?$
 A) $\{\frac{21}{5}\}$ B) $\{\frac{21}{5}, 5\}$ C) $\{-5, \frac{21}{5}\}$
 D) $\{0\}$ E) $\{-5\}$

6. $|2x - 2| + |5x - 5| - |6x - 6| = 5 \Rightarrow \sum x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

7. $|\frac{1}{x} - 1| = 4 \Rightarrow \sum x = ?$
 A) $-\frac{1}{15}$ B) $-\frac{2}{15}$ C) $-\frac{1}{5}$
 D) $-\frac{4}{15}$ E) $-\frac{1}{3}$

8. $|2x - 1| - |x + 4| = 0 \Rightarrow \sum x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

9. $|x + 1| + |3x + 3| = 8 \Rightarrow \sum x = ?$
 A) -1 B) -2 C) -3 D) -4 E) -5

10. $a^2 + |a| - 6 = 0 \Rightarrow \prod a = ?$
 A) 8 B) 4 C) 0 D) -4 E) -8

11. $|x^2 - 2x + 4| + 8 = 0 \Rightarrow \text{Ç.K(S.S)} = ?$
 A) {4} B) {-2} C) {0}
 D) {1} E) \emptyset

12. $|x^2 - 1| - 6|x + 1| = 0 \Rightarrow \sum x = ?$
 A) -6 B) -4 C) -2 D) 1 E) 2

13. $|x^2 - 6x + 9| - 2|x^2 - 9| = 0 \Rightarrow \sum x = ?$
 A) -10 B) -9 C) -8 D) -7 E) -6

14. $|7 - |8 - |x - 1|| = 8 \Rightarrow \sum x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

15. $||x - 2| - 4| = 12 \Rightarrow \sum x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

16. $x \in \mathbb{Z},$
 $|2x - |x - 2|| = 8 \Rightarrow \sum x = ?$
 A) -2 B) -4 C) -6 D) 4 E) 6



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1	2	3	4	5	6	7	8
C	A	D	C	A	B	B	D
9	10	11	12	13	14	15	16
B	D	E	D	D	B	D	D

1. $|\sqrt{19} - 4| + |4 - \sqrt{19}| = ?$

- A) 8
B) $2\sqrt{19}$
C) $2\sqrt{19} - 4$
D) $2\sqrt{19} - 8$
E) $8 - 2\sqrt{19}$

2. $2 < x < 5 \Rightarrow |x - 5| + |x - 2| = ?$

- A) 1
B) 2
C) 3
D) 4
E) 5

3. $a < b < c \Rightarrow |b - a| + |a - c| + |c - b| = ?$

- A) 2b
B) $2c - 2a$
C) $a - c$
D) $b - 2a$
E) $2c - b$

4. $x < 0 < y \Rightarrow |x - y| + |y - x| + |x \cdot y| = ?$

- A) $2x - y$
B) $2x - 2y + xy$
C) $2y - 2x - xy$
D) $xy - 2x$
E) $xy - y - x$

5. $a < b < 0 \Rightarrow |b - a| + |a + b| + |a - b| = ?$

- A) $b - 3a$
B) $b - 2a$
C) $b - a$
D) $a - b$
E) $a - 2b$

6. $x < 0 \Rightarrow |x| + |-x| - |-2x| = ?$

- A) $-2x$
B) $-x$
C) 0
D) x
E) $2x$

7. $x < 0 < y \Rightarrow \sqrt{x^2} + \sqrt{(x-y)^2} - \sqrt{y^2} = ?$

- A) $-2x$
B) $-x$
C) x
D) y
E) $2y$

8. $-2 < x < 2 \Rightarrow \sqrt{x^2 - 4x + 4} + \sqrt{x^2 + 4x + 4} = ?$

- A) 1
B) 2
C) 3
D) 4
E) 5

9. $A = |2x - 11| \Rightarrow \min(A) = ?$

- A) -11 B) -1 C) 0
D) 1 E) 11

10. $A = |x - 3| + |5 - x| \Rightarrow \min(A) = ?$

- A) -2 B) 0 C) 1
D) 2 E) 5

11. $A = \frac{24}{|x-2|+|3x-8|} \Rightarrow \max(A) = ?$

- A) 4 B) 6 C) 8
D) 36 E) 14

12. $A = |2x - 5|, 4x + 3y + 3 = 28$
 $\Rightarrow \min(A) \text{ için } / \text{ for } y = ?$

- A) 2 B) 3 C) 4
D) 5 E) 6

13. $x < |x| = y,$

$|y - x| + |x| + |y| - |x| = 9 \Rightarrow x = ?$

- A) -3 B) -2 C) -1
D) 0 E) 3

14. $|2x + y - 3| + |x - 3y + 2| = 0 \Rightarrow x + y = ?$

- A) -2 B) 0 C) 1
D) 2 E) 4

15. $|x - 5| + |2y - 8| + |3z - 6| = 0 \Rightarrow x - y + z = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

16. $|x - 3| = 3 - x \Rightarrow ? < x < ?$

- A) $-\infty < x < 3$
B) $-\infty < x \leq 3$
C) $-3 < x < 3$
D) $-3 \leq x \leq 3$
E) $0 < x \leq 3$



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1	2	3	4	5	6	7	8
D	C	B	C	A	C	A	D
9	10	11	12	13	14	15	16
C	D	D	D	A	D	C	B

1. $x = 3 \Rightarrow |x - 5| - |x - 4| + |x + 2| = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

2. $a < 0 < b < c$

$\Rightarrow |a - c| + |c - a| - |b - c| + |a| - |b + c| = ?$

- A)
- $-3a$
- B)
- $-2a$
- C)
- $-a$
-
- D)
- $b - a$
- E)
- $c - a$

3. $3 < x < 5 \Rightarrow |3 - x| - |x - 6| = ?$

- A)
- -9
- B)
- -3
- C) 3 D) 9 E)
- $2x - 9$

4. $-4 < x < 3 \Rightarrow |x + 5| + |x - 7| = ?$

- A)
- $2x - 2$
- B)
- $2x + 12$
- C)
- -2
-
- D) 2 E) 12

5. $x + 3 = 0 \Rightarrow |x - |x - |2x|| = ?$

- A) 0 B) 3 C) 6 D) 9 E) 12

6. $2 < x < 5, -10 < y < -5$

$\Rightarrow \frac{|5 - x| + |y + 5|}{x + y} = ?$

- A)
- -2
- B)
- -1
- C) 1
-
- D) 2 E)
- $\frac{x + y + 10}{x + y}$

7. $5 < x < 9 \Rightarrow |x - 10| + |5 - x| = ?$

- A)
- $2x - 5$
- B)
- $2x + 5$
- C)
- -5
-
- D) 5 E) 10

8. $x \in \mathbb{R},$

$|x - 4| + |2x - 8| = 18 \Rightarrow \sum x = ?$

- A)
- -12
- B)
- -8
- C) 8 D) 10 E) 12

9. $|x - 5y + 8| = -|3y - 6| \Rightarrow x + y = ?$

- A) 2 B) 4 C) 6 D) 8 E) 10

10. $x < y < z, z \cdot x > y \cdot z$

$\Rightarrow |x - z| - \sqrt{x^2 + 2xy + y^2} - (x + y) + |z| = ?$

- A) $-x$ B) y C) $x + y$
D) $x - z$ E) $z - x$

11. $x \in \mathbb{Z},$

$\left| \frac{4x-3}{3} \right| \leq 3 \Rightarrow \sum x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

12. $|x| < 3, y = \frac{4x}{3} - 1 \Rightarrow ? < y < ?$

- A) $-5 < y < 5$ B) $-4 < y < 4$
C) $-5 < y < 3$ D) $-4 < y < 5$
E) $-3 < y < 5$

13. $x, y, m \in \mathbb{Z},$

$|m - 2x| + |x - y + 7| + |y - 3| = 0 \Rightarrow m = ?$

- A) -8 B) -6 C) -4 D) 4 E) 6

14. $x \in \mathbb{Z},$

$||x - 4| - 5| = 6 \Rightarrow \sum x = ?$

- A) 12 B) 10 C) 8 D) 6 E) 4

15. $a < |a| \Rightarrow |a + |2a|| - |-2a| = ?$

- A) $-3a$ B) $-2a$ C) $-a$ D) a E) $2a$

16. $-3 < x < 8,$

$|x - 8| + 2|x + 3| = 13 \Rightarrow x = ?$

- A) -3 B) -2 C) -1 D) 1 E) 3



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1	2	3	4	5	6	7	8
C	A	E	E	E	B	D	C
9	10	11	12	13	14	15	16
B	A	E	C	A	C	D	C

1. $x < 0 < y \Rightarrow \frac{|x|}{x} - \frac{|y|}{y} = ?$

- A) -2 B) -1 C) 0
D) 1 E) 2

5. $a < 0 < b \Rightarrow \frac{|a-2b|}{|-2b|+|-a|} = ?$

- A) -a B) a C) -1
D) 1 E) 2

2. $a < 5 \Rightarrow |a + |a - 5|| = ?$

- A) a - 5 B) 5 - a C) a
D) 5 E) 7

6. $|x + 3| = 5 \Rightarrow \sum x = ?$

- A) -10 B) -8 C) -6
D) -4 E) -2

3. $a < 0, b > 0, c < 0$

$\Rightarrow |b-a| + \sqrt[4]{a^4} + \sqrt[3]{8c^3} - |c-b| = ?$

- A) b - a B) 3c - 2a C) 4c - a
D) 2a E) a

7. $|2x + 4| = 6 \Rightarrow \sum x = ?$

- A) -4 B) -1 C) 2
D) 4 E) 6

4. $A = |2x - y| \Rightarrow \min(A) \text{ için / for } \frac{y+x}{y-x} = ?$

- A) -2 B) -1 C) 1
D) 2 E) 3

8. $|3x - 8| = 4 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {4} B) $\left\{\frac{4}{3}\right\}$ C) {-4}
D) {4, -4} E) $\left\{\frac{4}{3}, 4\right\}$

9. $|3x - 2| + 3 = 4 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) \emptyset B) $\{1\}$ C) $\left\{\frac{1}{3}\right\}$
 D) $\left\{\frac{1}{3}, 1\right\}$ E) $\{1, 3\}$

10. $2|x - 1| + 4 = 8 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-3, -1\}$ B) $\{-1, 3\}$ C) $\{-1\}$
 D) $\{1\}$ E) $\{3\}$

11. $|x^2 - 2| = 7 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-3\}$ B) $\{3\}$ C) $\{-3, 3\}$
 D) $\{-5, 9\}$ E) $\{9\}$

12. $||x - 1| + 1| = 3 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-1, 3\}$ B) $\{-4, 4\}$ C) $\{-1, 4\}$
 D) $\{-4, -1, 3\}$ E) $\{-4, -1, 3, 4\}$

13. $2|x - 3| + |3 - x| = 12 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-1, 7\}$ B) $\{-7, 1\}$ C) $\{-1\}$
 D) $\{-7\}$ E) $\{7\}$

14. $|x - 2| + |6 - 3x| = 8 \Rightarrow \sum x = ?$

- A) 1 B) 2 C) 3
 D) 4 E) 5

15. $||x - 3| + 4| = 7 \Rightarrow \sum x = ?$

- A) 6 B) 4 C) 2
 D) -1 E) -3

16. $|4x - 12| = x - 4 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\left\{\frac{8}{3}\right\}$ B) $\left\{\frac{16}{5}\right\}$ C) $\left\{\frac{8}{3}, \frac{16}{5}\right\}$
 D) \emptyset E) $\left\{\frac{10}{3}, 7\right\}$



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1	2	3	4	5	6	7	8
A	D	B	E	D	C	A	E
9	10	11	12	13	14	15	16
D	B	C	A	A	D	A	D

1. $x < 0 < y \Rightarrow \frac{3|x-y|}{|y+|x||} = ?$

- A) $-3x$ B) $-3y$ C) $x+y$
D) -3 E) 3

2. $x \in \mathbb{Z}$,

$$|3x - 15| + |10 - 2x| \geq 25 \Rightarrow \sum x = ?$$

- A) -55 B) -45 C) 0 D) 45 E) 55

3. $3 < x < 4 < y < 5$

$$\Rightarrow |5x + 4y - 30| + |4x + 5y - 42| + |x - y| = ?$$

- A) $10x + 8y - 72$ B) $10x - 12$ C) $8y - 12$
D) -12 E) 12

4. $x < 0$

$$\Rightarrow \sqrt{4x^2} + \sqrt[3]{-27x^3} + \sqrt[4]{(-x)^4} = ?$$

- A) $-6x$ B) $-4x$ C) $-2x$
D) $2x$ E) $6x$

5. $|3x - y - 9| + |2x + 3y - 17| = 0 \Rightarrow x^2 + y^2 = ?$

- A) 16 B) 18 C) 20 D) 25 E) 36

6. $4 < a < 8 \Rightarrow \frac{|a-4| - |a+6|}{|a+3| - |a-2|} = ?$

- A) $a - 2$ B) $a + 2$ C) -2
D) 0 E) 2

7. $x \in \mathbb{Z}$,

$$3 < |4 - x| < 6 \Rightarrow \sum x = ?$$

- A) 18 B) 16 C) 14 D) 9 E) 8

8. $3^x = 108 \Rightarrow |2x - 10| + 3|x - 11| + x = ?$

- A) $2x + 7$ B) $2x + 5$ C) $2x + 3$
D) $2x - 1$ E) $2x - 3$

9. $x \in \mathbb{R}$,

$|x+2| + |x-4| + |x-6| = A \Rightarrow \min(A) = ?$

- A) 4 B) 6 C) 8 D) 10 E) 14

10. $x \in \mathbb{Z}$,

$|2x-3| > 5 \Rightarrow \sum x = ?$

- A) -9 B) -7 C) -3 D) 7 E) 9

11. $|3x-6| + |x^2-4| = 0 \Rightarrow |x-4| + |4-x| = ?$

- A) 2 B) 4 C) 6 D) 8 E) 12

12. $x, y \in \mathbb{Z}$,

$|2x+3| < 7, |y-2| < 5$

$3x+2y = A \Rightarrow \max(A) = ?$

- A) 6 B) 9 C) 12 D) 15 E) 18

13. $x, y \in \mathbb{R}, y = x + 3$,

$m|x-y| + 3|y-x| = 15 \Rightarrow m = ?$

- A) -2 B) -1 C)
- $\frac{1}{2}$
- D) 1 E) 2

14. $|6-|5-|x-3|| = 9 \Rightarrow \sum x = ?$

- A) 6 B) 8 C) 12 D) 17 E) 23

15. $3x - y = 34, |x - 6y| = A$
 $\Rightarrow \min(A)$ için / for $x = ?$

- A) 8 B) 12 C) 14 D) 16 E) 18

16. $x < y < 0$,

$|x+y| - |x-y| = 24 \Rightarrow y = ?$

- A) -12 B) -10 C) -8 D) -6 E) -4



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1	2	3	4	5	6	7	8
E	B	E	A	D	C	B	A
9	10	11	12	13	14	15	16
C	A	B	D	E	A	B	A

1. $|2x - 3| = 1 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {1} B) {2} C) {1, 2}
 D) {-1} E) {-2, -1}

5. $|x + 2| - 3x + 2 = 0 \Rightarrow \text{ÇK(SS)} = ?$

- A) \emptyset B) {2} C) {0}
 D) {-2, 0} E) {0, 2}

2. $|4x - 1| + 6 = 9 \Rightarrow \sum x = ?$

- A) -1 B) $-\frac{1}{2}$ C) 0
 D) $\frac{1}{2}$ E) 1

6. $\left. \begin{array}{l} |a| + 5 = b \\ |a| + |b - 5| = 4 \end{array} \right\} \Rightarrow b = ?$

- A) 8 B) 7 C) 6
 D) 3 E) 2

3. $|2x + 1| = 2x - 5 \Rightarrow \text{ÇK(SS)} = ?$

- A) {1} B) $\{\frac{1}{7}\}$ C) $\{\frac{1}{7}, 1\}$
 D) {-1} E) \emptyset

7. $|2x - 3| = |x + 3| \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {0} B) {-3} C) {6}
 D) {0, 6} E) {-6, 0}

4. $|2x - 1| = x + 2 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-3, -\frac{1}{3}\}$ B) $\{-\frac{1}{3}\}$ C) {3}
 D) $\{-3, \frac{1}{3}\}$ E) $\{-\frac{1}{3}, 3\}$

8. $x \in \mathbb{Z},$
 $|3 - 2x| < 7 \Rightarrow \sum x = ?$

- A) 12 B) 9 C) 7
 D) 4 E) 2

9. $\left|\frac{x+1}{3}\right| < 1 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) (-4, 2) B) [-4, 2) C) (0, 2)
D) (-4, 0) E) (-4, 2]

10. $x, y \in \mathbb{Z},$
 $\left. \begin{array}{l} |3x-7| < 5 \\ |2y+5| \leq 3 \end{array} \right\} \Rightarrow \min(x-2y) = ?$

- A) -1 B) 0 C) 1
D) 2 E) 3

11. $x \in \mathbb{Z},$
 $1 \leq |2x+3| \leq 5 \Rightarrow \sum x = ?$

- A) -9 B) -8 C) -6
D) -4 E) -2

12. $||x+2|+1| < 5 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) (-6, 2) B) (-6, -2) \cup (-2, 2)
C) (-2, 2) D) (-6, -2)
E) (-2, 6)

13. $|x^2 - 16| + 3|x + 4| = 0 \Rightarrow \sum x = ?$

- A) -5 B) -4 C) -1
D) 2 E) 4

14. $|x-2| \leq |x+4| \Rightarrow \text{Ç.K(S.S)} = ?$

- A) (-1, ∞) B) (-1, 1) C) [-1, ∞)
D) [-1, 1) E) ($-\infty$, -1]

15. $|x-3|x^2-9| = 1 \Rightarrow \sum x = ?$

- A) 1 B) 3 C) 5
D) 6 E) 9

16. $x \in \mathbb{R}^+,$
 $|8-2x| > 14 \Rightarrow \max(x) = ?$

- A) -6 B) -4 C) -3 D) -2 E) -1


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1	2	3	4	5	6	7	8
C	D	E	E	B	B	D	B
9	10	11	12	13	14	15	16
A	E	A	A	B	C	B	B

1. $\frac{72}{|x+3|+|2x-6|} = A \Rightarrow \max(A) = ?$
 A) 12 B) 18 C) 24 D) 25 E) 36

2. $||x-1|-4| = 6 \Rightarrow \sum x = ?$
 A) 0 B) 2 C) 4 D) 6 E) 19

3. $x, y \in \mathbb{R}^+, 1 < y < x,$
 $|y-1| + |y-x| = 7 \Rightarrow x = ?$
 A) 4 B) 5 C) 6 D) 7 E) 8

4. $y \in \mathbb{Z}, |x-1| < 5,$
 $x-y+3=0 \Rightarrow \sum y = ?$
 A) 21 B) 28 C) 33 D) 35 E) 36

5. $|2x-4| + |x+2| = 8 \Rightarrow \sum x = ?$
 A) -4 B) $-\frac{4}{3}$ C) $\frac{4}{3}$
 D) $\frac{10}{3}$ E) $\frac{14}{3}$

6. $|3x-2| \leq 1,$
 $3 < |x+4| \Rightarrow \text{Ç.K(S.S)} = ?$
 A) $(\frac{1}{3}, 1]$ B) $[\frac{1}{3}, 1]$ C) $(-1, 1]$
 D) $(-2, 2)$ E) $(0, 1]$

7. $|x-3| - 3x = 12 \Rightarrow \sum x = ?$
 A) $-\frac{39}{4}$ B) $-\frac{15}{2}$ C) $-\frac{15}{4}$
 D) $-\frac{9}{4}$ E) $-\frac{1}{4}$

8. $|\frac{2}{x}-1| = 3 \Rightarrow \sum x = ?$
 A) -1 B) $-\frac{1}{2}$ C) 0 D) $\frac{1}{2}$ E) 1

9. $|x-4| + |x+2| = 7 \Rightarrow \sum x = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

10. $x \in \mathbb{Z}$,

$-1 \leq |x-3| < 5 \Rightarrow \sum x = ?$

- A) 9 B) 12 C) 27 D) 32 E) 36

11. $\frac{6}{|x-2|+|2x-1|} = A \Rightarrow \max(A) = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

12. $|x+1| \leq 5$,

$2x+3y=0 \Rightarrow ? \leq y \leq ?$

- A) $[-\frac{8}{3}, 6]$ B) $[-\frac{8}{3}, 4]$ C) $[\frac{8}{3}, 6]$
 D) $[\frac{8}{3}, 7]$ E) $[-6, \frac{8}{3}]$

13. $|x-1| + |x+5| = 5 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{-\frac{9}{2}\}$ B) $\{-\frac{9}{2}, \frac{1}{2}\}$ C) $\{\frac{1}{2}\}$
 D) \mathbb{R} E) \emptyset

14. $||2+x|+3| \leq 6 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) (-5, 1) B) (-5, -1] C) [-5, -1]
 D) [-5, 1] E) [-5, 5]

15. $x = |y+1| + 3$

$|y+1| + |2x-6| = 12 \Rightarrow x = ?$

- A) 4 B) 6 C) 7 D) 8 E) 9

16. $x \in \mathbb{Z}$,

$|\frac{1}{x-3}| \geq \frac{1}{5} \Rightarrow \sum x = ?$

- A) 18 B) 24 C) 26 D) 28 E) 30


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1	2	3	4	5	6	7	8
A	B	E	E	C	B	D	B
9	10	11	12	13	14	15	16
E	C	E	B	E	D	C	E

1. $|3x - 3| + 6 = |1 - x| \Rightarrow \text{Ç.K(S.S)} = ?$

- A)
- \emptyset
- B) 1 C) 2 D) 3 E) R

2. $|2x - 1| + |4x - 2| + |6x - 3| = 30 \Rightarrow \text{Ç.K(S.S)} = ?$

- A)
- $\{-3, -2\}$
- B)
- $\{-2, 0\}$
- C)
- $\{-2, 3\}$
-
- D)
- $\{0, 2\}$
- E)
- $\{2, 3\}$

3. $\sqrt{x^2 + 4x + 4} + |2x + 4| = 6 \Rightarrow \sum x = ?$

- A) -6 B) -4 C) 0 D) 4 E) 6

4. $|x^2 - 1| - 4|x - 1| = 0 \Rightarrow \prod x = ?$

- A) -15 B) -9 C) 9 D) 12 E) 15

5. $y < x < 0,$

$|x - y| = 6,$

$|x - 2| = 20 \Rightarrow y = ?$

- A) -36 B) -24 C) -18 D) -12 E) -10

6. $|a - b| = 1,$

$|2x - a + b| = 7 \Rightarrow \sum x = ?$

- A) -8 B) -6 C) 0 D) 6 E) 8

7. $||x - 4| - 5| = 5 \Rightarrow \sum x = ?$

- A) 3 B) 6 C) 9 D) 12 E) 15

8. $||2x - 3| - 6| = 9 \Rightarrow \text{Ç.K(S.S)} = ?$

- A)
- $\{-9, -6\}$
- B)
- $\{-9, 0\}$
- C)
- $\{-6, 3\}$
-
- D)
- $\{0, 6\}$
- E)
- $\{-6, 9\}$

9. $x \in \mathbb{N}^+$,

$$|3x - 12| = -3x + 12 \Rightarrow \sum x = ?$$

- A) 3 B) 5 C) 7 D) 10 E) 16

10. $|x - 1| = 3x - 2 \Rightarrow \text{Ç.K(S.S)} = ?$

- A)
- $\left\{\frac{-1}{2}\right\}$
- B)
- $\left\{-\frac{2}{3}\right\}$
- C)
- $\left\{-\frac{3}{4}\right\}$
- D)
- $\left\{\frac{2}{3}\right\}$
- E)
- $\left\{\frac{3}{4}\right\}$

11. $x + 2|x - 1| = 4 \Rightarrow \sum x = ?$

- A) -5 B) -3 C) 0 D) 3 E) 5

12. $|x + 4| = |x - 1| \Rightarrow x = ?$

- A)
- $-\frac{4}{3}$
- B)
- $-\frac{3}{2}$
- C)
- $-\frac{1}{2}$
- D)
- $\frac{3}{2}$
- E)
- $\frac{4}{3}$

13. $|2x - 3| = |x + 1| \Rightarrow \text{Ç.K(S.S)} = ?$

- A)
- $\left\{-\frac{2}{3}, 1\right\}$
- B)
- $\left\{-\frac{2}{3}, 2\right\}$
- C)
- $\left\{\frac{2}{3}, 1\right\}$
-
- D)
- $\left\{\frac{2}{3}, 3\right\}$
- E)
- $\left\{\frac{2}{3}, 4\right\}$

14. $|x - 3| + |x - 2| = 9 \Rightarrow \sum x = ?$

- A) 3 B) 5 C) 7 D) 10 E) 15

15. $|2x - |x - 1|| = 4 \Rightarrow \sum x = ?$

- A) 0 B) 2 C) 3 D) 5 E) 7

16. $x \cdot |x - 1| = 12 \Rightarrow \text{ÇK(SS)} = ?$

- A) {1} B) {2} C) {3} D) {4} E) {5}



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	C	B	A	B	C	D	E
9	10	11	12	13	14	15	16
D	E	C	B	E	B	B	D

1. $\frac{36}{|x-2|+|x-4|} = A \Rightarrow \max(A) = ?$

- A) 6 B) 9 C) 12 D) 18 E) 36

2. $3^a = 12 \Rightarrow |a-2| + |3-a| = ?$

- A) 2a B) a C) 0 D) 1 E) 5

3. $x \in \mathbb{R}^+$,

$A = |x-2y| + |y-4z|$

$\Rightarrow \min(A)$ için / for? <? <?

- A) $x < y < z$ B) $x < z < y$ C) $y < x < z$
D) $z < x < y$ E) $z < y < x$

4. $|2-\sqrt{7}| + |4-\sqrt{7}| = ?$

- A) $-2 + 2\sqrt{7}$ B) $6 - 2\sqrt{7}$ C) -2
D) 2 E) 6

5. $0 < x < \frac{2}{5}$

$\Rightarrow |5x-2| + |-x-1| = ?$

- A) $-6x+3$ B) $-4x-1$ C) $-6x-1$
D) $-4x+3$ E) $4x-3$

6. $|x^2-x-6| + 2|x-3| = 0 \Rightarrow x = ?$

- A) -3 B) -1 C) 0 D) 1 E) 3

7. $|3x-4| = 5 \Rightarrow \sum x = ?$

- A) $\frac{8}{3}$ B) $\frac{10}{3}$ C) $\frac{14}{3}$ D) $\frac{16}{3}$ E) $\frac{19}{3}$

8. $|a-b| = 7,$

$|b+2| = 4 \Rightarrow \sum a = ?$

- A) -10 B) -8 C) -6 D) 8 E) 10

9. $A = |2x - 3y|$

$\Rightarrow \min(A)$ için / for $\frac{4x+y}{4y} = ?$

- A) $\frac{5}{2}$ B) $\frac{5}{4}$ C) $\frac{7}{2}$ D) $\frac{7}{4}$ E) $\frac{9}{4}$

10. $2|x| - |x - 1| = 2 \Rightarrow \sum x = ?$

- A) -4 B) -2 C) 0 D) 2 E) 4

11. $x < 0,$

$|x| + |-x| - |2x| = A \Rightarrow \sum A = ?$

- A) -4x B) -2x C) 0 D) 2x E) 4x

12. $a < 0 < b,$

$|a| < |b| \Rightarrow |-a - b| - |b + a| = ?$

- A) -2a B) -2b C) 0 D) 2a E) 2b

13. $x^2 - 4|x| - 12 = 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) {-6,6} B) {-6,0} C) {0,6} D) {-6} E) {-6}

14. $x \in \mathbb{Z},$

$3 < |2x + 1| < 11 \Rightarrow \sum x = ?$

- A) -5 B) -3 C) 5 D) 7 E) 10

15. $|x^2 - 4x + 4| < 0 \Rightarrow \text{Ç.K(S.S)} = ?$

- A) \emptyset B) {-2} C) {2} D) {-2,2} E) R

16. $|x - 1| < 5 \Rightarrow x^2 \in (?, ?)$

- A) [0,5) B) [0,15) C) [0,25) D) [0,36) E) [0,49)



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	D	E	D	D	E	A	B
9	10	11	12	13	14	15	16
D	B	C	C	A	B	A	D

1. $a < b < 0 < c < d \Rightarrow |2a - c| - |b - 2d| + |2d - c| + |b| = ?$

- A) b B) -b C) c - a D) -2a E) -d

[HARRAN ÜNİVERSİTESİ - YÖS 2020]

2. $x < y < 0 < z,$

$|x - y| - |z - x| - |x + y| + |y - z| = ?$

- A) 4z B) $3z - 2x + y$ C) $y + 2z$
D) 2y E) $y + x$

[GAZİANTEP ÜNİVERSİTESİ - YÖS 2020]

3. $x < 0 \Rightarrow \sqrt{x^2 - 2x + 1} + \sqrt{x^2 - 3} - \sqrt{-x^3} = ?$

- A) $1 - x$ B) $1 + x$ C) $-1 + x$ D) $-1 - x$ E) 0

[DUMLUPINAR ÜNİVERSİTESİ - YÖS 2019]

4. $|x - 1| \leq 3$

$4x - 3y - 1 = 0$

koşullarını sağlayan kaç tane y tam sayı değeri vardır?

How many y integer values satisfy the conditions?

- A) 5 B) 6 C) 7 D) 8 E) 9

[ONDOKUZ MAYIS ÜNİVERSİTESİ - YÖS 2019]

5. $a - 3 = b \Rightarrow |a - b| - |b - a| = ?$

- A) -6 B) -3 C) 0 D) 3 E) 6

[GAZİANTEP ÜNİVERSİTESİ - YÖS 2019]

6. $| -x + 1| + 3x \leq 11$

$x \in \mathbb{N}$

$\Rightarrow \text{Ç.K (S.S)} = ?$

- A) $0 \leq x \leq 3$ B) $1 \leq x \leq 4$ C) $1 \leq x \leq 5$
D) $3 \leq x \leq 4$ E) $3 \leq x \leq 5$

[ANKARA ÜNİVERSİTESİ - YÖS 2018]

7. $a < 0 < b$

$|a - b| + |a| - |b| = 10 \Rightarrow a = ?$

- A) -10 B) -5 C) 0 D) 5 E) 10

[KARADENİZ TEKNİK ÜNİVERSİTESİ - YÖS 2018]

8. $|2x - 1| + 9 - x = 0 \Rightarrow x = ?$

- A) -8 B) -4 C) $\frac{2}{3}$ D) $\frac{10}{3}$ E) \emptyset

[KARADENİZ TEKNİK ÜNİVERSİTESİ - YÖS 2018]

9. $b < 0 < a \Rightarrow \sqrt{(3a-b)^2} - \sqrt{(b-a)^2} = ?$
 A) $2a$ B) $4a$ C) $2a - 2b$
 D) $4a - 2b$ E) $-4a + 2b$
 [ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2018]

10. $|x| = -x, y^2 < y$
 $\Rightarrow |x-y| - \sqrt{x^2} - \sqrt{y^2} + 3|x| = ?$
 A) $3x$ B) 0 C) $-3x$ D) $2x$ E) -2
 [DUMLUPINAR ÜNİVERSİTESİ – YÖS 2018]

11. $|2x - 13| + x = 7 \Rightarrow \text{Ç.K (S.S)} = ?$
 A) $\left\{6, \frac{20}{3}\right\}$ B) $\{6\}$ C) $\{6, 7\}$
 D) $\left\{\frac{20}{3}\right\}$ E) $\left\{\frac{10}{3}, 7\right\}$
 [YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

12. $x + 3 \cdot |x - 1| + 2 = 0 \Rightarrow \text{Ç.K (S.S)} = ?$
 A) $\left\{-\frac{1}{4}, -\frac{5}{2}\right\}$ B) $\left\{\frac{1}{4}\right\}$ C) $\left\{\frac{5}{2}\right\}$
 D) $\left\{-\frac{1}{4}, \frac{5}{2}\right\}$ E) \emptyset
 [KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

13. $y < 0 < x \Rightarrow |y| - |x - y| + |x| = ?$
 A) x B) y C) $-x$ D) $-y$ E) 0
 [BALIKESİR ÜNİVERSİTESİ – YÖS 2017]

14. $0 < x < y$
 $\sqrt{(x-y)^2} - 4\sqrt{x^4} - 3\sqrt{y^3} + \sqrt{x^4} = 0$
 $x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
 [İSTANBUL ÜNİVERSİTESİ – YÖS 2016]

15. $\left. \begin{array}{l} a = \frac{1}{36} \\ b = \frac{1}{4} \\ c = \frac{1}{3} \end{array} \right\} \Rightarrow |a - |b - c|| = ?$
 A) $-\frac{1}{18}$ B) $\frac{1}{18}$ C) $-\frac{1}{9}$ D) $\frac{1}{9}$ E) $\frac{1}{36}$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2015]

16. $x \cdot y > 0, x^2 y < 0$
 $\Rightarrow \frac{|x| - |x+y| - 1}{1-y} = ?$
 A) $-x$ B) x C) -1 D) 0 E) 1
 [ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2014]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	E	A	E	C	A	B	E
9	10	11	12	13	14	15	16
A	C	A	E	E	B	B	C

BÖLÜM CHAPTER

10

TARİHSEL NOT / HISTORICAL NOTE

Maryam Mirzakhani [1977 - 2017]

İrânli matematikçi ve Stanford Üniversitesi matematik profesörü. Araştırma konuları arasında Teichmüller teorisi, hiperbolik geometri, ergodik teori ve symplectic geometri yer almaktadır. 13 Ağustos 2014'te Fields Madalyası (matematiğin en prestijli ödülü) ile onurlandırıldı. Böylece, bu ödülle onurlandırılan ilk kadın ve ilk İrânli oldu. Ödül komitesi çalışmalarını "dinamizm ve geometride, Riemann yüzeylerinin ve moduli uzayları" konularında onurladı.

She was an Iranian mathematician and a professor of mathematics at Stanford University. Her research topics included Teichmüller theory, hyperbolic geometry, ergodic theory, and symplectic geometry. On August 13th 2014, she was honored with the Fields Medal (the most prestigious award in mathematics.) Thus, she became both the first woman and the first Iranian to be honored with this award at the same time. The award committee cited her work in "the dynamics and geometry of Riemann surfaces and their moduli spaces".

MANTIK LOGIC

Bu bölüm 16 test sorusu içermektedir.
This chapter includes 16 test questions.

BÖLÜM / CHAPTER 10

MANTIK / LOGIC

- Mantık / Logic 303 - 306

1. $p \vee (p \vee q) \equiv ?$

- A) p B) p'
D) q' E) p v q'

2. $(p \wedge q) \vee (p \wedge q') \equiv ?$

- A) p B) q
D) p v q E) p'

3. $(p \vee q) \wedge (p' \wedge q) \equiv ?$

- A) q B) q'
D) p' E) p \wedge q

4. $p \equiv 1, q \equiv 0, r \equiv 1 \Rightarrow [r \wedge (q' \vee p)]' \equiv ?$

- A) p B) q C) r
D) q' E) 1

5. $p \equiv 0, q \equiv 0, r \equiv 1 \Rightarrow (p' \wedge q) \vee (r \wedge p) \equiv ?$

- A) p B) q C) r
D) r' E) 0

6. $p \wedge (p \Rightarrow q) \equiv ?$

- A) p B) q C) 1
D) 0 E) p \wedge q

7. $p \vee (p \Rightarrow q) \equiv ?$

- A) 0 B) 1 C) p
D) q E) p v q

8. $(p' \vee q) \wedge (p \wedge q) \equiv ?$

- A) 0 B) 1 C) p
D) q E) p'

METROPOL YAYINLARI • METROPOL PUBLICATIONS

9. $[p \Rightarrow (p \wedge q)]' \equiv ?$

- A) $p \vee q$ B) $p \wedge q$ C) $p' \wedge q$
 D) $p \wedge q'$ E) $p \vee q'$

10. $[(p \wedge q) \Rightarrow q]' \equiv ?$

- A) 0 B) q C) p'
 D) q' E) $p \vee q$

11. $p \wedge (q' \wedge r) \equiv 1 \Rightarrow (p, q, r) \equiv ?$

- A) (0, 0, 0) B) (0, 1, 0) C) (1, 0, 1)
 D) (1, 1, 0) E) (1, 1, 1)

12. $p' \vee (q \wedge r)' \equiv 0 \Rightarrow (p, q, r) \equiv ?$

- A) (0, 0, 0) B) (1, 0, 1) C) (1, 1, 0)
 D) (0, 1, 1) E) (1, 1, 1)

13. $(p \wedge q)' \vee r' \equiv 0 \Rightarrow (p, q, r) \equiv ?$

- A) (0, 0, 1) B) (1, 0, 0) C) (1, 0, 1)
 D) (1, 1, 0) E) (1, 1, 1)

14. $(p' \Rightarrow q)' \wedge r' \equiv 1 \Rightarrow (p, q, r) \equiv ?$

- A) (0, 0, 0) B) (1, 0, 1) C) (0, 0, 1)
 D) (1, 1, 0) E) (1, 1, 1)

15. $(p' \wedge q) \Rightarrow (r \wedge q) \equiv 0 \Rightarrow (p, q, r) \equiv ?$

- A) (0, 1, 0) B) (0, 1, 1) C) (1, 0, 0)
 D) (0, 0, 1) E) (1, 1, 1)

16. $(p \vee q')' \Rightarrow r \equiv 0 \Rightarrow (p, q, r) \equiv ?$

- A) (0, 0, 1) B) (1, 0, 0) C) (1, 0, 1)
 D) (1, 1, 0) E) (0, 1, 0)

METROPOL YAYINLARI • METROPOL PUBLICATIONS

 YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	A	C	B	C	E	B	A
9	10	11	12	13	14	15	16
D	A	C	E	C	A	A	E

BÖLÜM CHAPTER

11

TARİHSEL NOT / HISTORICAL NOTE

Cantor, Georg (Ferdinand Ludwig Philipp) [1845 – 1918]

St. Petersburg'da doğmuş, hayatının büyük bir kısmını Almanya'da Halle Üniversitesi'nde geçirmiştir. 1873'de rasyonel sayılar kümesinin sayılamaz olduğunu göstermiştir. Aynı zamanda reel sayılar kümesinin de sayılamaz sonsuzlukta olduğunu göstermiştir. Daha sonra sonsuz kümeler kuramını geliştirmiştir.

He was born in St Petersburg, but spent most of his life at the University of Halle in Germany. In 1873, he showed that the set of rational numbers is denumerable. He also showed that the set of all real numbers is not. Later he fully developed his theory of infinite sets.

KÜMELER SETS

Bu bölüm 192 test sorusu ve 16 YÖS sorusu içermektedir.

This chapter includes 192 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 11 KÜMELER / SETS

1. $A = \{a, b, \{c, d\}, e, f\}$

Buna göre aşağıdakilerinden hangisi yanlıştır?

Accordingly, which one of the following is wrong?

- A) $a \in A$ B) $\{c, d\} \in A$ C) $e \in A$
D) $f \in A$ E) $c \in A$

2. $B = \{1, 2, 3, \{7, 6, 5\}, 4\}$

Buna göre aşağıdakilerinden hangisi yanlıştır?

Accordingly, which one of the following is wrong?

- A) $\{1\} \subset B$ B) $\{2, 3, 4\} \subset B$ C) $\{7, 6, 5\} \subset B$
D) $\{3\} \subset B$ E) $\{1, 4\} \subset B$

3. $A = \{\{1, 2\}, 3, 4, 5\}$

$B = \{1, 2, 3, a, b, c\}$

Buna göre aşağıdakilerinden hangisi yanlıştır?

Accordingly, which one of the following is wrong?

- A) $\{1, 2\} \subset B$ B) $\{1, 2\} \in A$ C) $\{3, 4\} \subset A$
D) $n(B) = 6$ E) $n(A) = 5$

4. $A = \{a, b, c, d\}$,

$B = \{a, b, \{c, d\}\}$

Buna göre aşağıdakilerinden hangisi yanlıştır?

Accordingly, which one of the following is wrong?

- A) $n(A) > n(B)$ B) $\{c, d\} \in A$ C) $a \in A$
D) $b \in B$ E) $\{\{c, d\}\} \subset B$

5. $A = \{x: 2^x < 11, x \in \mathbb{N}\} \Rightarrow n(A) = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

6. $A = \{(x, y) : x, y \in \mathbb{N} \text{ ve } / \text{ and } x + y \leq 3\}$

$\Rightarrow n(A) = ?$

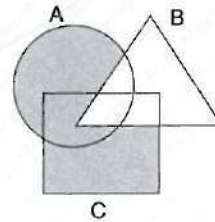
- A) 6 B) 7 C) 8 D) 9 E) 10

7. $A = \{x: x^3 \leq 75, x \in \mathbb{N}\}$

$\Rightarrow n(A) = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

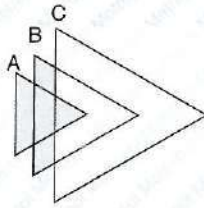
8.



\Rightarrow Taralı bölgeler / The Shaded Regions = ?

- A) $(A \setminus B) \cup C$ B) $(A \cap B) \cup C$ C) $(A \cup C) \setminus B$
D) $(A \setminus B) \cap C$ E) $(A \cup C) \cap B$

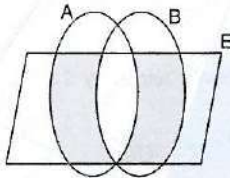
9.



⇒ Taralı bölgeler / The Shaded Regions = ?

- A) $(A \cup B) \setminus C$ B) $(A \setminus C) \cup B$ C) $A \cup (C \cap B)$
 D) $A \cup (B \setminus C)$ E) $(A \cup C) \cap B$

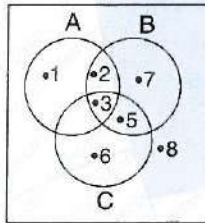
10.



⇒ Taralı bölgeler / The Shaded Regions = ?

- A) $[(A \setminus B) \cup (B \setminus A)] \cap E$ B) $(A \cup B) \cap E$
 C) $(A \cap E) \cup (B \cap E)$ D) $E \setminus (A \cap B)$
 E) $[(A \setminus B) \cap (B \setminus A)] \cap E$

11.



⇒ $[(A' \cup B) - C] = ?$

- A) {3, 7, 8} B) {2, 5, 6} C) {3, 5, 7}
 D) {2, 5, 7} E) {2, 7, 8}

12. $A = \{a, b, c\}$,

$A \cup B = \{a, b, c, d, e, f\}$,

$A \cap B = \{a, c\} \Rightarrow B = ?$

- A) {a, b, c} B) {a, c, d, e, f} C) {a, c, f}
 D) {d, e, f, b} E) {a, d, e, f}

13. $A \cap B = \{1, 2, 3\}$,

$A \cap C = \{2, 3, 4, 5\}$

⇒ $A \cap (B \cup C) = ?$

- A) {1, 2, 3, 4, 5} B) {4, 5} C) {2, 3}
 D) {1, 4, 5} E) {2, 5}

14. $A \cup B = \{1, 2, 3, 4\}$,

$A \cup C = \{2, 3, 4, 5\}$

⇒ $A \cup (B \cap C) = ?$

- A) {1, 5} B) {1, 2, 3} C) {2, 3, 4}
 D) {2, 5, 7} E) {2, 7, 8}

15. $[(B - A) \cap (A \cup B')] = ?$

- A) E B) $A \cap B$ C) A
 D) B E) \emptyset

16. $A \cap B \neq \emptyset$

⇒ $(A \cup \emptyset) \cap (A \cup A) \cap (A' \cup B) = ?$

- A) $A \cup B$ B) $A \cap B$ C) A
 D) B E) E



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	C	E	B	C	E	B	C
9	10	11	12	13	14	15	16
D	A	E	B	A	C	E	B

1. $n(A \setminus B) = 4$,
 $n(B) = 7$
 $\Rightarrow n(A \cup B) = ?$
 A) 8 B) 9 C) 10 D) 11 E) 121
2. $n(B \cap A') = 7$,
 $n(A \cap B') = 8$,
 $n(A) = 12$
 $\Rightarrow n(A \cup B) = ?$
 A) 15 B) 16 C) 17 D) 18 E) 19
3. $A \cup B \neq E$,
 $n(A \cap B) = 3$,
 $n(A') + n(B') = 25$,
 $n(A' \cup B') = 15$
 $\Rightarrow n(A \cup B) = ?$
 A) 6 B) 7 C) 8 D) 9 E) 10
4. $n(A - B) = 5$,
 $n(B - A) = 3 \cdot n(A \cap B)$,
 $n(A) = 13$,
 $\Rightarrow n(A \cup B) = ?$
 A) 37 B) 38 C) 39 D) 40 E) 41
5. $n(A \cup B) = 57$,
 $n(A - B) = 20$,
 $n(A \cap B) = 10$
 $\Rightarrow n(B - A) = ?$
 A) 25 B) 27 C) 29 D) 31 E) 33
6. $n(A \cup B) = 15$,
 $n(A \cap B) = 5$,
 $n(A) = 10$
 $\Rightarrow n(A - B) - n(B - A) = ?$
 A) 0 B) 2 C) 3 D) 5 E) 10
7. $E = \{x : 1 \leq x \leq 11, x \in \mathbb{N}\}$,
 $A \cap B = \{2, 4, 6\}$,
 $A \cap C = \{1, 3, 7, 9\}$
 $\Rightarrow [A \cap (B \cup C)]' = ?$
 A) $\{5, 8\}$ B) $\{10, 11\}$ C) $\{5, 8, 9\}$
 D) $\{8, 11\}$ E) $\{5, 8, 10, 11\}$
8. $n(A - B) = 2 \cdot n(A \cap B)$,
 $n(B - A) = 3 \cdot n(A)$,
 $n(A \cup B) = 48$
 $\Rightarrow n(A \cap B) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

9. $n(A) = 12$,
 $n(B) = 10$
 $\Rightarrow \min[n(A - (B - A'))] = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
10. $A \cup B = [-2, 10)$,
 $A \cup C = (3, 14]$
 $\Rightarrow A \cup (B \setminus C) = ?$
 A) [3, 14] B) [-2, 14] C) [0, 10]
 D) (3, 10) E) [10, 14]
11. $n(A) = 2$,
 $n(B) = 7$,
 $n(C) = 11$
 $\Rightarrow \min(n(A \cup B \cup C)) = ?$
 A) 9 B) 10 C) 11 D) 12 E) 13
12. $n(A) = 6$,
 $n(A \cap B) = 4$
 $\Rightarrow \min(n(B)) = ?$
 A) 3 B) 4 C) 5 D) 6 E) 7
13. $A = \{x : 11 \leq x \leq 400, x = 3k, k \in \mathbb{Z}^+\}$,
 $B = \{y : y < 200, y = 8m, m \in \mathbb{N}\}$
 $\Rightarrow n(A \cup B) = ?$
 A) 127 B) 132 C) 141 D) 144 E) 147
14. $A = \{x : |x - 3| \leq 39, x = 2k, k \in \mathbb{Z}\}$,
 $B = \{x : |x - 9| \leq 36, x = 3k, k \in \mathbb{Z}\}$
 $\Rightarrow n(A \cup B) = ?$
 A) 42 B) 47 C) 51 D) 53 E) 57
15. $A - B = \{x : 1 \leq x \leq 5, x \in \mathbb{Z}\}$,
 $A \cap B = \{x : 6 \leq x \leq 9, x \in \mathbb{Z}\}$
 $\Rightarrow n(A) = ?$
 A) 9 B) 10 C) 11 D) 12 E) 13
16. $A \cap B = \{x : 2 \leq x \leq 4, x \in \mathbb{Z}\}$,
 $A - B = \{x : 5 \leq x \leq 7, x \in \mathbb{Z}\}$,
 $A \cup B = \{x : 1 \leq x \leq 7, x \in \mathbb{Z}\}$
 $\Rightarrow B = ?$
 A) {3, 4} B) {1, 2, 3, 4} C) {6, 7}
 D) {2, 3, 4} E) {1, 2, 3}



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	E	C	A	B	A	E	D
9	10	11	12	13	14	15	16
B	D	C	B	E	D	A	B

1. $n(A) = 2 \cdot n(B)$,
 $n(A \cup B) + n(A \cap B) = 18$
 $\Rightarrow n(A) = ?$
 A) 12 B) 13 C) 14 D) 15 E) 16
2. $A \cap C = \emptyset$,
 $n(A) = 7$,
 $n(B) = n(C) = 9$,
 $n(A \cap B) = 2$,
 $n(B \cap C) = 3$
 $\Rightarrow n(A \cup B \cup C) = ?$
 A) 16 B) 17 C) 18 D) 19 E) 20
3. $n(A) + n(A - B) = 32$,
 $n(B) = 12$
 $\Rightarrow \max(n(A \cup B)) = ?$
 A) 25 B) 26 C) 27 D) 28 E) 29
4. $2 \cdot n(A - B) = 3 \cdot n(B - A)$,
 $n(A \cup B) = 23$
 $\Rightarrow \min(n(B)) = ?$
 A) 9 B) 10 C) 11 D) 12 E) 13
5. $\frac{n(A)}{n(A \cap B)} = \frac{8}{3}$,
 $\frac{n(B)}{n(A \cap B)} = \frac{5}{4}$
 $\Rightarrow \min(n(A \cup B)) = ?$
 A) 28 B) 32 C) 34 D) 35 E) 36
6. $n(A \cap B) = 19$,
 $n(A \cup B) = 10$
 $\Rightarrow n(A - B) + n(B - A) = ?$
 A) 7 B) 9 C) 11 D) 13 E) 15
7. $n(A \cup B) = 56$,
 $\frac{n(A)}{7} = \frac{n(A \cap B)}{3} = \frac{n(B)}{10}$
 $\Rightarrow n(A \cap B) = ?$
 A) 8 B) 9 C) 10 D) 11 E) 12
8. $n(A \cup B) = 29$,
 $n(A \cap B) = 3$,
 $n(A) = n(B)$
 $\Rightarrow n(B - A) = ?$
 A) 13 B) 14 C) 15 D) 16 E) 17

9. $n(A \cap B) = 1$,
 $n(A - B) = n(B - A)$,
 $n(A \cup B) = 5$
 $\Rightarrow n(A) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
10. $n(A) = 12$,
 $n(B) = 15$,
 $2 \cdot n(A - B) = n(B - A)$
 $\Rightarrow n(A \cap B) = ?$
 A) 6 B) 7 C) 8 D) 9 E) 10
11. $n(A) = 4 \cdot n(B)$,
 $n(A \cap B) = 3$,
 $n(A \cup B) = 42$
 $\Rightarrow n(A - B) = ?$
 A) 27 B) 30 C) 33 D) 36 E) 39
12. $n(A - B) = 4$,
 $n(B - A) = 6$,
 $n(A \cup B) = 3 \cdot n(A \cap B)$
 $\Rightarrow n(A) = ?$
 A) 7 B) 9 C) 11 D) 13 E) 15
13. $n(A') = 12$,
 $n(B) = 9$,
 $n(A' \cap B') = 5$
 $\Rightarrow n(A \cap B) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
14. $n(A) = 3 \cdot n(A \cap B)$,
 $n(B) = 2 \cdot n(A - B) - 3$,
 $n(A \cup B) = 39$
 $\Rightarrow n(A) = ?$
 A) 17 B) 18 C) 20 D) 21 E) 22
15. $n(B) = n(A - B)$
 $n(A \cap B) = \frac{2}{5} \cdot n(B)$,
 $n(A \cup B) = 30 \Rightarrow n(A \cap B) = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10
16. $n(A \cup B) = 44$,
 $n(A - B) = 2 \cdot n(B - A) = 3 \cdot n(A \cap B)$
 $\Rightarrow n(A - B) = ?$
 A) 18 B) 20 C) 22 D) 24 E) 26



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	E	D	C	D	B	E	A
9	10	11	12	13	14	15	16
C	D	C	B	B	D	C	D

1. $A = \{x \mid |x+4| < 5, x \in \mathbb{Z}\}$

$B = \{x \mid -1 \leq x < 4, x \in \mathbb{Z}\}$

$\Rightarrow n(A) + n(B) = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

2. $A = \{x \mid |x| < 6, x \in \mathbb{Z}\}$,

$B = \{x \mid |x-1| = 4, x \in \mathbb{Z}\}$

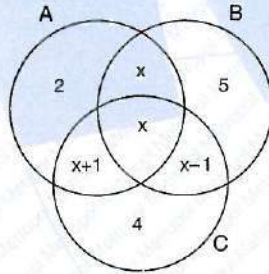
$\Rightarrow n(A \cap B) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

3. $n(A \cap B \cap C) = 3$

$\Rightarrow n(A \cap C) + n(B \cap C) = ?$

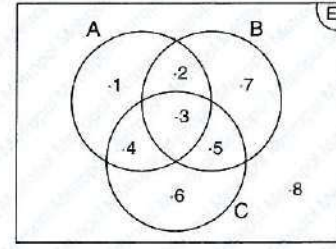
- A) 3
B) 6
C) 9
D) 12
E) 15



4. $(A \cap B) \cup (A \cap B) = ?$

- A) $A \cup B$ B) B C) A'
D) B' E) \emptyset

5.



$\Rightarrow B \cap (A' \cup C) = ?$

- A) {1,2} B) {2,3} C) {3,5,7}
D) {4,6} E) {5,7}

6. $[A \setminus (B \cap C)] \cap (A \cap B \cap C) = ?$

- A) $A \cap B \cap C$ B) A C) A'
D) $A \cup B \cup C$ E) \emptyset

7. $n(A \cup B) = 3 \cdot n(A \cap B) = 2 \cdot n(A \setminus B)$,

$n(B \setminus A) = 4$

$\Rightarrow n(B' \cap A) = ?$

- A) 4 B) 8 C) 12 D) 16 E) 20

8. $n(A) + n(B') = 15$,

$n(A') + n(B) = 13$

$\Rightarrow n(E) = ?$

- A) 10 B) 11 C) 12 D) 13 E) 14

9. $A = [-5, 7]$,
 $B = [-6, 8]$
 $\Rightarrow A \cap B = ?$
 A) $[-5, 8]$ B) $[-5, 7]$ C) $(-6, 8]$
 D) $[-5, 8)$ E) $[-6, 7)$
10. $A \subset B \subset C$,
 $n(C \setminus B) = 8$,
 $n(A) = 2$
 $\Rightarrow \min(n(A \cup B \cup C)) = ?$
 A) 8 B) 9 C) 10 D) 11 E) 12
11. $A = \{x \mid 0 \leq x \leq 48, x = 2k, k \in \mathbb{Z}\}$
 $B = \{x \mid -10 \leq x < 30, x = 3k, k \in \mathbb{Z}\}$
 $\Rightarrow n(A \cap B) = ?$
 A) 5 B) 6 C) 7 D) 8 E) 9
12. $A \cap B \neq \emptyset$,
 $n(A) = 10$,
 $n(B) = 15$
 $\Rightarrow \min(n(A \cup B)) + \max(n(A \cup B)) = ?$
 A) 20 B) 25 C) 29 D) 35 E) 39
13. $3 \cdot n(A \setminus B) = 4 \cdot n(A \cap B) = 8 \cdot n(B \setminus A)$
 $\Rightarrow \min(n(A \cup B)) = ?$
 A) 12 B) 17 C) 24 D) 28 E) 36
14. $n(A \cup B) = 100$,
 $A = \%60$,
 $B = \%70$
 $\Rightarrow n(A \cap B) = ?$
 A) 10 B) 20 C) 30 D) 40 E) 50
15. $A = [-8, 12]$,
 $B = [-9, 14]$
 $\Rightarrow A' \cap B = ?$
 A) $[-9, -8) \cup (12, 14]$ B) $[-8, 14]$
 C) $(-9, 12)$ D) $(-\infty, 8)$
 E) $(12, \infty)$
16. $A = \{x \mid -11 < x < 92, x = 3k, k \in \mathbb{Z}^+\}$,
 $B = \{x \mid -8 < x < 100, x = 9k, k \in \mathbb{Z}^+\}$
 $\Rightarrow n(A \cap B) = ?$
 A) 10 B) 11 C) 12 D) 13 E) 14



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	B	D	B	C	E	C	E
9	10	11	12	13	14	15	16
B	C	A	E	B	C	A	A

1. $n(A) = 1$, $n(B) = 3$, $n(C) = 5$
 $\Rightarrow \min(n(A \cup B \cup C)) = ?$

- A) 1 B) 2 C) 5 D) 8 E) 9

2. $n(A \setminus B) = 2x - 5$,
 $n(A \cap B) = x + 1$,
 $n(A' \cap B) = x$
 $\Rightarrow \min(n(A \cup B)) = ?$

- A) 7 B) 8 C) 9 D) 10 E) 11

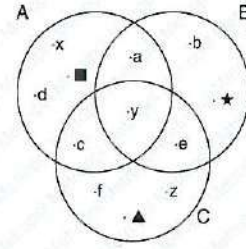
3. $n(A \setminus B) = 12$, $n(A \cap B) = 6$, $n(E) = 38$
 $\Rightarrow n(A') = ?$

- A) 12 B) 16 C) 20 D) 23 E) 25

4. $n(A \setminus B) = x^2$, $n(A \cap B) = 1$,
 $n(B \setminus A) = 2x$, $n(A \cup B) = 16$
 $\Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

5.



$\Rightarrow [(A \cup B) \setminus C] = ?$

- A) $\{x, \blacksquare, d\}$ B) $\{a, y\}$ C) $\{a, b, \star\}$
D) $\{c, e, y\}$ E) $\{f, \blacktriangle, z\}$

6. $A = \{x \mid 10 < x < 100, x = 2k, x \in \mathbb{Z}\}$
 $B = \{x \mid 20 < x < 120, x = 4k, x \in \mathbb{Z}\}$
 $\Rightarrow n(A \setminus B) = ?$

- A) 23 B) 25 C) 28 D) 34 E) 35

7. $n(A \cap B) \neq \emptyset$, $A \not\subset B$,
 $n(A) = 9$,
 $n(B) = 12$
 $\Rightarrow \min(n(A \cup B)) + \max(n(A \cup B)) = ?$

- A) 30 B) 31 C) 32 D) 33 E) 34

8. $(A' \cap B) \cup (B \setminus A) = ?$

- A) A B) A' C) B D) B' E) A \cup B

9. $n(A) + n(B) = 24,$
 $n(B') + n(A') = 12$
 $\Rightarrow n(E) = ?$
 A) 10 B) 15 C) 17 D) 18 E) 24

10. $n(A) = 2x + 6,$
 $n(A \cap B) = x + 2,$
 $n(B' \cap A) = 8,$
 $n(B \setminus A) = 2 \cdot n(A \setminus B)$
 $\Rightarrow n(A \cup B) = ?$
 A) 8 B) 12 C) 14 D) 16 E) 30

11. $A = \{ (a, b) \mid a-b = 14, a, b \in \mathbb{N}^+ \}$
 $\Rightarrow n(A) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

12. $n(A) = 2 \cdot n(B)$
 $n(A \cup B) + n(A \cap B) = 36$
 $\Rightarrow n(B) = ?$
 A) 6 B) 9 C) 12 D) 15 E) 18

13. $n(A \cup B) = 44,$
 $n(A \cap B) = 6,$
 $n(A) = 4 \cdot n(B)$
 $\Rightarrow n(B) = ?$
 A) 6 B) 10 C) 12 D) 16 E) 20

14. $n(A \cup B) - n(A \cap B) = 12,$
 $n(A) + n(B) = 30$
 $\Rightarrow n(A \cap B) = ?$
 A) 6 B) 9 C) 12 D) 15 E) 18

15. 

\Rightarrow **Taralı bölgeler / The Shaded Regions = ?**

- A) $A' \setminus (B \cup C)$ B) $A \cap (B' \cap C)$
 C) $(B \cap C) \setminus A$ D) $A \setminus (B \cup C)$
 E) $A \setminus B$

16. $A = [-8, 18],$
 $B = [-7, 20]$
 $\Rightarrow A \cup B = ?$
 A) $[-8, 20]$ B) $(-8, 18]$ C) $(-7, 20)$
 D) $[-7, 18]$ E) $[-7, 20)$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	C	C	D	B	D	C
9	10	11	12	13	14	15	16
D	E	D	C	B	B	E	A

1. $A = \{3, 4, 5, 6, 7, 8, 9\}$ kümesinin alt kümelerinin kaç tanesinde en az bir tek sayı bulunur?

How many of the subsets of the set $A = \{3, 4, 5, 6, 7, 8, 9\}$ include at least one odd number?

- A) 20 B) 60 C) 80 D) 100 E) 120

2. $A = \{x: |x - 2| \leq 1, x \in \mathbb{Z}\}$ kümesinin kaç tane öz alt kümesi vardır?

How many proper subsets does the set $A = \{x: |x - 2| \leq 1, x \in \mathbb{Z}\}$ have?

- A) 7 B) 8 C) 15 D) 16 E) 31

3. 3 elemanlı alt kümelerinin sayısı 20 olan bir kümenin 4 elemanlı alt küme sayısı kaçtır?

If the number of subsets which has 3 elements, of a set is 20, what is the number of the subsets which has 4 elements, of that set?

- A) 6 B) 9 C) 12 D) 15 E) 18

4. $A = \{a, b, c, d, e, f\}$ kümesinin 4 elemanlı alt kümelerinin kaç tanesinde c elemanı bulunur?

How many of the subsets which has 4 elements, of set $A = \{a, b, c, d, e, f\}$ have c as an element?

- A) 8 B) 10 C) 12 D) 14 E) 16

5. $n(E) = 16$,
 $n(A \setminus B) = 8$,
 $n(A' \cap B') = 3$ olduğuna göre **B kümesinin alt küme sayısı kaçtır?**

If $n(A' \cap B') = 3$, what is the number of subsets of set B?

- A) 8 B) 16 C) 32 D) 64 E) 128

6. $n(E) = 20$,
 $n(A') = 8$,
 $n(A \setminus B) = 7$ olduğuna göre **$A \cap B$ kümesinin öz alt küme sayısı kaçtır?**

If $n(A \setminus B) = 7$, what is the number of proper subsets of $A \cap B$?

- A) 7 B) 15 C) 31 D) 63 E) 127

7. $n(A \setminus B) = 8$,
 $n(A \cap B) = 5$,
 $n(A \cup B) = 20$ olduğuna göre **$A' \cap B$ kümesinin 3 elemanlı alt küme sayısı kaçtır?**

If $n(A \cup B) = 20$, what is the number of 3-element subsets of the set $A' \cap B$?

- A) 21 B) 27 C) 30 D) 35 E) 42

8. $A = \{x \mid x \in \mathbb{Z}, 10 < x < 25\}$, $B = \{y \mid y \in \mathbb{Z}, 1 < y < 20\}$ ise **$A \cap B$ kümesinin 3 elemanlı alt kümelerinin kaç tanesinde asal sayı bulunmaz?**

How many of the subsets which has 3 elements, of the set $A \cap B$ do not have any prime numbers?

- A) 5 B) 10 C) 15 D) 20 E) 25

9. $A \cup B$ nin alt kümelerinin sayısı 256 ve $A \cap B$ nin alt kümelerinin sayısı 32'dir. $A \setminus B$ nin alt küme sayısı 4 ise B kümesinin eleman sayısı kaçtır?

The number of the subsets of the set $A \cup B$ is 256 and the number of the subsets of the set $A \cap B$ is 32, if number of subsets of $A \setminus B$ is 4, then $n(B)=?$

- A) 1 B) 3 C) 4 D) 5 E) 6

10. $A \cap B = \{a, b, c\}$, $B \cap C = \{c, d, e\}$ ise $B \setminus (A \cup C)$ kümesinin özalt küme sayısı kaçtır?

If $A \cap B = \{a, b, c\}$ and $B \cap C = \{c, d, e\}$, what is the number of the proper subsets of the set $B \setminus (A \cup C)$?

- A) 7 B) 15 C) 31 D) 63 E) 127

11. $n(A \cap B) = 3$,
 $n(A') + n(B') = 25$,
 $n(A' \cup B') = 15$ olduğuna göre $A \cup B$ kümesinin 2 elemanlı kaç alt kümesi vardır?

If $n(A \cap B) = 3$, $n(A' \cup B') = 15$, what is the number of 2-element subsets of the set $A \cup B$?

- A) 28 B) 32 C) 36 D) 48 E) 52

12. $A \setminus B$, $B \setminus A$ ve A kümelerinin alt küme sayıları sırasıyla 8, 16, 32 sayılarıyla orantılıdır. $A \cup B$ kümesinin eleman sayısı 36 olduğuna göre $A \cap B$ kümesinin eleman sayısı kaçtır?

The number of the subsets of the sets $A \setminus B$, $B \setminus A$ and A are proportional to the numbers 8, 16, 32, respectively.

if the number of elements of $A \cup B$ is 36, then $n(A \cap B) = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

13. A kümesinin 2 elemanlı alt kümelerinin sayısı x ve 3 elemanlı alt kümelerinin sayısı y dir. $y = 2x$ olduğuna göre, x kaçtır?

The number of the subsets which has 2 elements of the set A is x and the number of the subsets which has 3 elements of the set A is y . If $y = 2x$, then what is the value of x ?

- A) 8 B) 16 C) 24 D) 28 E) 32

14. $A = \{x \mid x \in \mathbb{Z}, |2x - 3| > 5\}$ olduğuna göre, A' kümesinin 3 elemanlı kaç alt kümesi vardır?

If $A = \{x \mid x \in \mathbb{Z}, |2x - 3| > 5\}$, what is the number of subsets which has 3 elements of the set A' ?

- A) 16 B) 18 C) 20 D) 24 E) 28

15. Bir kümenin alt küme sayısı ile özalt küme sayısının çarpımı 240'tır. Bu kümenin 2 elemanlı alt kümelerinin sayısı kaçtır?

The product of the number of subsets of a set and its proper subsets is 240. What is the number of the subsets which has 2 elements of this set?

- A) 4 B) 6 C) 8 D) 10 E) 12

16. $n(A') = 9$, $n(A' \cup B') = 15$

Buna göre $A \setminus B$ kümesinin özalt küme sayısı kaçtır?

Accordingly, what is the number of the proper subsets of $A \setminus B$?

- A) 7 B) 15 C) 31 D) 63 E) 127



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	A	D	B	C	C	D	B
9	10	11	12	13	14	15	16
E	C	A	E	D	C	B	D

1. $A \cup B = \{a, b, c, d\}$,
 $A \cup C = \{a, c, d, e\}$
 $\Rightarrow n(A \cup (B \cap C)) = ?$
 A) 1 B) 2 C) 3 D) 5 E) 7

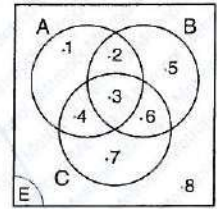
2. $A \setminus B = \{a, b, c, d\}$,
 $A \cap C' = \{a, e, c, f\}$
 $\Rightarrow A \setminus (B \cup C) = ?$
 A) $\{a, c\}$ B) $\{a, b, c\}$ C) $\{a, b, c, d, e\}$
 D) $\{a, b, c, d, e, f\}$ E) \emptyset

3. $[(A' \cap B) \cup (A \cap B)]' = ?$
 A) B B) A C) B' D) A' E) A \cup B

4. $A = \{x, y, \{x, y\}, \emptyset\}$,
 $B = \{x, \emptyset\}$
 $\Rightarrow n(A \setminus B) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

5. $A = \{1, 2, 3, 4, 5\}$,
 $B = \{2, 3, 4, 6, 8\}$,
 $C = \{0, 3, 5, 7\}$
 $\Rightarrow (A \cap B) \cup (A \cap C) = ?$
 A) $\{2, 3\}$ B) $\{3, 5\}$ C) $\{4, 5\}$
 D) $\{2, 3, 5\}$ E) $\{2, 3, 4, 5\}$

6. $B' \setminus (A \cap C) = ?$



- A) $\{1, 4, 7\}$ B) $\{1, 7\}$ C) $\{1, 3\}$
 D) $\{1, 6, 7\}$ E) $\{1, 7, 8\}$

7. $A \neq \emptyset, B \neq \emptyset$,
 $n(A \cup B) = 25$,
 $n(A - B) = 5$,
 $n(A) + n(B) = 29$
 $\Rightarrow n(B - A) = ?$
 A) 16 B) 15 C) 14 D) 13 E) 11

8. $n(A) + n(B) = 35$,
 $n(A) = 18$,
 $n(A - B) + n(B - A) = 21$
 $\Rightarrow n(A - B) = ?$
 A) 4 B) 5 C) 6 D) 8 E) 11

9. $n(A \cap B) = 5$,
 $n(B) - n(A) = 3$,
 $4 \cdot n(A) = 3 \cdot n(B)$
 $\Rightarrow n(A \cup B) = ?$
 A) 9 B) 14 C) 16 D) 17 E) 18

13. $n(A \cup B) = 15$,
 $n(A) = 2 \cdot n(A \setminus B)$,
 $n(B) = 3 \cdot n(B \setminus A)$
 $\Rightarrow n(A \cap B) = ?$
 A) 2 B) 4 C) 6 D) 8 E) 9

10. $[(A' \cap B) \cup B] \cap [(A \cap C) \cup B] = ?$
 A) $C \cup B$ B) $A \cup B$ C) A
 D) B E) C

14. $A \neq \emptyset, B \neq \emptyset$,
 $n(A - B) = x + 5$,
 $n(B) = 2x$,
 $n(A \cup B) = 8 \Rightarrow n(A - B) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

11. $A \subset B \subset C$,
 $n(A) = 3$,
 $n(B) = 5$,
 $n(C) = 9$
 $\Rightarrow n(A \cup B) + n(B \cap C) = ?$
 A) 10 B) 9 C) 8 D) 5 E) 3

15. $A \cup B = E$,
 $A = \{2, 3, 4, 5\}$,
 $B = \{1, 2, 3, 5, 6, 7, 8\}$
 $\Rightarrow n(A' - B') = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

16. $B \not\subset A$,
 $n(A) = 8$,
 $n(B) = 4$
 $\Rightarrow \min(n(A \cup B))$ için / for $n(A \cap B) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

12. $n(B) = 11$,
 $n(B \setminus A) = 5$,
 $n(A \cup B) = 15$
 $\Rightarrow n(A) = ?$
 A) 6 B) 9 C) 10 D) 11 E) 12



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	A	C	B	E	E	A	E
9	10	11	12	13	14	15	16
C	D	A	C	C	E	C	C

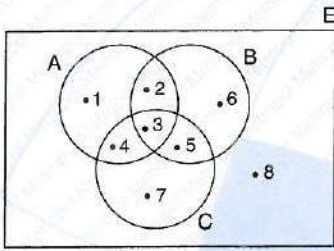
1. $A = \{x \mid -3 \leq x \leq 6, x \in \mathbb{N}\},$

$B = \{x \mid 1 \leq x^2 \leq 9, x \in \mathbb{Z}\}$

$\Rightarrow n(A) + n(B) = ?$

- A) 10 B) 11 C) 12 D) 13 E) 15

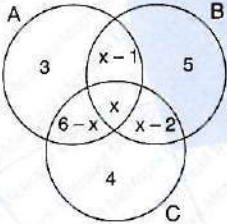
2.



$\Rightarrow A \cap (B \cup C)^c = ?$

- A) {1} B) {1,2} C) {1,8}
D) {2,3,4} E) {1,2,3,4}

3.



$n(A \cup B \cup C) = 25$

$\Rightarrow n(A) = ?$

- A) 10 B) 11 C) 12 D) 13 E) 15

4. $A = \{x \mid |x-2| \leq 4, x \in \mathbb{Z}\},$

$B = \{x \mid |x| \leq 8, x \in \mathbb{N}\}$

$\Rightarrow n(A \cap B) = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

5. $(A \cap B) \cup (A \setminus B) = ?$

- A) A B) B C) A' D) B' E) E

6. $n(B) = 3 \cdot n(A),$

$2 \cdot n(B \setminus A) = 7 \cdot n(A \setminus B)$

$\Rightarrow \min(n(B)) = ?$

- A) 14 B) 15 C) 16 D) 18 E) 21

7. $4 \cdot n(A \setminus B) = 3 \cdot n(A \cap B) = 10 \cdot n(B \setminus A)$

$\Rightarrow \min(n(A \cup B)) = ?$

- A) 32 B) 34 C) 36 D) 41 E) 48

8. $A = \{x \mid 20 < x < 200, x = 8k, k \in \mathbb{Z}\},$

$B = \{x \mid 25 < x < 250, x = 6k, k \in \mathbb{N}\}$

$\Rightarrow n(A \cap B) = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

9. $A \cup B = E$,
 $n(A \cap B) = 12$, $n(A' \cup B') = 23$
 $\Rightarrow n(A) = ?$
 A) 7 B) 8 C) 9 D) 10 E) 11

10. $A \cup B = E$
 $\Rightarrow (A' \cup B') \cup (A \setminus B) = ?$
 A) A B) B C) A' D) B' E) E

11. $A = \{x \mid x < 103, x = 3k, k \in \mathbb{N}^+\}$,
 $B = \{x \mid 25 < x < 122, x = 5k, k \in \mathbb{N}^+\}$
 $\Rightarrow n(A \cup B) = ?$
 A) 42 B) 46 C) 48 D) 50 E) 53

13. $A = (-3, 4]$, $B = [2, 6) \Rightarrow A \setminus B = ?$
 A) $(-3, 3)$ B) $(-3, 4)$ C) $(-2, 2)$
 D) $(-3, 2)$ E) $(-3, 2]$

14. $A \cup B = E$
 $n(A \cup B) = 120$,
 $A = \%60$, $B = \%90$
 $\Rightarrow n(A \cap B) = ?$
 A) 40 B) 50 C) 60 D) 70 E) 80

15. $n(E) = 20$, $A \cup B = \%80$,
 $A = \%65$, $B = \%40 \Rightarrow n(B \setminus A) = ?$
 A) 3 B) 4 C) 5 D) 6 E) 8

16. $A = [-2, 5]$,
 $B = [1, 7]$,
 $C = [2, 3]$
 $\Rightarrow (A \cap B) \setminus C = ?$
 A) $[1, 2)$ B) $(3, 5]$ C) $(1, 5]$
 D) $[-2, 1) \cup (5, 7)$ E) $[1, 2) \cup (3, 5]$

12. $3 \cdot n(A) = 2 \cdot n(B)$,
 $n(A \cup B) + n(A \cap B) = 50$
 $\Rightarrow n(B) = ?$
 A) 16 B) 18 C) 20 D) 24 E) 30



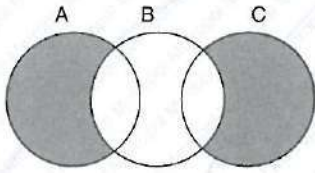
YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	A	D	B	A	B	D	C
9	10	11	12	13	14	15	16
E	E	C	E	D	C	A	E

1. $A \neq \emptyset, B \neq \emptyset, A \subset B,$
 $n(A) + n(B) = 6 \cdot n(B \setminus A) - 1$
 $\Rightarrow \min(n(A \cap B)) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
2. $n(A) = 9, n(B) = 6$
 $\Rightarrow \max(n(A \cup B)) + \min(n(A \cup B)) = ?$
 A) 22 B) 24 C) 26 D) 28 E) 30
3. $A = \{x : |x - 11| < 3, x \in \mathbb{Z}\}$
 $\Rightarrow n(A) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
4. $A = \{1, 3, 5, 7, 9\},$
 $B = \{x \mid 1 < x < 10, x \in \mathbb{Z}\}$
 $\Rightarrow n(A \cap B) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
5. $n(A \cap B) = 5,$
 $n(A \setminus B) + n(B \setminus A) = 64$
 $\Rightarrow n(A \cup B) = ?$
 A) 57 B) 60 C) 63 D) 66 E) 69
6. $n(A) = 9,$
 $n(B) = 20$
 $\Rightarrow n(A \cup B) + n(A \cap B) = ?$
 A) 28 B) 29 C) 30 D) 31 E) 32
7. $A \cap B \neq \emptyset,$
 $n(A \setminus B) = 4, n(B \setminus A) = 5$
 $\Rightarrow \min(n(A \cup B)) = ?$
 A) 8 B) 9 C) 10 D) 12 E) 14
8. $A \cup B = E,$
 $n(A \cup B) = 18,$
 $n((A \cap B)') = 16,$
 $n(A) = 3 \cdot n(B)$
 $\Rightarrow n(B \setminus A) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

9. $A \not\subset B$,
 $n(A \cap B) = 4$,
 $n(A \cup B) = 12$
 $\Rightarrow \max(n(B \setminus A)) = ?$
 A) 4 B) 7 C) 9 D) 12 E) 10

10.



\Rightarrow Taralı bölgeler / The Shaded Regions = ?

- A) $(A \cup B) \cap C$ B) $(A \cup C) \setminus B$
 C) $(B \setminus A) \cup C$ D) $(B \setminus C) \cap A$
 E) $(A \cap C) \setminus B$
11. $A \subset B \subset C$,
 $n(A) + n(B) + n(C) = 24$
 $\Rightarrow \max(n(A)) = ?$
 A) 3 B) 4 C) 5 D) 6 E) 8
12. $n(E) = 16$,
 $n(A' \cap B) = 6$,
 $n(A \cap B) = 3$,
 $n(A \cap B') = 5$
 $\Rightarrow n(A' \cup B) = ?$
 A) 16 B) 8 C) 4 D) 2 E) 11
13. $n(A \cup B) = 26$,
 $n(A - B) = 2 \cdot n(B - A)$,
 $n(A \cap B) = 5$
 $\Rightarrow n(A) = ?$
 A) 14 B) 16 C) 18 D) 19 E) 20
14. $n(E) = 32$,
 $n(A') = 16$,
 $n(B) = 12$,
 $n(A' \cup B') = 30 \Rightarrow n(A \cup B) = ?$
 A) 26 B) 24 C) 22 D) 20 E) 16
15. $n(A) = 3x + 4$,
 $n(B) = 6x - 1$,
 $n(A \cap B) = x - 2$,
 $4 \cdot n(A \cap B) = n(A)$
 $\Rightarrow n(A \cup B) = ?$
 A) 102 B) 101 C) 90 D) 89 E) 88
16. $A \cup B \cup C = E$,
 $n(A \cap B) = \emptyset$,
 $n(A \cap C) = \emptyset$,
 $n(A) = 8$, $n(B) = 11$, $n(C) = 13$,
 $n(B - C) + n(C - B) = 12$
 $\Rightarrow n(E) = ?$
 A) 26 B) 27 C) 28 D) 29 E) 30



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1	2	3	4	5	6	7	8
A	B	D	C	E	B	C	B
9	10	11	12	13	14	15	16
B	B	E	E	D	A	B	A

1. $A = \{1, 2, 3\}$, $A \cup B = \{1, 2, 3, 4, 5\}$,
 $A \setminus B = \{1, 2\}$
 $\Rightarrow B = ?$
 A) $\{3, 4\}$ B) $\{4, 5\}$ C) $\{3, 4, 5\}$
 D) $\{3, 5\}$ E) $\{1, 2\}$
2. $A = \{x \mid (x+3)^2 \leq 16, x \in \mathbb{Z}\}$,
 $B = \{x \mid |x-1| \leq 5, x \in \mathbb{Z}\}$
 $\Rightarrow n(B \setminus A) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
3. $A \not\subset B$, $B \not\subset A$,
 $n(A \cup B) = 15$, $n(A) = 8$
 $\Rightarrow \max(n(B)) = ?$
 A) 10 B) 11 C) 12 D) 13 E) 14
4. $2 \cdot n(A \setminus B) = 3 \cdot n(A \cap B) = 4 \cdot n(B \setminus A)$
 $\Rightarrow \min(n(A \cup B)) = ?$
 A) 12 B) 13 C) 14 D) 15 E) 16
5. $n(E) = 25$, $n(A \cap B') = 5$,
 $n(A' \cap B) = 6$, $n(A \cap B) = 4$
 $\Rightarrow n(A' \cap B') = ?$
 A) 10 B) 12 C) 13 D) 14 E) 15
6. $n(E) = 17$, $n(A \cap B') = 5$,
 $n(A' \cap B) = 4 \Rightarrow n(B) = ?$
 A) 6 B) 7 C) 8 D) 9 E) 10
7. $A = [2, 4]$, $B = [-4, 3]$
 $\Rightarrow A' \cap B = ?$
 A) $[-4, 2)$ B) $[-4, 2]$ C) $(-4, 2)$
 D) $(3, 4)$ E) $(3, 4]$
8. $n(A \cup B) = 42$, $n(A \cap B) = 3$
 $n(B) = 2 \cdot n(A) \Rightarrow n(B \setminus A) = ?$
 A) 22 B) 24 C) 25 D) 26 E) 27

9. $n(A \cap B') = 5$, $n(B \setminus A) = 5$,

$n(A \cup B) = 12$

$\Rightarrow n(A \cap B) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

10. $B \subset A$, $A - B = \{3, 4\}$

$A = \{1, 2, 3, 4\} \Rightarrow B = ?$

- A) $\{1\}$ B) $\{1, 2\}$ C) $\{1, 2, 3\}$
D) $\{1, 3, 4\}$ E) $\{2, 3, 4\}$

11. $3 \cdot n(A \setminus B) = 4 \cdot n(A \cap B) = 6 \cdot n(B - A)$,

$n(A \cup B) < 87$

$\Rightarrow \max(n(A \cup B)) = ?$

- A) 63 B) 72 C) 81 D) 90 E) 99

12. $A \cup B = E \Rightarrow (A' \cup B')' \cup (A \setminus B) = ?$

- A) A B) B C) $A \cap B$ D) A' E) B'

13. $n(A) + n(B') = 27$,

$n(A') + n(B) = 21$

$\Rightarrow n(E) = ?$

- A) 22 B) 23 C) 24 D) 25 E) 26

14. $A \not\subset B$, $B \not\subset A$,

$n(A \cup B) = 23$, $n(A) = 11$,

$A \cap B \neq \emptyset$

$\Rightarrow \min(n(B)) = ?$

- A) 12 B) 13 C) 14 D) 15 E) 16

15. $n(A) = 13$, $n(B \setminus A) = 5$

$\Rightarrow n(A \cup B) = ?$

- A) 15 B) 16 C) 17 D) 18 E) 19

16. $A \cap B \neq \emptyset$

$n(A) = 3 \cdot n(B)$

$n(A \setminus B) = 6 \cdot n(B \setminus A)$

$\Rightarrow \min(n(B)) = ?$

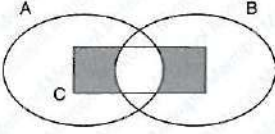
- A) 1 B) 2 C) 3 D) 4 E) 5



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	D	E	B	A	C	A	E
9	10	11	12	13	14	15	16
B	B	C	A	C	B	D	E

1.



⇒ **Taralı bölgeler / The Shaded Regions = ?**

- A) $C \setminus A$ B) $(A \cap C) \cup B$ C) $C \setminus (A \cap B)$
 D) $(B \cup C) \setminus A$ E) $(A \cup B) \setminus C$

2. $A \cap B \neq \emptyset$,

$n(A) = 8,$

$n(B) = 4$

⇒ **$\min(n(A \cup B))$ için / for $n(A \cap B) = ?$**

- A) 3 B) 4 C) 5 D) 6 E) 7

3. $n(A) = 2 \cdot n(B)$,

$n(A \cap B) = 4,$

$n(A \cup B) = 11$

⇒ **$n(A - B) = ?$**

- A) 2 B) 4 C) 6 D) 8 E) 10

4. $A = \{x \mid k = \frac{3x+3}{x}, x, k \in \mathbb{Z}\}$

$B = \{y \mid m = \frac{3y+3}{y}, y, m \in \mathbb{Z}\}$

⇒ **$n(A \cup B) = ?$**

- A) 2 B) 4 C) 6 D) 7 E) 8

5. $A = \{x \mid 1 \leq x \leq 500, x = 4k, k \in \mathbb{N}\},$

$B = \{y \mid 1 \leq y \leq 600, y = 6k, k \in \mathbb{N}\}$

⇒ **$n(A \cup B) = ?$**

- A) 160 B) 163 C) 180
 D) 184 E) 190

6. $A = \{x \mid 1 \leq x \leq 50, x \in \mathbb{Z}\},$

$B = \{y \mid 1 \leq y \leq 50, y \in \mathbb{Z}\},$

⇒ **$n(A - B) = ?$**

- A) 50 B) 45 C) 30 D) 15 E) 0

7. $A = \{x \mid 0 < x \leq 10, x \in \mathbb{Z}^+\},$

$B = \{y \mid y = 2k, 0 < k \leq 10, k \in \mathbb{Z}^+\}$

⇒ **$n(A \cap B) = ?$**

- A) 4 B) 5 C) 6 D) 7 E) 8

8. $A = \{x \mid k = \frac{3x+7}{x-1}, x, k \in \mathbb{Z}\}$

⇒ **$n(A) = ?$**

- A) 4 B) 5 C) 6 D) 7 E) 8

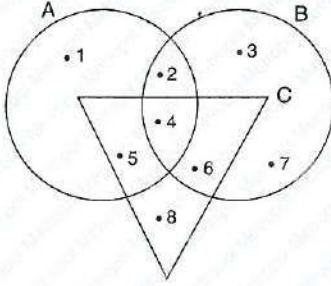
9. $A = \{x \mid 1 < x \leq 6, x \in \mathbb{N}\}$,
 $B = \{y \mid |1 - 2y| \leq 9, y \in \mathbb{Z}\}$,
 $\Rightarrow n(A \cap B) = ?$
 A) 3 B) 4 C) 5 D) 6 E) 7
10. $A = \{x \mid 8 < x \leq 20, x \in \mathbb{N}\}$,
 $B = \{x \mid x = 3k, 3 \leq k \leq 6, k \in \mathbb{Z}\}$
 $\Rightarrow n(A \cap B) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
11. $A = \{x \mid x = 4k, x \leq 100, k \in \mathbb{Z}^+\}$,
 $B = \{x \mid x = 10k, x \leq 100, k \in \mathbb{Z}^+\}$
 $\Rightarrow n(A \cup B) = ?$
 A) 10 B) 15 C) 20 D) 25 E) 30
12. $n(A) + n(B') = 20$,
 $n(A') + n(B) = 14$
 $\Rightarrow n(E) = ?$
 A) 7 B) 11 C) 13 D) 17 E) 19
13. $n(A) = 2x - 3$,
 $n(B) = 3x + 4$,
 $n(A \cup B) = 3x + 7$,
 $n(A \cap B) \neq \emptyset$
 $\Rightarrow \min(x) = ?$
 A) 3 B) 4 C) 5 D) 6 E) 7
14. $n(A) = 5 \cdot n(B)$,
 $n(A \cup B) + n(A \cap B) = 30$
 $\Rightarrow n(A) = ?$
 A) 5 B) 10 C) 15 D) 20 E) 25
15. $n(A \cap B) = 11$,
 $n(A \cup B) = 29$
 $\Rightarrow \min(n(A)) = ?$
 A) 10 B) 11 C) 18 D) 29 E) 40
16. $n(A') = 10$
 $n(B') = 11 \Rightarrow n((A \cup B)') = ?$
 $n(A \cap B') = 5$
 A) 4 B) 5 C) 6 D) 7 E) 8



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	C	B	D	E	B	E
9	10	11	12	13	14	15	16
B	C	E	D	B	E	B	A

1.



$$\Rightarrow (A \cup B') \cap C = ?$$

- A) {4} B) {4, 5} C) {4, 5, 8}
D) {4, 8} E) {4, 5, 6, 8}

2. $n(A' \cup B') = 20$, $n(A \cup B)' = 8$,
 $A \cap B \neq \emptyset$

$$\Rightarrow \min[n(A) + n(B)] = ?$$

- A) 8 B) 9 C) 12 D) 13 E) 14

3. $n(A \setminus B) = 35$,

$$n(B) = 4 \cdot n(A \cap B),$$

$$n(A) = 2 \cdot n(B \setminus A)$$

$$\Rightarrow n(A \cup B) = ?$$

- A) 30 B) 42 C) 56 D) 63 E) 68

4. $n(A) = 6$, $n(B \setminus A) = 3$,

$$n(A') = 8$$
, $n(B') = 7$

$$\Rightarrow n(A \cap B) = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

5. $n(A \setminus B) = 3 \cdot n(B) = 6 \cdot n(A \cap B)$,

$$n(A \cup B) = 32$$

$$\Rightarrow n(B) = ?$$

- A) 4 B) 5 C) 6 D) 8 E) 9

6. $(A' \setminus B') \cap (A' \setminus B) = ?$

- A) A B) B C) A' D) B' E) \emptyset

7. $n(A') = 15$, $n(B') = 17$,

$$n(A) + n(B) = 16$$

$$\Rightarrow n(E) = ?$$

- A) 24 B) 26 C) 28 D) 30 E) 32

8. $n(A) = 3 \cdot n(B)$, $n(A \cap B) = 6$,

$$n(A \cup B) = 50$$

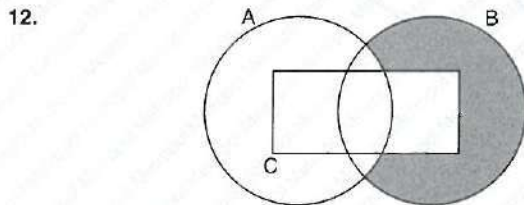
$$\Rightarrow n(A \setminus B) = ?$$

- A) 13 B) 26 C) 32 D) 36 E) 39

9. $A = \{x \mid 21 \leq x < 78, x = 3k, k \in \mathbb{N}\}$,
 $B = \{x \mid 30 < x \leq 90, x = 5k, k \in \mathbb{N}\}$
 $\Rightarrow n(A \cap B) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

10. $A = \{x \mid 13 \leq x \leq 75, x = 3k, k \in \mathbb{N}\}$,
 $B = \{x \mid 24 \leq x < 82, x = 2k, k \in \mathbb{N}\}$
 $\Rightarrow n(A \setminus B) = ?$
 A) 12 B) 14 C) 16 D) 18 E) 21

11. $A = \{x \mid 18 \leq x < 81, x = 3k, k \in \mathbb{N}\}$,
 $B = \{x \mid 3 < x \leq 60, x = 4k, k \in \mathbb{N}\}$
 $\Rightarrow n(A \cup B) = ?$
 A) 28 B) 30 C) 31 D) 32 E) 36



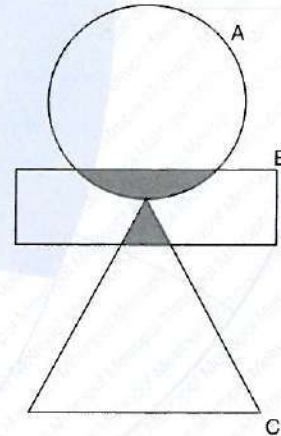
- \Rightarrow **Taralı bölge / The Shaded Region = ?**
 A) $(A \cup C) \setminus B$ B) $C \setminus (A \cap B)$ C) $B \setminus A$
 D) $(A \cap B) \setminus C$ E) $B \setminus (A \cup C)$

13. $A = \{x \mid 32 \leq x < 202, x = 4k, k \in \mathbb{N}\}$,
 $B = \{x \mid 47 < x < 243, x = 6k, k \in \mathbb{N}\}$
 $\Rightarrow n(A \cap B) = ?$
 A) 24 B) 29 C) 30 D) 31 E) 32

14. $[A' \cap (B \cap A)]' = ?$
 A) \emptyset B) A C) B D) A' E) E

15. $n(A \cup B) = 17$, $n(A \cap B) = 4$,
 $n(B) + 3 = 2 \cdot n(A)$
 $\Rightarrow n(B) = ?$
 A) 9 B) 11 C) 12 D) 13 E) 15

16.



- \Rightarrow **Taralı bölge / The Shaded Region = ?**
 A) $B \cap (A \cup C)$ B) $(A \cap B) \setminus C$ C) $(B \cap C) \cup A$
 D) $(B \cap A) \setminus C$ E) $(B \cap C) \setminus A$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	E	D	D	D	E	A	D
9	10	11	12	13	14	15	16
B	A	D	E	C	E	D	A

1. $A \neq \emptyset; B \neq \emptyset$
 $s(A \setminus B) = 5$
 $s(A' \cup B') = 18$
 $s(A' \cap B') = 4$ } $\Rightarrow s(B \setminus A) = ?$
- A) 13 B) 14 C) 11 D) 7 E) 9

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

2. A ve B kümeleri E evrensel kümesinin alt kümeleri ise
 $(A \cap B') \cup (A' \cap B) = ?$

If the sets A and B are subsets of the universal set E, then

$(A \cap B') \cup (A' \cap B) = ?$

- A) A B) B C) A – B D) A
- \cup
- B E) A
- \cap
- B

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2019]

3. $A \subset B \subset C \subset D$ olmak üzere;
 $(D \setminus C) \cup (C \setminus B) \cup (B \setminus A) = ?$

If $A \subset B \subset C \subset D$ then which one of the following is equivalent to the set $(D \setminus C) \cup (C \setminus B) \cup (B \setminus A) = ?$

- A)
- $D \setminus A$
- B)
- $D \setminus B$
- C)
- $D \setminus C$
- D)
- $C \setminus B$
- E)
- $B \setminus A$

[HARRAN ÜNİVERSİTESİ – YÖS 2019]

4. $A = \{a, b, \{a, c\}\}$ kümesiyle ilgili aşağıdakilerden hangisi yanlıştır?

For the given set $A = \{a, b, \{a, c\}\}$, which of the following is false?

- A)
- $\{a, c\} \in A$
- B)
- $\{a\} \subset A$
- C)
- $\{a, c\} \subset A$
-
- D)
- $\{a, b\} \subset A$
- E)
- $\{a, \{a, c\}\} \subset A$

[GAZİANTEP ÜNİVERSİTESİ – YÖS 2019]

5. $A = \{1, 2, a, \{b, *\}, \{2\}, \emptyset\}$
 $B = \{1, \{2, b\}, *, \{\emptyset\}\}$

A – B kümesinin 3 elemanlı alt küme sayısı kaçtır?What is the number of 3-element subsets of the set $A - B = ?$

- A) 2 B) 10 C) 6 D) 4 E) 16

[ATATÜRK ÜNİVERSİTESİ – YÖS 2018]

6. $n(A \cap B) = 3, n(A) = 2 \cdot n(B)$
 $n(A \cup B) = 30$ ise / if $n(B) = ?$

- A) 7 B) 8 C) 9 D) 1 E) 12

[ULUDAĞ ÜNİVERSİTESİ – YÖS 2018]

7. $A \cap B = \{1, 2\}, B \cap C = \{2, 3, 5, 6\}$
 $\Rightarrow n[B \cap (A \cup C)] = ?$

- A) 5 B) 6 C) 7 D) 8 E) 10

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

8. $s(A)$, A kümesinin eleman sayısı olmak üzere
 Provided that $S(A)$ is the number of elements of set A,
 $s(A) = 8, s(A \cap B) = 4$

$s(A \cup B) = 19$

$\Rightarrow s(B) = ?$

- A) 12 B) 13 C) 14 D) 15 E) 16

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

9. $A \subset B \subset C \subset D$
 $\Rightarrow [(A \cup B) \cap (C \setminus B)] \cup D = ?$
 A) C B) \emptyset C) $B \cup C$ D) $A \cap C$ E) D
 [ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2018]

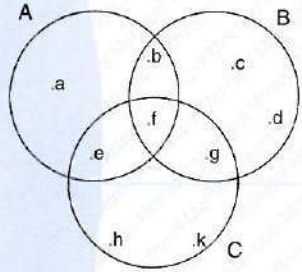
10. $A = \{\{1\}, 1, 2, \{1, \{2\}\}, \{3\}\}$
 Aşağıdakilerden hangisi yanlıştır?
 Which one of the following is wrong?
 A) $\{1, \{3\}\} \subset A$ B) $\{1\} \in A$ C) $\{1, 2\} \in A$
 D) $\{2, \{3\}\} \subset A$ E) $\{1\} \subset A$
 [ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2018]

11. $2 \cdot n(A) = 3 \cdot n(B) = 7 \cdot n(A \cap B)$
 $\Rightarrow \min[n(A \cap B)] = ?$
 A) 4 B) 6 C) 8 D) 12 E) 15
 [ATATÜRK ÜNİVERSİTESİ – YÖS 2017]

12. $A = \{3, 4, \{5\}, \{6, 7\}, \emptyset\}$
 Aşağıdakilerden hangisi yanlıştır?
 Which one of the following is wrong?
 A) $3 \in A$ B) $\{4\} \subset A$ C) $\{\{6, 7\}\} \subset A$
 D) $\{\emptyset\} \subset A$ E) $\{5\} \notin A$
 [SELÇUK ÜNİVERSİTESİ – YÖS 2017]

13. $n(P \cup R) = 20,$
 $n(P - R) = 6,$
 $n(P) = n(R)$
 $\Rightarrow n(P \cap R) = ?$
 A) 4 B) 5 C) 6 D) 7 E) 8
 [ERCİYES ÜNİVERSİTESİ – YÖS 2017]

14. $A \cup A' = E, s(A) + s(A') = s(E)$
 $A \setminus B = \{x \mid x \in A \wedge x \notin B\}$
 $s(A \cap B') = 3$
 $s(A') + s(B') = 17$
 $s(A' \cap B') = 5$
 $s(B \setminus A) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 8
 [YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2016]

15. 
 $A \setminus B = \{x \mid x \in A \wedge x \notin B\}$
 $(A \setminus B) \cap (C \setminus B) = ?$
 A) d B) e C) f D) g E) h
 [YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2015]

16. $n(A - B) = 3 \cdot n(A \cap B),$
 $n(A \cup B) = 17,$
 $n(B) = 8$
 $\Rightarrow n(B - A) = ?$
 A) 3 B) 4 C) 5 D) 6 E) 7
 [ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2014]

 YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	A	A	C	B	D	A	D
9	10	11	12	13	14	15	16
E	C	B	E	E	C	B	C

BÖLÜM CHAPTER

12

TARİHSEL NOT / HISTORICAL NOTE

Grigori Perelman [1977 -]

Birçok kişi tarafından Dünya'nın yaşayan en zeki insanı olarak kabul edilen Grigori Perelman 2000 yılında Clay Matematik Enstitüsü'nün o güne kadar çözülmemiş ve "Bin Yılın Soruları" olarak görülen milenyum sorularından 1 milyon dolar ödüllü "Poincare Varsayımı" nı 2002 yılında çözmüş ve 2006 yılında Fields ödülüne layık görülmüştür.

Fakat Grigori Perelman hem soru başına koyulan 1 milyon dolarlık ödülü hem de hak ettiği Fields ödülünü reddetmiş ve tarihe bu şekilde geçmiş ilk matematikçidir.

He is regarded as the smartest living person in the world by a lot of people, at the year of 2002 he solved one of the so called "Millennium Questions" that was introduced by Clay Institute, questions which were not resolved until that day and was awarded 1 million dollars in year 2000; he deserved the Fields award in 2006.

However, Grigori Perelman not only rejected the fields award, but also he rejected the 1 million dollars award which was awarded per each question, so his name was written as the first mathematician who didn't accept this award.

BAĞINTI RELATION

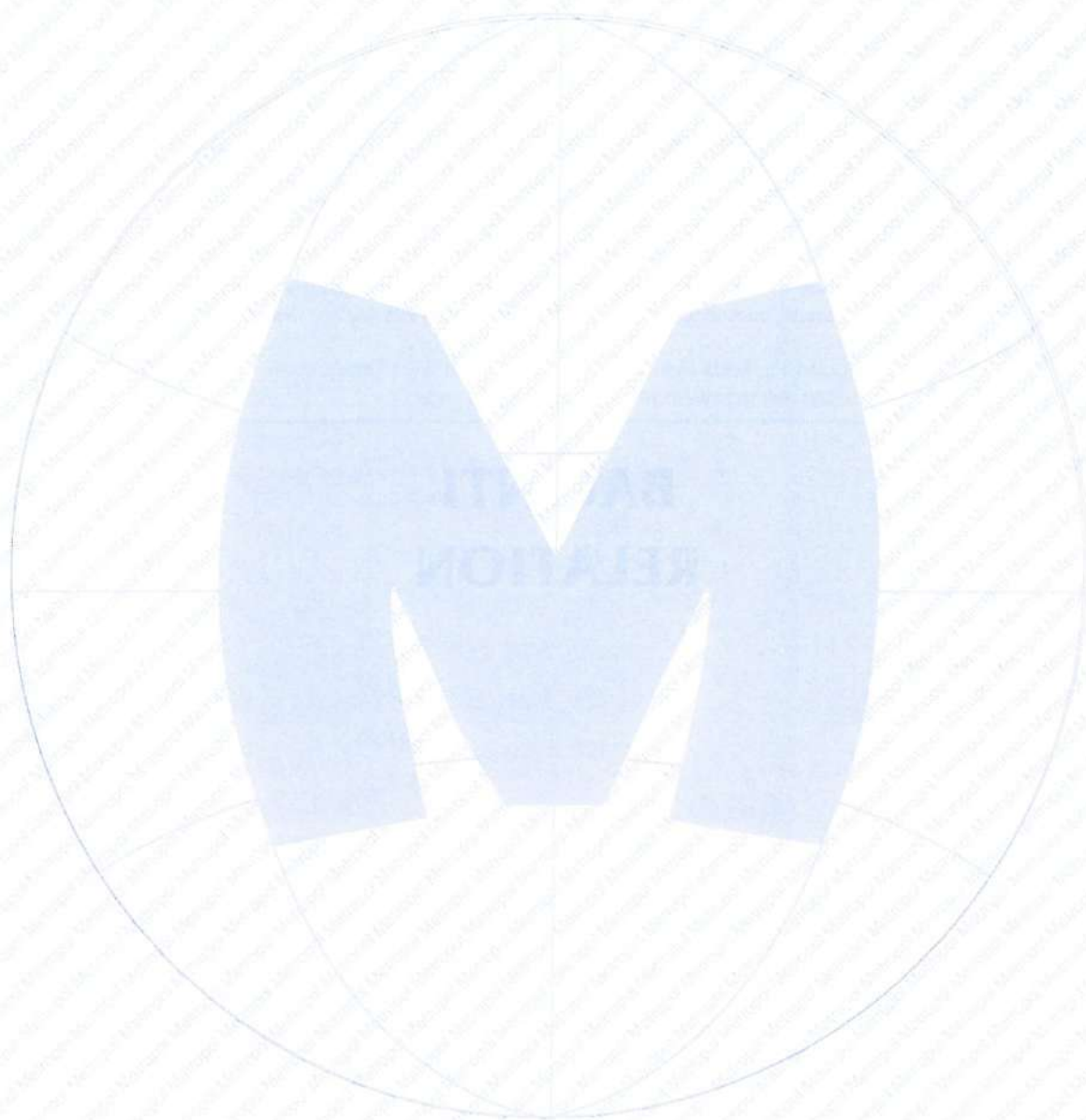
Bu bölüm 16 test sorusu içermektedir.

This chapter includes 16 test questions.

BÖLÜM / CHAPTER 12

BAĞINTI / RELATION

- Bağinti / Relation 335 - 338



1. $(3^{2x+1}, 2y) = (3^y, x-7) \Rightarrow x+y = ?$

- A) -8 B) -7 C) -5
D) 7 E) 8

2. $n[(A \times B) \cap (A \times C)] = 13 \Rightarrow \max[n(A)] = ?$

- A) 1 B) 5 C) 7
D) 9 E) 13

3. $A = \{x \mid -1 \leq x < 4, x \in \mathbb{Z}\},$

$n(A \times B) = 15 \Rightarrow n(B) = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

4. $A \cap B = \{1, 3\}, C = \{a, b, c, d\}$

$\Rightarrow n[(C \times A) \cap (C \times B)] = ?$

- A) 4 B) 6 C) 8
D) 10 E) 12

5. $A = \{x \mid -1 < x < 3, x \in \mathbb{Z}\},$

$B = \{y \mid 2 < y < 7, y \in \mathbb{Z}\}$

$\Rightarrow n(A \times B) = ?$

- A) 12 B) 14 C) 16
D) 18 E) 20

6. $A = \{1, 2, 3, 4\},$

$B = \{2, 3, 4, 5, 6, 7, 8, 9\},$

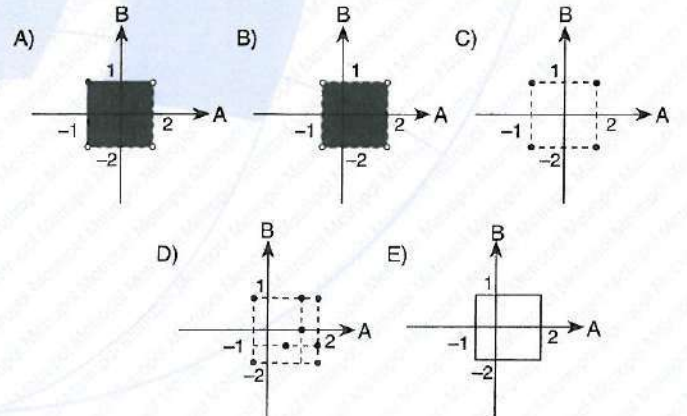
$C = \{3, 4, 5, 10\}$

$\Rightarrow n[(A \times B) \cap (A \times C)] = ?$

- A) 10 B) 12 C) 16
D) 18 E) 20

7. $A = [-1, 2), B = \{y \mid -2 < y \leq 1, y \in \mathbb{R}\}$ ise / if
 $A \times B$ nin grafiği aşağıdakilerden hangisidir?

Which one of the following is the graph of $A \times B$?



8. $A = \{x \mid -5 \leq x < 3, x \in \mathbb{Z}\},$

$n(A \times B) = 48 \Rightarrow n(B) = ?$

- A) 2 B) 4 C) 6
D) 8 E) 12

9. $A = \{x \mid 2 < x \leq 5, x \in \mathbb{R}\}$,
 $B = \{y \mid 2 < y < 4, y \in \mathbb{R}\}$
 $\Rightarrow \max(A \times B) = ?$

- A) 4 B) 6 C) 8
 D) 9 E) 10

10. $A \times B = \{(a, b), (a, c), (b, b), (b, c), (c, b), (c, c)\}$
 $\Rightarrow A \cap B = ?$

- A) \emptyset B) $\{a\}$ C) $\{b\}$
 D) $\{c\}$ E) $\{a, b\}$

11. $A \times B = \{(1, 2), (1, 3), (2, 2), (2, 3), (3, 2), (3, 3)\}$
 $\Rightarrow A \cap B = ?$

- A) $\{1, 2\}$ B) $\{1, 3\}$ C) $\{2, 3\}$
 D) $\{2\}$ E) $\{3\}$

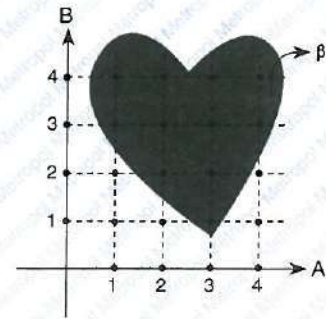
12. $n[(A \times B) \cup (A \times C)] = 24$,
 $3 < n(A) < 18 \Rightarrow \max\{n(A)\} = ?$

- A) 4 B) 6 C) 8
 D) 9 E) 12

13. $A \times B = \{(1, a), (1, b), (2, a), (2, b)\}$,
 $B \times C = \{(a, 3), (a, 4), (a, 5), (b, 3), (b, 4), (b, 5)\}$
 $\Rightarrow n(A \times B \times C) = ?$

- A) 10 B) 12 C) 16
 D) 18 E) 24

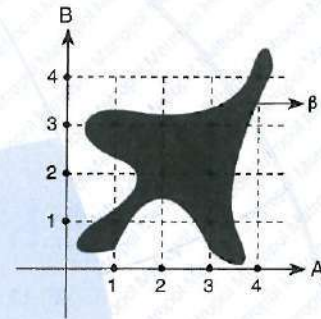
14.



$\Rightarrow n(\beta) = ?$

- A) 8 B) 9 C) 10
 D) 11 E) 16

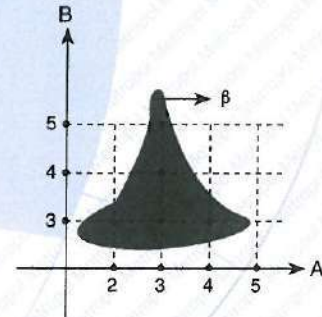
15.



$\Rightarrow n(\beta) = ?$

- A) 4 B) 5 C) 6
 D) 7 E) 8

16.



$\Rightarrow n(\beta^{-1}) = ?$

- A) $\{(2, 3), (3, 3), (4, 3), (3, 4), (3, 5)\}$
 B) $\{(3, 2), (3, 3), (4, 3), (3, 4), (5, 3)\}$
 C) $\{(3, 2), (3, 3), (3, 4), (4, 3), (3, 5)\}$
 D) $\{(2, 3), (3, 3), (4, 3), (4, 4), (5, 5)\}$
 E) $\{(3, 2), (4, 2), (5, 2), (2, 5), (3, 5)\}$

 **YANITLAR / ANSWERS**

1	2	3	4	5	6	7	8
A	E	C	C	A	B	A	C
9	10	11	12	13	14	15	16
B	B	C	E	B	D	E	B

BÖLÜM CHAPTER

13

TARİHSEL NOT / HISTORICAL NOTE

Bessel Friedrich Wilhelm [1784 – 1846]

Alman gökbilimci ve matematikçi, Bessel fonksiyonları ortaya çıkarmakla matematiğe büyük katkıda bulunmuştur. Bessel fonksiyonları, diferansiyel denklemlerin elde edilmesinde ve muhtemelen temel fonksiyonlardan sonra mühendislik ve fizik alanında en sık kullanılan fonksiyonlardır.

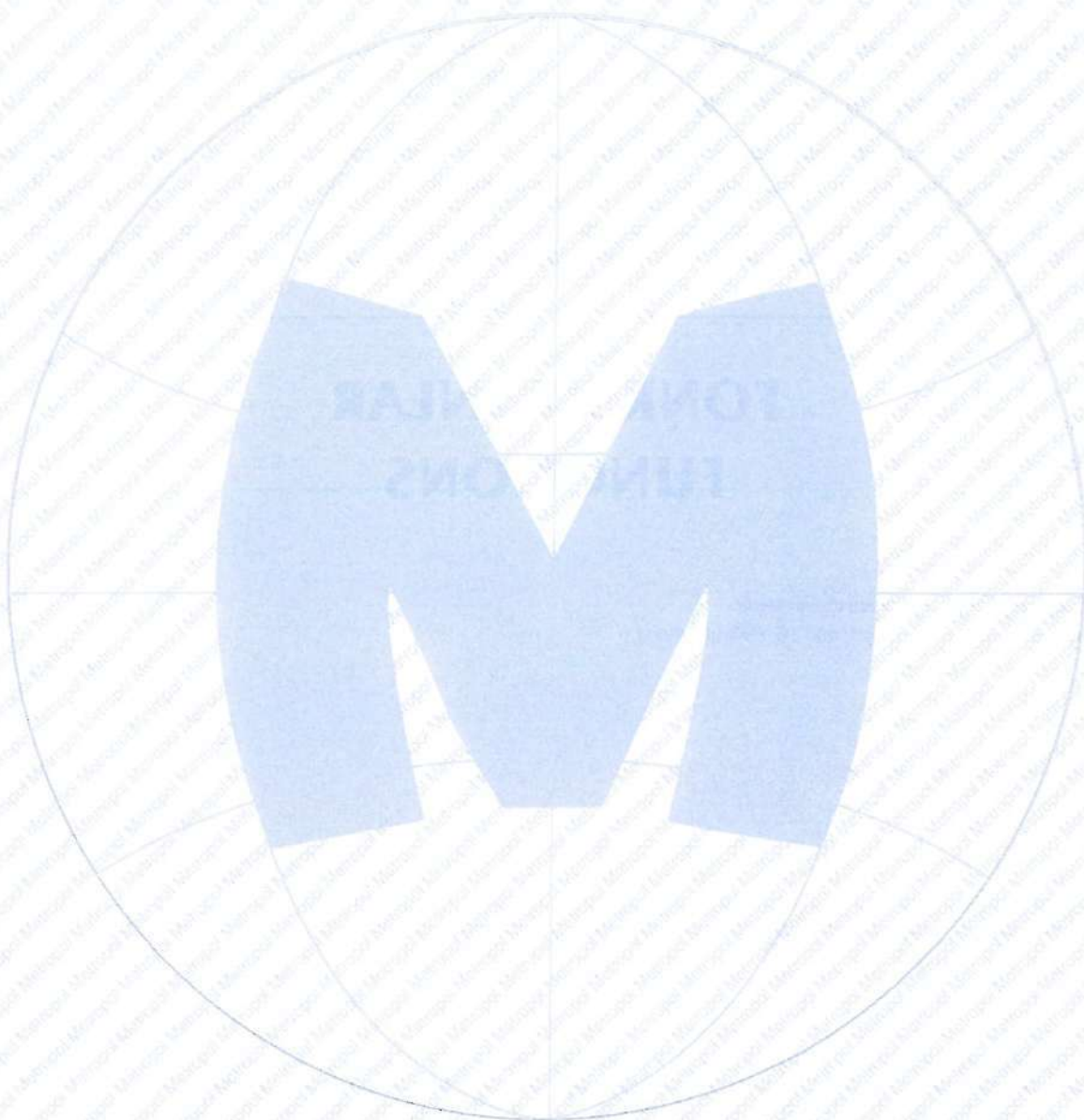
German astronomer and mathematician who made a major contribution to mathematics in the development of what are now called Bessel functions. These functions, satisfy certain differential equations, and probably are the most commonly occurring functions in physics and engineering after the elementary functions.

FONKSİYONLAR FUNCTIONS

Bu bölüm 263 test sorusu, 16 YÖS sorusu içermektedir.
This chapter includes 263 test questions, and 16 YÖS questions.

BÖLÜM / CHAPTER 13

FONKSİYONLAR / FUNCTIONS



1. $f: A \rightarrow B$, $A = \{-1, 0, 1\}$,

$$f(x) = -x - 1$$

$$\Rightarrow B = ?$$

A) $\{-2, -1, 0\}$

C) $\{0, 1, 2\}$

E) $\{-2, 0, 1\}$

B) $\{-1, 0, 1\}$

D) $\{-3, -2, 1\}$

2. $f: A \rightarrow B$,

$$A = \{-2, 1, 2\}$$

$$B = \{-3, -2, -1, 1, 2, 3\}$$

$$f(x) = x^2 - 3 \Rightarrow f = ?$$

A) $\{(-2, 1), (1, -2), (2, 1)\}$

B) $\{(-2, 1), (1, -2)\}$

C) $\{(1, 2), (2, 1), (-2, 1)\}$

D) $\{(-2, -2), (1, 1), (2, 2)\}$

E) $\{(2, 2), (1, 1), (-2, -2)\}$

3. $f: A \rightarrow B$, $A = \{0, 1, 2, 3\}$

$$f(x) = 3x - 6 \Rightarrow B = ?$$

A) $\{-3, -2, -1, 0\}$

C) $\{-6, -3, 3, 6\}$

E) $\{0, 1, 2, 3\}$

B) $\{-6, -3, 0, 3\}$

D) $\{-3, 0, 3, 6\}$

4. $f: A \rightarrow B$ ve / and $A = \{-1, 0, 1, 2\}$

$$f(x) = 2x - 4 \Rightarrow \sum f(A) = ?$$

A) -12

B) -8

C) -6

D) 8

E) 12

5. $f = \{(-2, 3), (2, -1), (3, 1), (5, 4)\}$,

$$g = \{(3, 5), (-2, 4), (4, 3), (1, 2)\}$$

$$\Rightarrow f + g = ?$$

A) $\{(7, 4), (6, 6)\}$

C) $\{(-4, 7), (6, 6)\}$

B) $\{(-2, 7), (3, 6)\}$

D) $\{(1, 8), (0, 3), (7, 4), (6, 6)\}$

E) \emptyset

6. $f: \mathbb{R} \rightarrow \mathbb{R}$,

$$y = f(x) = -3x + 4,$$

$$\Rightarrow f([-2, 3]) = ?$$

A) $[-5, 10]$

D) $[-5, 10]$

B) $(3, 8]$

E) $[-5, 9]$

C) $(4, 7]$

7. $f(x) = x + 3$,

$$g(x) = 3x - 2 \Rightarrow (2f + g)(5) = ?$$

A) 20

B) 23

C) 24

D) 26

E) 29

8. $(f \cdot g)(x) = x^3 - 5x^2 + 3$,

$$f(x) = x^2 - 2 \Rightarrow g(1) = ?$$

A) $-\frac{4}{3}$

D) $\frac{4}{5}$

B) -1

E) 1

C) 0

9. $f(x) = x^2 + x - 1$,
 $g(x) = x^2 - x + 1$
 $\Rightarrow f(1) + g(-1) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

10. $f(x) = 6x^2 - ax + 4$,
 $f(2) = 0 \Rightarrow f(-1) = ?$

- A) 12 B) 16 C) 20 D) 24 E) 28

11. $f(x) = 2^{x+3} \Rightarrow f(x+1) = ?$

- A) $f(x)$ B) $f(x) - 2$ C) $f^2(x)$
 D) $2f(x)$ E) $\frac{f(x)}{2}$

12. $f(x) = x$,
 $f(x) = (a-1)x^4 + (b+4)x^3 + (2-c)x^2 + x + d - 5$
 $\Rightarrow a + b + c + d = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $f(x) = 5x - 6$, $g(x) = 2x + 6$,
 $f(2m) = g(3m) \Rightarrow m = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

14. $f: \mathbb{R}^+ \rightarrow \mathbb{R}$,
 $f(x-1) = x^2 - 2x + 2$,
 $f(a) = 10 \Rightarrow a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

15. $f: \mathbb{R}^+ \rightarrow \mathbb{R}$,
 $f(x^2 + 1) = 8x - 7$
 $\Rightarrow f(10) = ?$

- A) 11 B) 13 C) 15 D) 17 E) 19

16. $f(x) = \begin{cases} -x+1, & x < 0 \\ x-1, & x > 0 \end{cases} \Rightarrow f(-2) + f(3) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

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YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	A	B	A	B	A	E	E
9	10	11	12	13	14	15	16
D	D	D	D	C	C	D	E

1. $f(x) = 3 \cdot 2^x + 2 \cdot 3^x \Rightarrow f(2) = ?$

- A) 15 B) 18 C) 24 D) 28 E) 30

2. $f(x) = 2x^2 + ax - 3,$
 $f(-1) = 3 \Rightarrow f(3) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

3. $f(x) = x^3 - x^2 + x + 1 \Rightarrow f(2) = ?$

- A) 5 B) 6 C) 7 D) 8 E) 9

4. $f(x) = 5x^2 - 3x + 4 \Rightarrow f(-1) + f(1) = ?$

- A) 16 B) 18 C) 20 D) 22 E) 24

5. $f(x, y) = \min(2x, 3y),$

$g(x, y) = \max(5x, 6y)$

$\Rightarrow f(4, 3) + g(2, 3) = ?$

- A) 20 B) 22 C) 24
-
- D) 26 E) 28

6. $f(5x + 1) = 2x^2 + 3x + a,$
 $f(1) = 2 \Rightarrow f(6) = ?$

- A) 3 B) 5 C) 7 D) 9 E) 11

7. $f^2(x + 1) = x^3 + 3x^2 + 3x + 1$
 $\Rightarrow f(4) = ?$

- A) 2 B) 4 C) 8 D) 16 E) 32

8. $f(\sqrt[3]{4x+4}) = 3^{x+2} \Rightarrow f(2) = ?$

- A) 3 B) 9 C) 18 D) 27 E) 81

9. $f(5^x) = 125^x - 5^{-2x} - 5^{2x} \Rightarrow f(3) = ?$

- A) $\frac{160}{3}$ B) $\frac{111}{9}$ C) $\frac{160}{9}$
D) $\frac{161}{9}$ E) $\frac{163}{3}$

10. $f(3x - 7) = 2x^3 + 3x \Rightarrow f(2) = ?$

- A) 48 B) 52 C) 56 D) 63 E) 65

11. $f: \mathbb{R} \rightarrow \mathbb{R}$,

$$f(x) = \begin{cases} x^2 - 3, & x < 2 \\ 3x - 2, & x \geq 2 \end{cases}$$

$\Rightarrow f(3) + f(0) = ?$

- A) 2 B) 4 C) 6 D) 8 E) 12

12. $f(x) = 2^x$,

$f(x) - f(x - 1) = 32 \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

13. $f(x) = 2x - 4 \Rightarrow f(x + 1) = ?$

- A) $2 - f(x)$ B) $f(x) + 2$ C) $2f(x) - 1$
D) $2f(x) + 2$ E) $3f(x) - 3$

14. $f(x) = \frac{f(x+1) \cdot 3}{x}$, $f(4) = 12 \Rightarrow f(1) = ?$

- A) 28 B) 30 C) 42 D) 50 E) 54

15. $(4x - 8) \cdot f(3x + 5) + f(3x - 5) = x^3 + x^2$
 $\Rightarrow f(1) = ?$

- A) 12 B) 14 C) 16 D) 18 E) 20

16. $f(x + 1) = 2f(x) + 4$,

$f(5) = 44 \Rightarrow f(2) = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	C	C	B	D	C	C	D
9	10	11	12	13	14	15	16
D	D	B	E	B	E	A	E

1. $f(x) = x^2 + 1$,
 $g(x) = 8 - 2x$
 $\Rightarrow (2 \cdot f + g)(3) = ?$
 A) 20 B) 21 C) 22 D) 23 E) 24

2. $f(x) = 3x - 4$, $g(x) = x + 1$,
 $2 \cdot f(x) - 4 \cdot g(x) = 2 \Rightarrow x = ?$
 A) 3 B) 4 C) 5 D) 7 E) 9

3. $f(x) = 3(x^2 + 1) + x(x^2 + 3)$
 $\Rightarrow f(\sqrt[3]{5} - 1) = ?$
 A) 7 B) 12 C) 17 D) 27 E) 52

4. $f(x^2 + 1) = 2x^2 + 2$
 $\Rightarrow f(1) + f(2) + \dots + f(11) = ?$
 A) 128 B) 129 C) 132 D) 135 E) 138

5. $f(3x^2 - 4x + 1) = 6x^2 - 8x + 3 \Rightarrow f(6) = ?$
 A) 5 B) 6 C) 9 D) 12 E) 13

6. $f(x + 1) = f(x) + 2$
 $f(1) = 2 \Rightarrow f(10) = ?$
 A) 10 B) 12 C) 14 D) 18 E) 20

7. $f(a-b) = f(a) + f(b)$,
 $f(3) = 4 \Rightarrow f(27) = ?$
 A) 4 B) 8 C) 12 D) 16 E) 20

8. $f(x) = \begin{cases} x-4, & x < 3 \\ x+4, & x \geq 3 \end{cases}$, $g(x) = \begin{cases} \frac{2}{x}, & x > 2 \\ -3, & x \leq 2 \end{cases}$
 $\Rightarrow \frac{f(-2) + g(0)}{f(4) - g(4)} = ?$
 A) $-\frac{6}{5}$ B) $-\frac{3}{5}$ C) $-\frac{2}{15}$
 D) $\frac{3}{5}$ E) $\frac{6}{5}$

9. $f(x+2) = (x+2) \cdot f(x+1)$,

$f(2) = 4 \Rightarrow f(10) = ?$

- A) $10!$ B) $2 \cdot 10!$ C) $4 \cdot 10!$
D) $20!$ E) $24!$

10. $f(x) = 4x - 5 \Rightarrow f(x+3) = ?$

- A) $4x + 1$ B) $4x + 4$ C) $4x + 7$
D) $4x + 12$ E) $4x + 16$

11. $f(x) = 2x^2 + 4 \Rightarrow f(x+3) = ?$

- A) $2x^2 + 12x + 22$ B) $x^2 + 6x + 13$
C) $x^2 + 12x + 22$ D) $2x^2 + 6x + 9$
E) $2x^2 + 6x + 13$

12. $x \in \mathbb{N}^+$

$f(x) = x^2 + 2x \Rightarrow f(x-2) = ?$

- A) $x^2 + 6x$ B) $x^2 + 6x + 4$ C) $x^2 + 12x + 22$
D) $x^2 - 2x$ E) $x^2 + 6x + 8$

13. $f(x) - 2f(-x) = -x^2$

$\Rightarrow f(2) = ?$

- A) -4 B) -2 C) 2 D) 4 E) 8

14. $f: \mathbb{R} - \left\{ \frac{3}{2} \right\} \rightarrow \mathbb{R} - \{0\}$

$f(x) = \frac{5}{2x-3} \Rightarrow f^{-1}(x) = ?$

- A) $\frac{3x}{2x-5}$ B) $\frac{x-3}{2x+5}$ C) $\frac{3x-5}{2x}$
D) $\frac{3x+5}{2x}$ E) $\frac{3x+5}{2x-3}$

15. $f(x) = x^2 + 6x + 8 \Rightarrow f^{-1}(x) = ?$

- A) $\sqrt{x+3} - 1$ B) $\sqrt{x-3} + 1$ C) $\sqrt{x+1} - 3$
D) $\sqrt{x-1} + 3$ E) $\sqrt{x+2} - 1$

16. $f(x) = 2x - 1$,

$g(x-1) = 3x - 1$

$\Rightarrow f^{-1}(5) - g^{-1}(8) = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	D	A	C	E	E	C	A
9	10	11	12	13	14	15	16
B	C	A	D	D	D	C	D

1. $f: \mathbb{R} - \{2\} \rightarrow \mathbb{R} - \{1\}$

$$f(x) = \frac{x-1}{x-2}$$

$$\Rightarrow f(4) \cdot f(5) \cdot f(6) \cdot \dots \cdot f(18) = ?$$

A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{9}{2}$ D) $\frac{15}{2}$ E) $\frac{17}{2}$

2. $f(x) = \begin{cases} x-2, & x < -3 \\ x^2+3, & -3 < x < 4 \\ 2x+1, & 4 \leq x \end{cases}$

$$\Rightarrow f(-4) - f(5) + f(2) = ?$$

A) -17 B) -10 C) -7 D) 7 E) 10

3. $f(x) = \begin{cases} x+5, & x < 2 \\ x-1, & 2 < x < 7 \\ x^2+x+1, & 7 \leq x \end{cases}$

$$\Rightarrow f(1) - f(6) + f(9) = ?$$

A) 92 B) 90 C) 88 D) 86 E) 84

4. $f(x) + f(2x+1) = 6x+10$

$$\Rightarrow f(4) = ?$$

A) 8 B) 12 C) 14 D) 17 E) 21

5. $x \cdot f(x-2) = 2x^2 - 3x + 2a + 8$

$$\Rightarrow f(-1) = ?$$

A) -2 B) -1 C) 0 D) 1 E) 2

6. $f(x) = ax + b,$

$$f(2) = 12,$$

$$f(-1) = 6$$

$$\Rightarrow f(0) = ?$$

A) 2 B) 4 C) 6 D) 8 E) 10

7. $x = \frac{3-2f(x)}{f(x)+4} \Rightarrow f(x) = ?$

A) $\frac{3-4x}{x+2}$

B) $\frac{4x-6}{2x+3}$

C) $\frac{6-5x}{x+2}$

D) $\frac{4x-3}{x+2}$

E) $\frac{3-4x}{x-2}$

8. $f(x) = 3x+6 \Rightarrow f^{-1}(12) = ?$

A) 1 B) 2 C) 3 D) 4 E) 5

9. $f: \mathbb{R} - \{4\} \rightarrow \mathbb{R} - \{6\}$

$$f(x) = \frac{ax-8}{3x-b} \Rightarrow a+b = ?$$

- A) 15 B) 20 C) 24 D) 28 E) 30

10. $f(x) = x^2 - 6x \Rightarrow f^{-1}(x) = ?$

- A) $\sqrt{x+3}+9$ B) $\sqrt{x-9}-3$ C) $\sqrt{x+9}+3$
D) $\sqrt{2x+5}-3$ E) $\sqrt{2x+5}-3$

11. $f(2^{x+1} - 3x - 1) = x + 1 \Rightarrow f^{-1}(4) = ?$

- A) 4 B) 6 C) 9 D) 12 E) 15

12. $f(x) = 2^{2x-3} + 4^{x-1} \Rightarrow f^{-1}(384) = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

13. $f(x) = x^2 + 2, g(x) = 3x - 5 \Rightarrow (f \circ g)(2) = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

14. $f(x) = x + 1, g(x) = x^2 - 3 \Rightarrow (g \circ f)(x) = ?$

- A) $x^2 + x - 1$ B) $x^2 + 2x - 1$ C) $x^2 + 2x - 2$
D) $x^2 - x + 1$ E) $x^2 - 2x + 2$

15. $f(x) = (x+1) \cdot f(x-1), f(0) = 3$
 $\Rightarrow f(4) = ?$

- A) 72 B) 156 C) 234 D) 360 E) 384

16. $A = \{1, 2, 3, 4\}, f: A \rightarrow A, g: A \rightarrow A$

$$f = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 2 \end{pmatrix}, g = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 1 & 3 \end{pmatrix}$$

$$\Rightarrow (f+g)(3) = ?$$

- A) 2 B) 3 C) 4 D) 5 E) 6



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	B	A	B	B	D	A	B
9	10	11	12	13	14	15	16
E	C	B	C	B	C	D	A

1. $f = \{(2, 3), (-2, 1), (1, 4), (3, -1)\}$

$\Rightarrow f(2) + f^{-1}(1) + f(1) - f^{-1}(-1) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

2. $f(x-1) + f(x+1) = 2x^2 + 6$

$\Rightarrow f(x) = ?$

- A) $x^2 + x + 1$ B) $x^2 - 1$ C) $x^2 + 1$
D) $x^2 + 2$ E) $x^2 + 2x$

3. $f(x) + f(-2x) = -6x - 12$

$\Rightarrow f(1) = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

4. $f(x) = c, (c \in \mathbb{R})$

$f(x) = \frac{(a-2b)x^2 + (b-1)x + 9}{4x-3} \Rightarrow a = ?$

- A) -25 B) -22 C) -18 D) -15 E) -10

5. $f\left(\frac{x-1}{3x+2}\right) = \frac{3x+2}{1-x} \Rightarrow f\left(\frac{1}{9}\right) = ?$

- A) -11 B) -9 C) 9 D) 11 E) 13

6. $f(x) = 2x - 5 \Rightarrow f(3x+1) = ?$

- A) $3f(x) + 10$ B) $2f(x) + 12$ C) $3f(x) + 12$
D) $2f(x) + 10$ E) $3f(x) + 18$

7. $f: \mathbb{R} - \{a\} \rightarrow \mathbb{R} - \{b\}$

$f(x) = \frac{2x-3}{5x} \Rightarrow a+b = ?$

- A) $\frac{2}{5}$ B) $\frac{2}{3}$ C) $\frac{1}{5}$ D) $\frac{1}{3}$ E) $\frac{3}{5}$

8. $f: \mathbb{R} \rightarrow [-4, \infty)$

$f(x) = x^2 - 4 \Rightarrow f^{-1}(x) = ?$

- A) $x^2 + 4$ B) $\frac{x^2+4}{2}$ C) $\frac{x^2-4}{4}$
D) $\sqrt{x-4}$ E) $\sqrt{x+4}$

9. $f(x) = ax + b$,
 $f^{-1}(-5) = 2$,
 $f^{-1}(2) = 1 \Rightarrow b - a = ?$
 A) 12 B) 13 C) 14 D) 15 E) 16

10. $f(x) = ax + b$, $f(2) = -1$,
 $f^{-1}(3) = 3 \Rightarrow f^{-1}(7) = ?$
 A) 4 B) 5 C) 6 D) 7 E) 8

11. $f(x) = \frac{ax-1}{x-2}$, $f(x) = f^{-1}(x) \Rightarrow a = ?$
 A) -3 B) -2 C) 0
 D) 2 E) 3

12. $f(x) = \begin{cases} 4 - \frac{x}{3}, & x < 4 \\ 5x + 2, & x \geq 4 \end{cases}$
 $\Rightarrow \frac{(f \circ f)(-3)}{f(-15)} = ?$
 A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) $\frac{4}{3}$ D) $\frac{5}{3}$ E) $\frac{7}{3}$

13. $f(x) = \begin{cases} \frac{1-x}{3}, & x > 0 \\ \frac{x+3}{2}, & x \leq 0 \end{cases}$
 $\Rightarrow (f \circ f \circ f)(1) = ?$
 A) $-\frac{1}{8}$ B) $-\frac{1}{6}$ C) $-\frac{1}{4}$ D) $\frac{1}{4}$ E) $\frac{1}{6}$

14. $f(x) = \begin{cases} x^2 + 4x + 1, & x \geq 1 \\ 2x + 3, & x < 1 \end{cases}$
 $\Rightarrow (f \circ f)(-1) + f^{-1}(-3) = ?$
 A) -3 B) -2 C) 2 D) 3 E) 5

15. $f(x) = 3x - 1$
 $(f \circ f^{-1})(16) = 2a + 4 \Rightarrow f^{-1}(9a + 26) = ?$
 A) 18 B) 21 C) 24 D) 27 E) 32

16. $A = \{a, b, c, d\}$, $f: A \rightarrow A$, $g: A \rightarrow A$,
 $f = \begin{pmatrix} a & b & c & d \\ b & d & a & c \end{pmatrix}$, $g = \begin{pmatrix} a & b & c & d \\ c & a & d & b \end{pmatrix}$, $(h \circ f) = g \Rightarrow h = ?$
 A) $\begin{pmatrix} a & b & c & d \\ b & a & d & c \end{pmatrix}$ B) $\begin{pmatrix} a & b & c & d \\ c & d & b & a \end{pmatrix}$ C) $\begin{pmatrix} a & b & c & d \\ c & a & b & d \end{pmatrix}$
 D) $\begin{pmatrix} a & b & c & d \\ a & b & c & d \end{pmatrix}$ E) $\begin{pmatrix} a & b & c & d \\ d & c & b & a \end{pmatrix}$



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1	2	3	4	5	6	7	8
B	D	C	B	B	C	A	E
9	10	11	12	13	14	15	16
E	A	D	C	B	D	D	E

1. $f(x) = x$

$f(x) = (a-2)x^2 - (2b-7)x + c - 3 \Rightarrow a \cdot b \cdot c = ?$

- A) 18 B) 20 C) 24 D) 28 E) 32

2. $f(x) = 3^{2x-1} \Rightarrow \frac{f(3x)}{f(3x+1)} = ?$

- A)
- $\frac{1}{9}$
- B)
- $\frac{1}{3}$
- C) 0 D) 3 E) 9

3. $f(x) = (2x-3) \cdot (3x+1)$

$\Rightarrow f(1) + f(2) - f(3) = ?$

- A) -21 B) -24 C) -27 D) -30 E) -33

4. $f(x) = \begin{cases} x^2 + 3, & x > 0 \\ x - 1, & x \leq 0 \end{cases}$

$\Rightarrow f(3) + f(-1) + f(2) = ?$

- A) 5 B) 7 C) 11 D) 13 E) 17

5. $f(x) = \frac{ax-4}{x+8},$

$f(x) = f^{-1}(x) \Rightarrow a = ?$

- A) -8 B) -6 C) -4 D) 6 E) 8

6. $f: \mathbb{R} \rightarrow \mathbb{R},$

$f(3x-4) = 4x+2,$

$f^{-1}(2a-6) = 8$

$\Rightarrow a = ?$

- A) 6 B) 9 C) 12 D) 15 E) 18

7. $f(5^{3x+1}) = 10 \cdot 5^{3x} \Rightarrow f^{-1}(2) = ?$

- A) -4 B) 0 C) 1 D) 2 E) 4

8. $f: \mathbb{R} \rightarrow \mathbb{R},$

$f(x) = \frac{2^x - 2^{-x}}{2^x + 2^{-x}}, f^{-1}(a) = 1 \Rightarrow a = ?$

- A)
- $\frac{3}{5}$
- B)
- $\frac{2}{5}$
- C)
- $\frac{1}{5}$
-
- D)
- $-\frac{1}{5}$
- E)
- $-\frac{2}{5}$

9. $\left. \begin{array}{l} f(x) = x - 1 \\ g(x) = x^2 - 1 \\ h(x) = 3x - 3 \end{array} \right\} \Rightarrow (g \circ f \circ h)(2) = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

10. $\left. \begin{array}{l} f(x) = 4x + 1 \\ (g \circ f)(x) = x - 3 \end{array} \right\} \Rightarrow g(-7) = ?$

- A) -5 B) 0 C) 1
D) 2 E) 3

11. $\left. \begin{array}{l} f: \mathbb{R} \rightarrow \mathbb{R}, g: \mathbb{R} \rightarrow \mathbb{R}, \\ f(x) = 3x + 5 \\ (f \circ f)(x) = (g \circ f)(x) \end{array} \right\} \Rightarrow f(1) + g^{-1}(0) = ?$

- A) $\frac{3}{19}$ B) $\frac{3}{17}$ C) $\frac{10}{3}$ D) $\frac{17}{3}$ E) $\frac{19}{3}$

12. $f: A \rightarrow A, g: A \rightarrow A,$
 $A = \{1, 2, 3, 4\},$

$f = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 3 & 1 \end{pmatrix}, g = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 1 & 2 \end{pmatrix} \Rightarrow (f \circ g^{-1})^{-1} = ?$

- A) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 4 & 1 & 3 \end{pmatrix}$ B) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 2 & 1 & 4 \end{pmatrix}$ C) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 2 & 1 \end{pmatrix}$
D) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 2 & 3 & 4 \end{pmatrix}$ E) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 3 & 2 \end{pmatrix}$

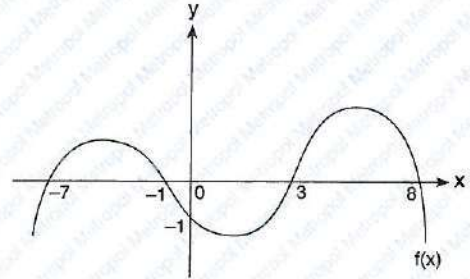
13. $A = \{1, 2, 3, 4\}$

$f = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 3 & 1 & 2 \end{pmatrix}, g = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 2 & 1 \end{pmatrix}$

$\Rightarrow (f \circ g^{-1}) = ?$

- A) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 1 & 2 & 3 \end{pmatrix}$ B) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 4 & 3 \end{pmatrix}$ C) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 2 & 4 \end{pmatrix}$
D) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 2 & 1 & 2 & 3 \end{pmatrix}$ E) $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 4 & 2 & 1 & 3 \end{pmatrix}$

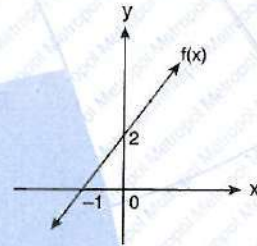
14.



$x \in \mathbb{Z}, 0 \leq f(x) \Rightarrow \sum x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

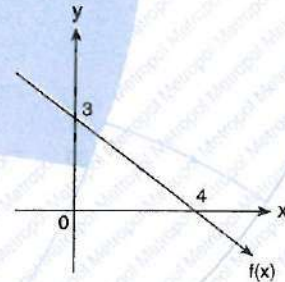
15.



$g(x) = x^2 \cdot f(x) \Rightarrow (g \circ f)(-2) = ?$

- A) -10 B) -8 C) -6 D) -4 E) -2

16.



$\Rightarrow f(0) + f^{-1}(0) = ?$

- A) -4 B) -1 C) 0 D) 3 E) 7

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1	2	3	4	5	6	7	8
A	A	C	E	A	C	C	A
9	10	11	12	13	14	15	16
C	A	E	A	B	D	B	E

1. $f(x) = x^2 + ax + 12$,
 $f(4) = 40 \Rightarrow a = ?$
 A) 1 B) 3 C) 5 D) 7 E) 9

2. $f(5x - 2) = 9x + 13 \Rightarrow f(8) = ?$
 A) 23 B) 25 C) 27 D) 29 E) 31

3. $f(x) = ax + b$,
 $f(2) = 1$
 $f(3) = 4$ } $\Rightarrow f(4) = ?$
 A) 7 B) 9 C) 10 D) 12 E) 14

4. $f(x) = 3x - 1$,
 $g(x) = x^2 + 2$
 $\Rightarrow f(2x + 3) + g(x - 3) = ?$
 A) $x^2 + 8$ B) $x^2 + 10$ C) $x^2 + 13$
 D) $x^2 + 17$ E) $x^2 + 19$

5. $3^{f(x)+1} = x + 3 \Rightarrow f(24) + f(6) = ?$
 A) 3 B) 6 C) 9 D) 12 E) 18

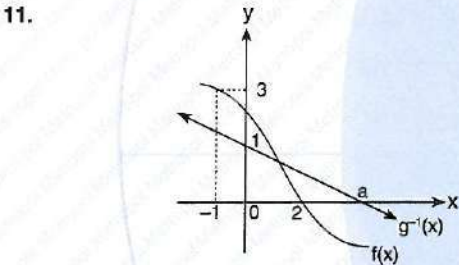
6. $x = \frac{2 - f(x)}{1 - 2f(x)} \Rightarrow f^{-1}(x) = ?$
 A) $\frac{x-2}{2x-1}$ B) $\frac{x-2}{x+1}$ C) $\frac{2x-1}{x-2}$
 D) $\frac{2x-1}{x+1}$ E) $\frac{2x-3}{x-1}$

7. $f: \mathbb{R} - \{a\} \rightarrow \mathbb{R} - \{b\}$,
 $1 + x \cdot f(x) = \frac{2x + 5 \cdot f(x) - 1}{3} \Rightarrow a + b = ?$
 A) $\frac{1}{7}$ B) $\frac{3}{7}$ C) $\frac{5}{7}$ D) $\frac{7}{5}$ E) $\frac{7}{3}$

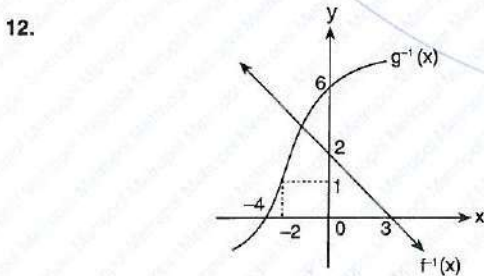
8. $f(x) = 8x \Rightarrow (f \circ f \circ f \circ f)(x) = ?$
 A) $2^8 \cdot x$ B) $2^{10} \cdot x$ C) $2^{12} \cdot x$
 D) $2^{15} \cdot x$ E) $2^{16} \cdot x$

9. $\left. \begin{matrix} f(2x+1) = 4x+1 \\ g(x) = 3x-1 \end{matrix} \right\} \Rightarrow (f \circ g)(x) = ?$
 A) $6x-3$ B) $6x-1$ C) $3x-1$
 D) $3x+1$ E) $3x+2$

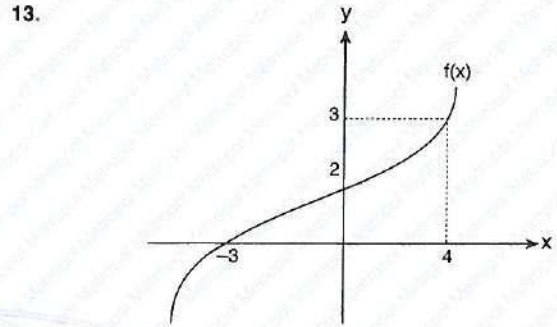
10. $\left. \begin{matrix} a \neq b, \\ f(x) = x-1 \\ g(x) = x^2-2 \\ (g \circ f)(a) = (g \circ f)(b) \end{matrix} \right\} \Rightarrow a+b = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5



- $\frac{(g^{-1} \circ f)(2)}{(g \circ f^{-1})(3)} = \frac{1}{5} \Rightarrow a = ?$
 A) $\frac{2}{5}$ B) $\frac{1}{5}$ C) $\frac{5}{3}$ D) $\frac{5}{2}$ E) 5



- $f[g^{-1}(x+1)] = -6 \Rightarrow x = ?$
 A) -6 B) -3 C) -1 D) 1 E) 3



- $\Rightarrow f(4) + f(0) + f^{-1}(3) = ?$
 A) 8 B) 9 C) 12 D) 15 E) 16

14. $A = \{1, 2, 3, 4, 5\}$
 $f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 1 & 5 & 4 & 2 \end{pmatrix} \Rightarrow f^{-1}(A) = ?$
 A) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 5 & 1 & 4 & 3 \end{pmatrix}$ B) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 1 & 4 & 3 & 5 & 2 \end{pmatrix}$ C) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 1 & 2 & 3 & 4 \end{pmatrix}$
 D) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 5 & 1 & 2 \end{pmatrix}$ E) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 4 & 5 & 1 & 2 & 3 \end{pmatrix}$

15. $A = \{g, \delta, z, d, e\}$
 $f = \begin{pmatrix} g & \delta & z & d & e \\ z & \delta & d & g & e \end{pmatrix}$
 $(f \circ g) = \begin{pmatrix} g & \delta & z & d & e \\ e & \delta & g & z & d \end{pmatrix} \Rightarrow g = ?$
 A) $\begin{pmatrix} g & \delta & z & d & e \\ e & \delta & d & g & z \end{pmatrix}$ B) $\begin{pmatrix} g & \delta & z & d & e \\ \delta & z & d & e & g \end{pmatrix}$ C) $\begin{pmatrix} g & \delta & z & d & e \\ z & d & e & g & \delta \end{pmatrix}$
 D) $\begin{pmatrix} g & \delta & z & d & e \\ d & e & g & \delta & z \end{pmatrix}$ E) $\begin{pmatrix} g & \delta & z & d & e \\ e & g & \delta & z & d \end{pmatrix}$

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1	2	3	4	5	6	7	8
B	E	A	E	A	A	E	D
9	10	11	12	13	14	15	
A	B	D	C	B	A	A	

1. $f: (-5, 3] \rightarrow B$

$f(x) = 3x - 8 \Rightarrow B = ?$

- A) $(-23, 1)$ B) $(-23, 1]$ C) $[-23, 1]$
 D) $(-8, 2]$ E) $[-8, 2]$

2. $f(x) = 3x - 1 \Rightarrow f(2x) = ?$

- A) $f(x) + 1$ B) $2f(x) + 1$ C) $3f(x) + 1$
 D) $3f(x) + 2$ E) $6f(x) + 1$

3. $f: \mathbb{R} - \{1\} \rightarrow \mathbb{R} - \{1\}, f(x) = 1 + \frac{1}{x-1}$

$\Rightarrow f(3) \cdot f(4) \cdot f(5) \cdot \dots \cdot f(16) = ?$

- A) 6 B) 8 C) 10 D) 14 E) 16

4. $2f(x) - f\left(\frac{1}{x}\right) = 8x \Rightarrow f(-2) = ?$

- A) -12 B) -4 C) $-\frac{1}{2}$ D) $-\frac{1}{4}$ E) $-\frac{1}{8}$

5. $\left. \begin{array}{l} f(2x - a) = 6x + 7 \\ f(2) = 4 \end{array} \right\} \Rightarrow a = ?$

- A) -6 B) -3 C) -1 D) 3 E) 6

6. $f: \mathbb{R} - \{a\} \rightarrow \mathbb{R} - \{b\}$

$x = \frac{4f(x)+1}{f(x)-6} \Rightarrow a+b = ?$

- A) 8 B) 10 C) 12 D) 14 E) 16

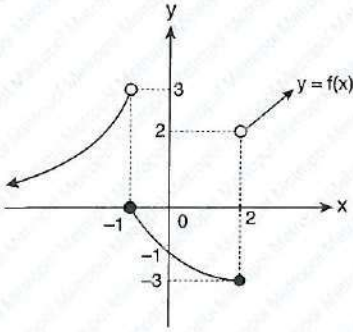
7. $f(2x - 1) = 4x + 3 \Rightarrow f^{-1}(x) = ?$

- A) $\frac{x-1}{2}$ B) $\frac{x-2}{2}$ C) $\frac{x-3}{2}$
 D) $\frac{x-4}{2}$ E) $\frac{x-5}{2}$

8. $f(x) = 4x - 3, f^{-1}(3x - 2) = x + 3 \Rightarrow x = ?$

- A) -11 B) -8 C) -4 D) 4 E) 6

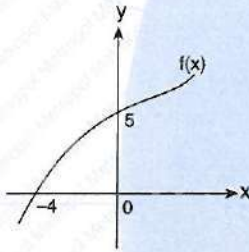
9.



$$\Rightarrow \frac{f(0) + f^{-1}(-3)}{f^{-1}(0)} = ?$$

- A) -1 B) -2 C) -3 D) -4 E) -5

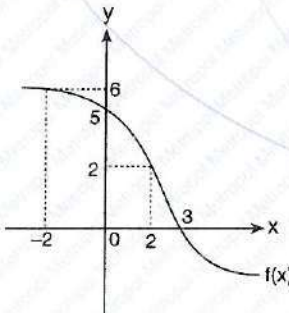
10.



$$f^{-1}(f(x-2)) = f(-4) \Rightarrow x = ?$$

- A) -4 B) -2 C) 2 D) 4 E) 6

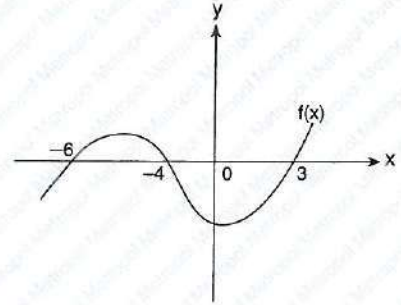
11.



$$\Rightarrow \frac{(f \circ f)(3) + (f \circ f)(2)}{f^{-1}(5) + f^{-1}(6)} = ?$$

- A) $-\frac{9}{2}$ B) $-\frac{7}{2}$ C) $-\frac{3}{2}$ D) $\frac{2}{3}$ E) $\frac{2}{7}$

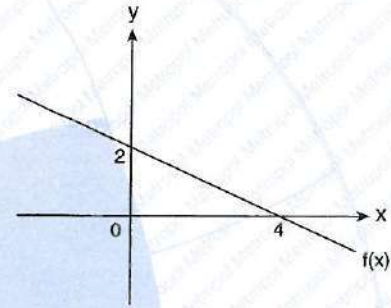
12.



$$x \in \mathbb{Z}, x \cdot f(x) \leq 0 \Rightarrow \sum x = ?$$

- A) -9 B) -6 C) -3 D) 6 E) 9

13.



$$\Rightarrow f^{-1}(-4) = ?$$

- A) 6 B) 8 C) 10 D) 12 E) 14

14. $A = \{a, b, c, d, e\}$

$$f = \begin{pmatrix} a & b & c & d & e \\ b & c & d & e & a \end{pmatrix} \Rightarrow f(f(f(a))) = ?$$

- A) a B) b C) c D) d E) e

15. $A = \{1, 2, 3, 4, 5\}$,

$$f = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 3 & 4 & 2 & 1 \end{pmatrix},$$

$$g = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 4 & 2 & 1 & 5 \end{pmatrix} \Rightarrow (f \circ g)^{-1} = ?$$

- A) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 5 & 2 & 3 & 1 & 4 \end{pmatrix}$ B) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 2 & 3 & 4 & 5 & 1 \end{pmatrix}$ C) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 2 & 1 & 5 & 4 \end{pmatrix}$

- D) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 4 & 1 & 5 & 2 & 3 \end{pmatrix}$ E) $\begin{pmatrix} 1 & 2 & 3 & 4 & 5 \\ 3 & 5 & 1 & 2 & 4 \end{pmatrix}$



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1	2	3	4	5	6	7	8
B	B	B	A	B	B	E	A
9	10	11	12	13	14	15	
A	C	B	A	D	D	A	

1. $f(x + y) = f(x) \cdot f(y)$,
 $f(2) = 4 \Rightarrow f(4) = ?$
 A) 8 B) 16 C) 24 D) 32 E) 64

2. $\left. \begin{array}{l} f(x) = 6x + 1 \\ g(x) = x^2 + 4 \end{array} \right\} \Rightarrow f(2) + g(3) = ?$
 A) 13 B) 16 C) 19 D) 23 E) 26

3. $f(2x + 1) + f(x + 2) + f(3x) = x^2 + 2x - 4$
 $\Rightarrow f(0) + f(1) + f(2) + f(3) = ?$
 A) -4 B) $-\frac{13}{3}$ C) -5 D) $-\frac{16}{3}$ E) $-\frac{19}{3}$

4. $f(x) = \frac{x}{3} \cdot f(x+1)$, $f(5) = \frac{3}{2} \Rightarrow f(3) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

5. $f: \mathbb{R} \rightarrow \mathbb{R}$,
 $f(x - 1) + f(x + 1) = 8x - 18$
 $\Rightarrow f(3) = ?$
 A) 7 B) 3 C) 0 D) -3 E) -6

6. $f\left(\frac{1-x}{x+1}\right) = \frac{x^2 - 3x + 6}{x^2 + 1} \Rightarrow f(1) = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

7. $f(x) = ax + b$,
 $f(x) - f(x - 2) = 6$, $f(2) = 4 \Rightarrow f^{-1}(13) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

8. $f(x) = 5^{x+2} \Rightarrow f(-2) + f^{-1}(5) = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

9. $f: \mathbb{R} - \{a\} \rightarrow \mathbb{R} - \{b\}$

$f(x) = \frac{-3x-5}{1+2x} \Rightarrow a+b = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

10. $f(x) = 3x - 2, (f \circ g)(x) = 9x - 5 \Rightarrow g^{-1}(23) = ?$

- A) 8 B) 10 C) 12 D) 15 E) 18

11. $(f \circ g)(x) = \frac{2f(g(x)) + g^2(x) + 5}{3} \Rightarrow f(4) = ?$

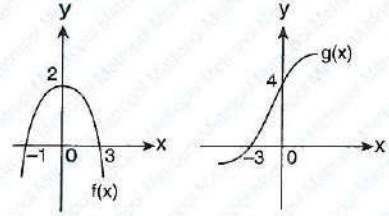
- A) 21 B) 25 C) 36 D) 42 E) 45

12. $f(3x^4 + x^3) = 6x^4 + 2x^3 - 3,$

$g^{-1}(x) = \frac{x+2}{3} \Rightarrow (f \circ g^{-1})^{-1}(1) = ?$

- A) 1 B) 4 C) 8 D) 12 E) 16

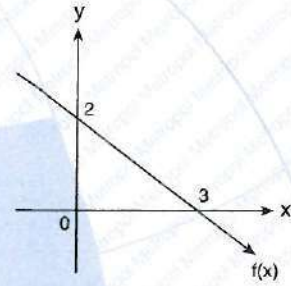
13.



$(g \circ f)(x - 2) = 4 \Rightarrow \sum x = ?$

- A) 6 B) 9 C) 12 D) 15 E) 18

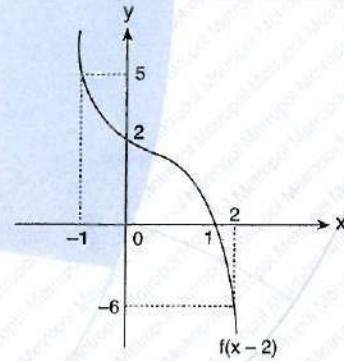
14.



$g(x) = x^2 - 1 \Rightarrow (f^{-1} \circ g)(3) = ?$

- A) -5 B) -8 C) -9 D) -16 E) -20

15.



$\Rightarrow \frac{f(0) + f(-3)}{f^{-1}(2) + f^{-1}(5)} = ?$

- A) $-\frac{1}{3}$ B) $-\frac{1}{5}$ C) $\frac{1}{5}$ D) $\frac{1}{3}$ E) $\frac{1}{2}$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	E	B	B	B	C	D	C
9	10	11	12	13	14	15	
A	A	A	B	A	C	C	

1. $f(2^x - 2) = 7x - 5 \Rightarrow f(14) = ?$

- A) 21 B) 22 C) 23 D) 24 E) 25

2. $f(x) = f(x+1) - 2,$
 $f(0) = 3 \Rightarrow f(9) = ?$

- A) 23 B) 21 C) 18 D) 9 E) 3

3. $f: \mathbb{R} \rightarrow \mathbb{R},$

$f(2x-1) + x + 1 = 12x + 6$

$\Rightarrow f(-1) - f(1) = ?$

- A) -11 B) -9 C) -7 D) -5 E) -3

4. $f(x) = 2^{x-3} \Rightarrow f(3x) = ?$

- A)
- $4 \cdot f^3(x)$
- B)
- $8 \cdot f^3(x)$
- C)
- $16 \cdot f^3(x)$
-
- D)
- $32 \cdot f^3(x)$
- E)
- $64 \cdot f^3(x)$

5. $f(x-1) = x^3 - 3x^2 + 3x - 1 \Rightarrow f(\sqrt[6]{3}) = ?$

- A)
- $\sqrt[3]{3}$
- B)
- $\sqrt{3}$
- C) 1 D) 3 E) 6

6. $(3x-6) \cdot f(3x+1) + f(3x-1) = x^2 + 5 \Rightarrow f(5) = ?$

- A) 5 B) 6 C) 8 D) 9 E) 10

7. $f(x) = \mathbb{R} - \{-1\} \rightarrow \mathbb{R} - \{1\},$

$f(x) = \frac{x}{x+1} \Rightarrow f(2x-1) = ?$

- A)
- $\frac{f(x)-1}{2f(x)}$
- B)
- $\frac{2f(x)-1}{f(x)}$
- C)
- $\frac{2f(x)-1}{2f(x)}$
-
- D)
- $\frac{3f(x)-1}{f(x)}$
- E)
- $\frac{3f(x)-1}{2f(x)}$

8. $f(x+2) = 2f(x) - f(x-2),$

$f(1) = 4,$

$f(3) = 6 \Rightarrow f(7) = ?$

- A) 4 B) 6 C) 7 D) 10 E) 14

9. $f(x) = 2^{x-1} \Rightarrow f(2x + 4) = ?$
 A) $4f^2(x)$ B) $8f^2(x)$ C) $16f^2(x)$ D) $32f^2(x)$ E) $64f^2(x)$

10. $f(2x-3) = \frac{3x+m}{x-1}$
 $f^{-1}(3) = 1 \Rightarrow m = ?$
 A) -2 B) -3 C) -4
 D) -5 E) -6

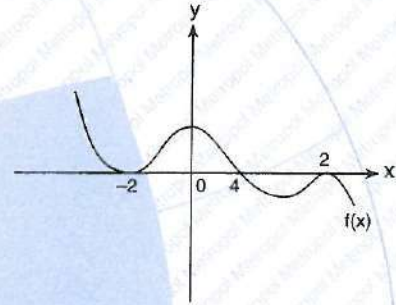
11. $f(2x-3) = \frac{x+2}{3} \Rightarrow f^{-1}(2) = ?$
 A) 4 B) 5 C) 6 D) 7 E) 8

12. $f: R - \{a\} \rightarrow R - \{b\}$,
 $f(x) = \frac{3x-2}{x+1} \Rightarrow a+b = ?$
 A) 1 B) 2 C) 3
 D) 4 E) 5

13. $g(x) = 3x - 1$
 $(g \circ f)(x) = 2f(x) + x \Rightarrow f(x) = ?$
 A) $x - 2$ B) $x - 1$ C) x
 D) $x + 1$ E) $x + 2$

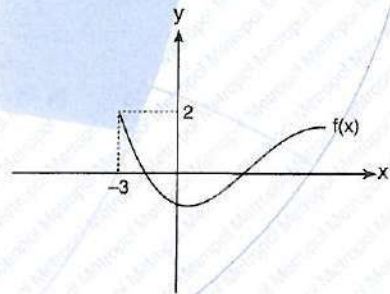
14. $f(x) = 4x - 1$,
 $(g \circ f)(x) = 8x + 5$
 $\Rightarrow g(x) = ?$
 A) $2x - 7$ B) $2x - 5$ C) $2x - 3$
 D) $2x + 3$ E) $2x + 7$

15.



- $f(x) \cdot x > 0 \Rightarrow \sum x = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

16.



- $A = [a, b], f: A \rightarrow R \Rightarrow A = ?$
 A) R B) $(-\infty, -3)$ C) $(-3, 2)$
 D) $[-3, \infty)$ E) \emptyset



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	A	E	B	D	E	D
9	10	11	12	13	14	15	16
D	B	B	B	D	E	C	D

1. $f(2x + 3) = 6x - 1$
 $\Rightarrow f(5) + f(1) = ?$
 A) -4 B) -2 C) 2 D) 4 E) 6

2. $f(mx + 3) = x + 2$
 $f(5) = 4$ } $\Rightarrow m = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

3. $f(x) = \frac{5x-1}{4}$, $f(a) + f(b) = \frac{9}{2} \Rightarrow a + b = ?$
 A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) 1 D) 2 E) 4

4. $f(x) = 4 \cdot f(x - 3)$,
 $f(11) = 36 \Rightarrow f(2) = ?$
 A) $\frac{3}{4}$ B) $\frac{3}{10}$ C) $\frac{3}{16}$ D) $\frac{9}{10}$ E) $\frac{9}{16}$

5. $f(x) = 3^{2x} + 1 \Rightarrow f\left(\frac{x}{2}\right) = ?$
 A) $\sqrt{f(x)-1}$ B) $\sqrt{f(x)+1}$ C) $\sqrt{f(x)-2}$
 D) $\sqrt{f(x)-1}+1$ E) $\sqrt{f(x)+1}-1$

6. $x = \frac{f(x)}{2 \cdot f(x)+5} \Rightarrow f^{-1}(3) = ?$
 A) $\frac{1}{3}$ B) $\frac{3}{10}$ C) $\frac{3}{11}$
 D) $\frac{1}{4}$ E) $\frac{3}{13}$

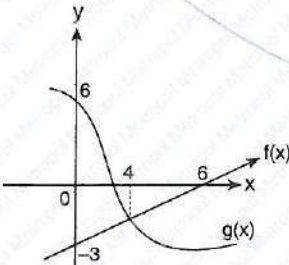
7. $f(x + y) = f(x) \cdot f(y)$,
 $f(16) = 8 \Rightarrow f(64) = ?$
 A) 8^2 B) 8^3 C) 8^4
 D) 8^5 E) 8^6

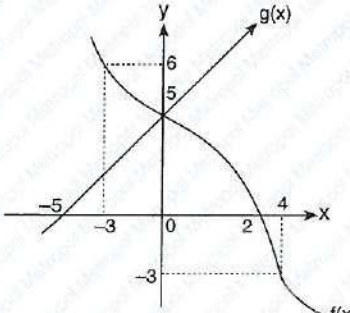
8. $(f \circ f^{-1})(4x + 3) = 15 \Rightarrow x = ?$
 A) 1 B) 2 C) 3
 D) 4 E) 5

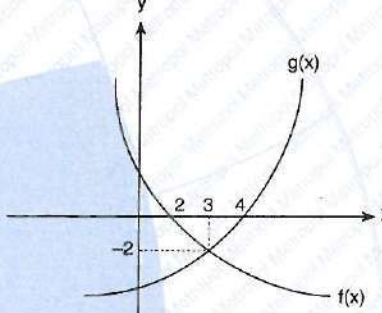
9. $f(x) = \begin{cases} 4 + \frac{x}{3}, & x < 4 \\ 2x - 3, & x \geq 4 \end{cases} \Rightarrow (f \circ f)(3) = ?$
 A) 5 B) 7 C) 9 D) 12 E) 15

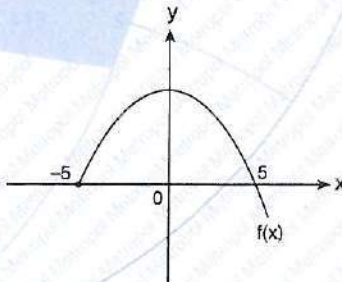
10. $\left. \begin{aligned} f(x) &= x^2 + 3 \\ g(x) &= 2x - 1 \end{aligned} \right\} \Rightarrow (f \circ g)(2) = ?$
 A) 12 B) 18 C) 24 D) 30 E) 36

11. $f(x) + f(2x) + f(4x) = 21x - 9$
 $\Rightarrow (f \circ f)(2) = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

12. 
 $\Rightarrow (f^{-1} \circ g)(4) + (g \circ f^{-1})(-3) = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

13. 
 $\Rightarrow (g^{-1} \circ f)(2) = ?$
 A) -5 B) -3 C) -2 D) 2 E) 3

14. 
 $\Rightarrow (f^{-1} \circ g)(3) = ?$
 A) -2 B) 3 C) 4 D) 2 E) 0

15. 
 $x \in \mathbb{Z}, x \cdot f(x) > 0 \Rightarrow \sum x = ?$
 A) 5 B) 7 C) 9 D) 10 E) 12

 **YANITLAR / ANSWERS**

1	2	3	4	5	6	7	8
B	A	E	E	D	C	C	C
9	10	11	12	13	14	15	
B	A	C	E	A	B	D	

1. $f(4x + 2) = 6x - 7 \Rightarrow f(0) = ?$

- A) -6 B) -8 C) -10 D) -12 E) -14

2. $f(x + 5) = x + 5$

$\Rightarrow f(1) + f(2) + f(3) + \dots + f(29) = ?$

- A) 305 B) 335 C) 385 D) 405 E) 435

3. $f(x) = ax + b,$

$f(2) = 4, f(3) = 9 \Rightarrow f(-2) = ?$

- A) -10 B) -12 C) -16 D) -18 E) -20

4. $f(2^n) = 16 - f(2^{n-1})$

$f(1) = 2 \Rightarrow f(16) = ?$

- A) 2 B) 4 C) 8 D) 16 E) 32

5. $f : \mathbb{R} - \{3\} \rightarrow \mathbb{R} - \{4\},$

$f(x) = \frac{ax-5}{bx-6} \Rightarrow a+b = ?$

- A) 6 B) 8 C) 10 D) 12 E) 15

6. $f(x) = \begin{cases} x^2 + 4x + 1, & x \geq 1 \\ 2x + 1, & x < 1 \end{cases}$

$g(x) = 3x + 6 \Rightarrow (g \circ f)(-1) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

7. $f(x) = 3^{2x-1} + 2 \Rightarrow f^{-1}(11) = ?$

- A)
- $\frac{1}{2}$
- B) 1 C)
- $\frac{3}{2}$
- D) 2 E)
- $\frac{5}{2}$

8. $f^{-1}\left(\frac{x+1}{2}\right) = g(x-2) \Rightarrow (f \circ g)(3) = ?$

- A) -3 B) -2 C) 1 D) 2 E) 3

9. $f: [-1, \infty) \rightarrow [2, \infty)$,

$f(x) = x^2 + 2x + 3 \Rightarrow f^{-1}(x) = ?$

- A) $\sqrt{x-2}$ B) $\sqrt{x-2}-1$ C) $\sqrt{x-2}-2$
 D) $\sqrt{x-2}+1$ E) $\sqrt{x-2}+2$

10. $f: \mathbb{R} \rightarrow \mathbb{R}, g: \mathbb{R} \rightarrow \mathbb{R}$,

$f(x) = 3x - 2$,

$(g^{-1} \circ f)(x) = \frac{3x+1}{2}$

$\Rightarrow g(x) = ?$

- A) $2x - 5$ B) $2x - 3$ C) $2x - 1$
 D) $2x + 1$ E) $2x + 3$

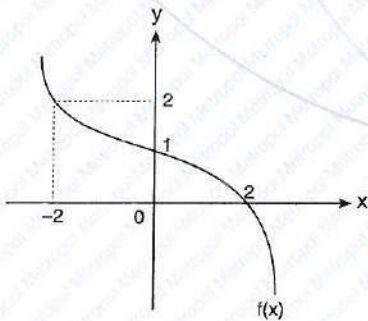
11. $f(x) = 2x$,

$(g \circ f)(x) = \frac{4x}{3} - 2$,

$g(x) = \frac{m}{6}x + n - 4 \Rightarrow m \cdot n = ?$

- A) 6 B) 8 C) 9 D) 12 E) 18

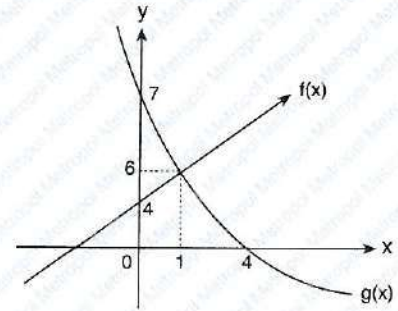
12.



$\Rightarrow (f \circ f \circ f)(-2) = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

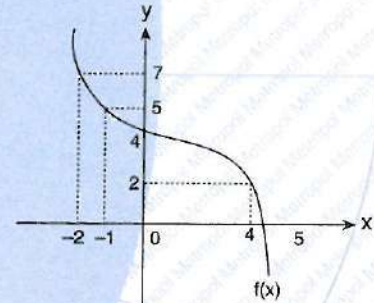
13.



$\Rightarrow \frac{(g \circ f)(0) + g^{-1}(6)}{(f^{-1} \circ g)(1)} = ?$

- A) -2 B) -1 C) 1 D) 2 E) 3

14.



$\Rightarrow \frac{f(4) + f^{-1}(5) + f^{-1}(7)}{2f(-1)} = ?$

- A) $-\frac{3}{10}$ B) $-\frac{1}{5}$ C) $-\frac{1}{10}$ D) $\frac{1}{10}$ E) $\frac{1}{5}$



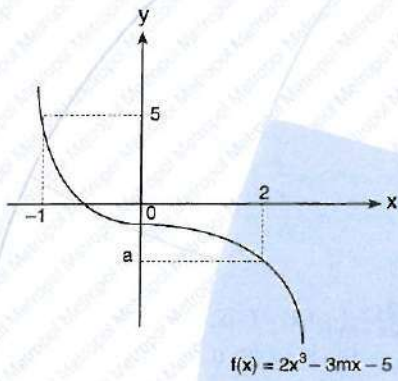
YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	E	C	A	C	C	C	E
9	10	11	12	13	14		
B	B	B	D	C	C		

1. $f(2^x + 3) = 4^x + 2^x - 12 \Rightarrow f(5) = ?$
 A) -10 B) -8 C) -6 D) 6 E) 8
2. $f(2^x) = 8^x + 5 \Rightarrow f(3) = ?$
 A) 12 B) 15 C) 24 D) 32 E) 36
3. $f(x) = \begin{cases} 2x-3, & x < -2 \\ \sqrt{4-x^2}, & -2 \leq x < 1 \\ x-2, & 1 \leq x \end{cases}$
 $\Rightarrow f(-3) + f(0) + f(5) = ?$
 A) -4 B) -2 C) 0 D) 2 E) 4
4. $f(x) = ax + b, f(-1) = 1$
 $f(2) = 7 \Rightarrow f(-2) = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2
5. $f\left(\frac{x-1}{x+1}\right) = \frac{x+2}{x+3} \Rightarrow f(x) = ?$
 A) $\frac{x-3}{4-2x}$ B) $\frac{3-x}{4-2x}$ C) $\frac{3-x}{2x-4}$
 D) $\frac{x+3}{2x-4}$ E) $\frac{x+3}{2x+4}$
6. $f(x) + f(2x) = 6x - 4 \Rightarrow f(3) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
7. $f(x) = 2x + 5 \Rightarrow f(2x + 1) = ?$
 A) $f(x) + 2$ B) $2f(x) - 1$
 C) $2f(x) + 1$ D) $f(x) + 1$
 E) $2f(x) - 3$
8. $f(x) = \frac{3x+3}{2x+m}, f(x) = f^{-1}(x) \Rightarrow m = ?$
 A) -3 B) -2 C) 0 D) 2 E) 3
9. $f(x) = x^2 + x + 1$
 $(g \circ f)(x) = 3x^2 + 3x + 8 \Rightarrow g(4) = ?$
 A) 13 B) 15 C) 17 D) 19 E) 21
10. $(g^{-1} \circ f)(x) = 3x - 1$
 $f^{-1}(8) = 2 \Rightarrow g(5) = ?$
 A) 3 B) 5 C) 8 D) 12 E) 16

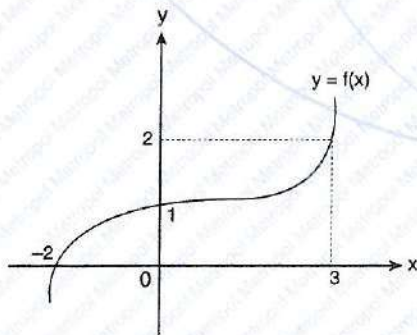
11. $f(x) = 3x + 4$, $(g \circ f)(x) = \frac{6x-2}{12} \Rightarrow g^{-1}(2) = ?$
 A) $\frac{1}{2}$ B) $\frac{3}{4}$ C) 8 D) 15 E) 17

12.



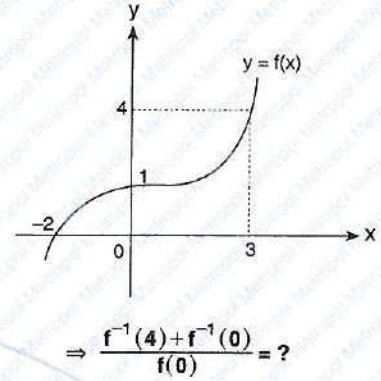
- $\Rightarrow a = ?$
 A) -13 B) -8 C) -6 D) -4 E) -2

13.



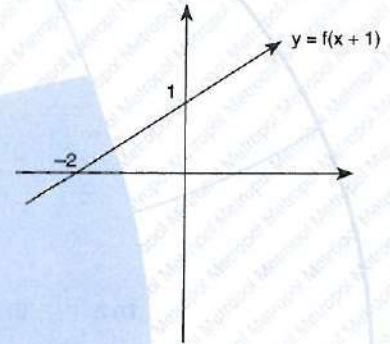
- $\Rightarrow f^{-1}(2) + f(0) - f^{-1}(0) = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6

14.



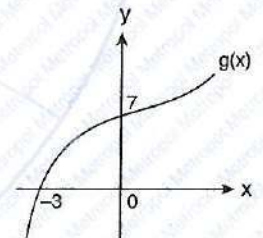
- $\Rightarrow \frac{f^{-1}(4) + f^{-1}(0)}{f(0)} = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

15.



- $\Rightarrow f(5) = ?$
 A) 2 B) $\frac{5}{2}$ C) 3 D) $\frac{7}{2}$ E) 4

16. $f(x+2) = x^2 + ax + 1$,
 $(g^{-1} \circ f)(4) = 0$
 $\Rightarrow a = ?$



- A) -3 B) -2 C) 1 D) 2 E) 3



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	D	A	B	B	D	E	A
9	10	11	12	13	14	15	16
C	C	E	A	E	A	C	C

1. $f(3^x) = 4 \cdot 3^x + 12 \Rightarrow f(x) = ?$

- A) $4x + 3$ B) $4x + 12$ C) $4x + 15$
 D) $3x - 9$ E) $3x - 12$

2. $x \in \mathbb{R}$,

$f(2x^2 - 3x) = 4x^2 - 6x + 7 \Rightarrow f(5) = ?$

- A) 17 B) 19 C) 24 D) 26 E) 28

3. $f(x^{-3} + x^2 + 1) = \frac{x^{-3}}{2} + \frac{x^2}{2} + 2^{-1} + 1 \Rightarrow f(5) = ?$

- A) $\frac{2}{7}$ B) $\frac{3}{7}$ C) $\frac{5}{7}$ D) $\frac{7}{2}$ E) $\frac{7}{3}$

4. $f: \mathbb{R} \rightarrow \mathbb{R}$,

$f(x + 1) = f(x) + 3$,

$f(3) = 4 \Rightarrow f(7) = ?$

- A) 8 B) 10 C) 12 D) 16 E) 18

5. $f\left(\frac{3}{x}\right) = \frac{9 + x^3}{x^2} \Rightarrow f(3x) = ?$

- A) $9x^2 + \frac{1}{x}$ B) $9x^3 + \frac{1}{x^2}$ C) $9x^3 + \frac{1}{x}$
 D) $3x^2 + \frac{1}{x}$ E) $3x^3 + \frac{1}{x}$

6. $f(x) = 3^{2x} + 1 \Rightarrow f\left(\frac{x}{2}\right) = ?$

- A) $\sqrt{f(x)-1}$ B) $\sqrt{f(x)+1}$ C) $\sqrt{f(x)-2}$
 D) $\sqrt{f(x)-1}+1$ E) $\sqrt{f(x)+1}-1$

7. $f(a + b) = f(a) + f(b)$,

$f(1) = 3 \Rightarrow f(97) = ?$

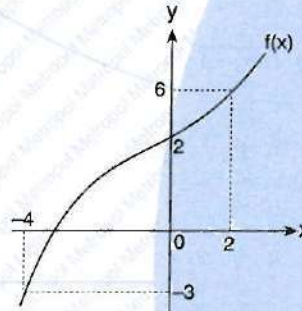
- A) 97 B) 194 C) 291
 D) 388 E) 485

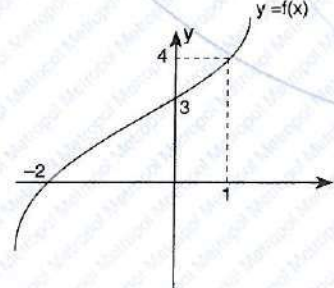
8. $x = \frac{3f(x)-2}{4f(x)-5} \Rightarrow f^{-1}(2) = ?$

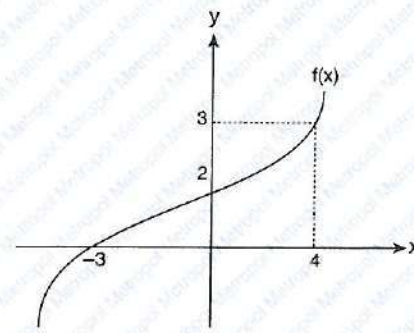
- A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) 1 D) $\frac{4}{3}$ E) $\frac{5}{3}$

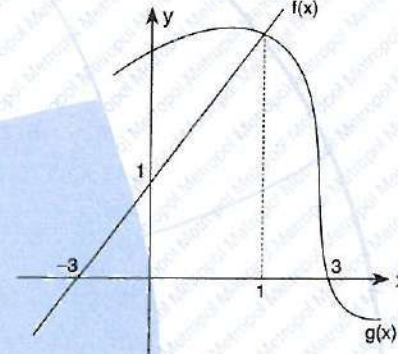
9. $f(x+1) = 2^{x+3} - 1 \Rightarrow f^{-1}(15) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

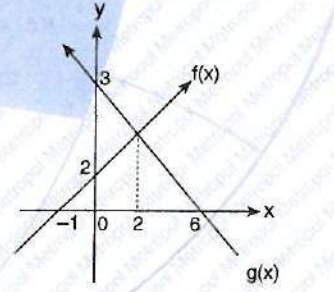
10. $A = \{a, b, c, d, e\}$
 $f: A \rightarrow A$
 $f = \begin{pmatrix} a & b & c & d & e \\ c & d & b & e & a \end{pmatrix} \Rightarrow (f^{-1} \circ f^{-1} \circ f^{-1})(b) = ?$
 A) a B) b C) c D) d E) e

11. 
 $\Rightarrow \frac{(f \circ f)(0)}{f^{-1}(-3)} = ?$
 A) $-\frac{3}{2}$ B) $-\frac{2}{3}$ C) $\frac{2}{3}$ D) $\frac{3}{4}$ E) $\frac{3}{2}$

12. 
 $\Rightarrow (f \circ f)(-2) + f^{-1}(4) = ?$
 A) -6 B) -4 C) 3 D) 4 E) 5

13. 
 $\Rightarrow f(4) + f(0) + f^{-1}(3) = ?$
 A) 8 B) 9 C) 12 D) 15 E) 16

14. 
 $\Rightarrow (f^{-1} \circ g)(1) = ?$
 A) $-\frac{3}{2}$ B) -1 C) 0 D) 1 E) 2

15. 
 $\Rightarrow (f \circ g^{-1})(1) + (g^{-1} \circ f)(3) = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

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 **YANITLAR / ANSWERS**

1	2	3	4	5	6	7	8
B	A	D	D	A	D	C	D
9	10	11	12	13	14	15	
B	E	A	D	B	D	C	

1. $f: \mathbb{R} \rightarrow \mathbb{R}$,

$f(x) = 2x - 1 \Rightarrow f(2x - 1) = ?$

- A) $2x - 1$ B) $4x - 1$ C) $2x - 2$
 D) $4x - 3$ E) $4x - 4$

2. $f(x) = ax + b$,

$f(-1) = 1$,

$f(1) = 3 \Rightarrow f(4) = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

3. $f(2) = 3$,

$f(x+2) + x = f(x+1) + x^2 + 1$

$\Rightarrow f(4) = ?$

- A) 2 B) 3 C) 4 D) 7 E) 9

4. $f(x) = 3^{x-1}$

$\Rightarrow f(x+1) - f(x+2) - 3 \cdot f(x) = ?$

- A) 3^x B) 3^2 C) -3^x D) -3^{x+1} E) 1

5. $f(x) = f(x-1) + x$,

$f(1) = 1 \Rightarrow f(20) = ?$

- A) 205 B) 207 C) 210
 D) 211 E) 213

6. $f(x) = ax + b$,

$f^{-1}(1-x) = 2x + 4$

$\Rightarrow b = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

7. $f(x) = \begin{cases} ax+4, & x < 1 \\ 2x-5, & x \geq 1 \end{cases}$

$(f \circ f)(2) = 2 \Rightarrow a = ?$

- A) -2 B) -1 C) 2 D) 3 E) 4

8. $f(x) = \frac{x+1}{x-1} \Rightarrow (f \circ f)(x) = ?$

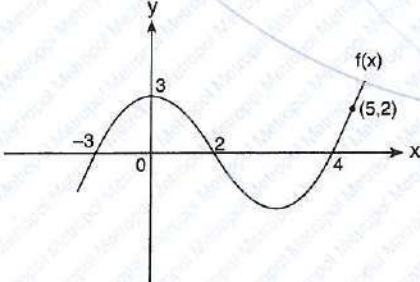
- A) x B) $\frac{2x+1}{5-x}$ C) $\frac{2x-1}{x-5}$
 D) $\frac{2x+1}{x-5}$ E) $\frac{x+1}{x-5}$

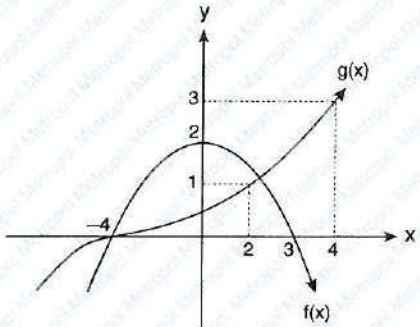
9. $\left. \begin{aligned} (f \circ g)(x) &= g(x) + a \\ f^{-1}(7) &= 2 \end{aligned} \right\} \Rightarrow a = ?$
 A) 2 B) 3 C) 5 D) 7 E) 9

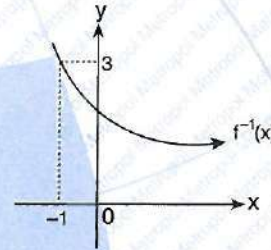
10. $g(x) = 3x^2 - 2, f(x) = 2x + 3 \Rightarrow (g \circ f)(0) = ?$
 A) 24 B) 25 C) 27 D) 30 E) 33

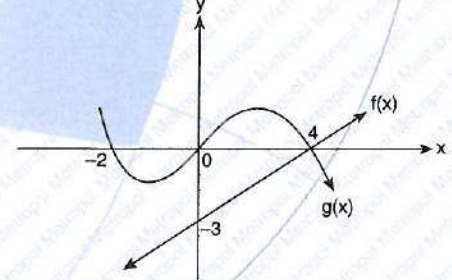
11. $(g \circ f)(x) = \frac{3f(x) - 4}{5} \Rightarrow g^{-1}(1) = ?$
 A) 1 B) 3 C) 5 D) 7 E) 12

12. $f(x) + f(x + 1) = 6x - 5 \Rightarrow f^{-1}(5) = ?$
 A) -3 B) -1 C) 0 D) 1 E) 3

13. 
 $\Rightarrow f(-3) + f(2) + f(0) + f(4) + f(5) = ?$
 A) 6 B) 5 C) 4 D) 3 E) 2

14. 
 $\Rightarrow (g \circ f \circ f)(3) = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

15. 
 $g(x) = x - 3 \Rightarrow (g^{-1} \circ f)(3) = ?$
 A) -2 B) -1 C) 0 D) 1 E) 2

16. 
 $(f \circ g)(x - 2) = -3 \Rightarrow \sum x = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

 YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	D	D	D	C	C	C	A
9	10	11	12	13	14	15	16
C	B	B	E	B	A	E	D

1. $f(x) = x^3 - 3x^2 + 3x - 1$
 $\Rightarrow f(4) = ?$

- A) 6 B) 12 C) 16
 D) 20 E) 27

2. $f\left(\frac{x}{2} - 1\right) = x^2 - 2x + a$,
 $f(-2) = 0 \Rightarrow a = ?$

- A) -1 B) -2 C) -4
 D) -6 E) -8

3. $f(x + y) = f(x) + f(y)$,
 $f(4) = 10 \Rightarrow f(8) = ?$

- A) -15 B) -10 C) 5
 D) 10 E) 20

4. $f(3x - 2) = 2x - 3 \Rightarrow f(x) = ?$

- A) $\frac{2x-5}{3}$ B) $\frac{2x+5}{3}$ C) $\frac{3x+5}{3}$
 D) $\frac{3x-2}{3}$ E) $\frac{2x-2}{3}$

5. $f(x) = f(x-1) + x$,
 $f(1) = 1 \Rightarrow f(10) = ?$

- A) 40 B) 45 C) 50
 D) 55 E) 60

6. $f(x) = 4^{x-1} \Rightarrow f\left(\frac{x-2}{2}\right) = ?$

- A) $\frac{\sqrt{f(x)}}{8}$ B) $\frac{\sqrt{f(x)}}{2}$ C) $\frac{\sqrt{f(x)}}{4}$
 D) $\sqrt{f(x)}$ E) $\frac{1}{\sqrt{f(x)}}$

7. $f: \mathbb{R} - \left\{\frac{1}{2}\right\} \rightarrow \mathbb{R} - \left\{-\frac{3}{2}\right\}$

$f(x) = \frac{-3x+4}{2x-1} \Rightarrow f^{-1}(3) = ?$

- A) $\frac{7}{9}$ B) 1 C) $\frac{11}{9}$ D) $\frac{16}{9}$ E) 2

8. $f: \mathbb{R} \rightarrow \mathbb{R}$,

$f(x) = x + 2$,

$g(x) = \begin{cases} x+1, & x \geq 1 \\ x^2, & x < 1 \end{cases}$

$\Rightarrow (g \circ f)(-3) = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

9. $f(2x - 5) = 3x + 2$,
 $f^{-1}(a + 3) = 7 \Rightarrow a = ?$
 A) 10 B) 12 C) 15 D) 17 E) 20

10. $f(x) = ax + b$
 $g(x) = bx$
 $f(1) = 3, g(-1) = 2$ } $\Rightarrow (f^{-1} \circ g)(6) = ?$
 A) -2 B) -1 C) 2 D) 3 E) 6

11. $f(x) = x^2 + 3x$
 $(f \circ g)(x) = x^2 - 3x \Rightarrow g(x) = ?$
 A) $x - 5$ B) $x - 4$ C) $x - 3$ D) $x - 2$ E) $x - 1$

12. $f(x) = 3x - 1$,
 $g(x) = \frac{3x + 5}{x + 7}$,
 $(g^{-1} \circ f)(x) = -9 \Rightarrow x = ?$
 A) 4 B) 7 C) 9 D) 12 E) 15

13.
 $(f \circ f)(x - 1) = 3 \Rightarrow x = ?$
 A) 4 B) 6 C) 9 D) 10 E) 12

14.
 $\Rightarrow (g^{-1} \circ g \circ f)(6) = ?$
 A) 2 B) 4 C) 6 D) 8 E) 10

15.
 $f(a - 2) = f^{-1}(7) \Rightarrow a = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	E	E	A	D	A	A	D
9	10	11	12	13	14	15	
D	A	C	A	B	B	B	

1. $f(x^2 - 2x - 3) = 4x^2 - 8x - 11$

$\Rightarrow f(x) = ?$

- A) $4x - 1$ B) $4x + 1$ C) $4x + 3$
 D) $4x + 5$ E) $4x + 7$

2. $f\left(\frac{x^2+1}{x^2+2}\right) = x^4 + 3x^2 - 3 \Rightarrow f\left(\frac{2}{3}\right) = ?$

- A) 1 B) 2 C) 3
 D) 4 E) 5

3. $f(x+2) = \frac{x^2+4x+4}{x+3} \Rightarrow f(x) = ?$

- A) $\frac{x^2}{x+1}$ B) $\frac{x^2}{x-1}$ C) $\frac{x}{x+1}$
 D) $\frac{x}{x-1}$ E) $\frac{1}{x+1}$

4. $f(x-1) = \frac{2 \cdot f(x) + 3}{2}$
 $f(1) = 5 \Rightarrow f(3) = ?$

- A) $\frac{1}{2}$ B) 1 C) $\frac{3}{2}$ D) 2 E) $\frac{5}{2}$

5. $f(x) = ax,$

$f(x) - f(-x) = -4x$

$\Rightarrow f(x-1) = ?$

- A) $2x$ B) $2x + 1$ C) $2x + 3$
 D) $-2x + 2$ E) $2x - 1$

6. $f(x-1) = x^2 - 2x + 4$

$\Rightarrow f(x+1) = ?$

- A) $x^2 + 2x + 4$ B) $x^2 - 2x + 7$
 C) $x^2 + 2x + 1$ D) $x^2 + 2x - 7$
 E) $x^2 - 2x - 4$

7. $f(x) = 1 - \frac{1}{x} \Rightarrow f(3x) = ?$

- A) $\frac{4f(x)-1}{3}$ B) $\frac{f(x)}{3}$ C) $\frac{f(x)-2}{3}$
 D) $\frac{f(x)+2}{3}$ E) $\frac{3f(x)-1}{3}$

8. $f(2x-3) = \frac{x+2}{3} \Rightarrow f^{-1}(2) = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

9. $f(x) = 81^x \Rightarrow f^{-1}(27) \cdot f^{-1}\left(\frac{1}{9}\right) = ?$

- A) $-\frac{3}{8}$ B) $-\frac{1}{4}$ C) $\frac{1}{2}$
 D) $\frac{1}{4}$ E) $\frac{3}{8}$

10. $f^{-1}(x^2 - 4) = 4x + 6 \Rightarrow f(-2) = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

11. $g(4) \in \mathbb{R}^+$, $f(x) = x^2 + 4x$,

$(f \circ g)(x) = 2x + 2 \cdot g(x) \Rightarrow g(4) = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

12. $f(x) = 2x - 24$, $g(x) = ax + 3a$,

$(f \circ g)(x) = (g \circ f)(x) \Rightarrow a = ?$

- A) $\frac{2}{3}$ B) $\frac{4}{3}$ C) $\frac{4}{9}$ D) $\frac{7}{9}$ E) $\frac{8}{9}$

13. $f: \mathbb{R} \rightarrow \mathbb{R}$, $g: \mathbb{R} \rightarrow \mathbb{R}$

$f(x) = 3x^2 - 2x$,

$(g \circ f)(x) = 6x^2 - 4x + 7 \Rightarrow g(2) = ?$

- A) 5 B) 7 C) 9 D) 11 E) 13

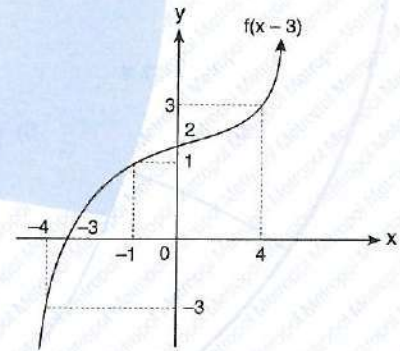
14. $f(x) = 4x - 1$,

$(f \circ g)(x) = 8x + 11$

$\Rightarrow g(x) = ?$

- A) $3x - 2$ B) $3x - 1$ C) $2x - 2$
 D) $2x + 2$ E) $2x + 3$

15.



$\Rightarrow (f \circ f)(-4) - (f \circ f)^{-1}(2) = ?$

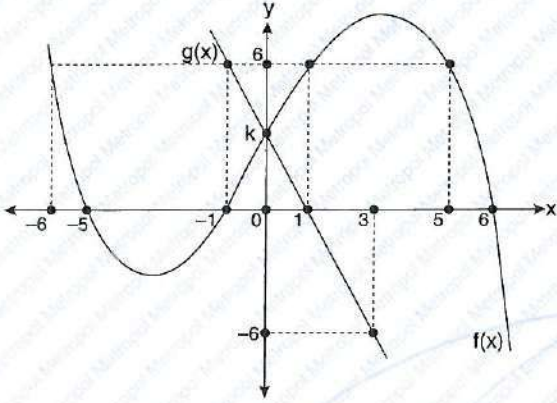
- A) -10 B) -5 C) 0 D) 5 E) 10



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	A	A	D	D	A	D	B
9	10	11	12	13	14	15	
A	C	B	E	D	E	E	

1.

 $x \perp y, k \in \mathbb{R}$

$$(f \circ f \circ f)(-6) = g^{-1}(-6) \Rightarrow \frac{(f \circ g)(k)}{(g^{-1} \circ f)(k+2)} = ?$$

- A) 1 B) 2 C) -6 D) -2 E) 6

[ANKARA ÜNİVERSİTESİ - YÖS 2020]

2. $f: \mathbb{R} \rightarrow \mathbb{R}$ $g: \mathbb{R} \rightarrow \mathbb{R}$

$$f(x) = \begin{cases} -\frac{1}{x}, & x > 0 \\ 2^x - 1, & x \leq 0 \end{cases}$$

$$g(x) = \begin{cases} 1 - x, & x \geq -\frac{1}{2} \\ x + 1, & x < -\frac{1}{2} \end{cases}$$

 $\Rightarrow (f \circ g \circ f)(3) = ?$

- A) -2 B) -4 C)
- $\frac{4}{3}$
- D)
- $\frac{1}{2}$
- E)
- $-\frac{1}{4}$

[ANKARA ÜNİVERSİTESİ - YÖS 2020]

3. $f(x) = 2(x-1)$

$$\Rightarrow \underbrace{(f \circ f \circ \dots \circ f)}_{50 \text{ tane / times}}(x) = ?$$

- A)
- $2^{50}(x-1) - 2$
- B)
- $2^{50}(x-1)$
- C)
- $2^{50}(x-2) + 2$
-
- D)
- $2^{50}(x-2) - 2$
- E)
- $2^{51}(x-1)$

[ONDOKUZ MAYIS ÜNİVERSİTESİ - YÖS 2020]

4. $(f \circ h)(x) = 4h(x) - 2$

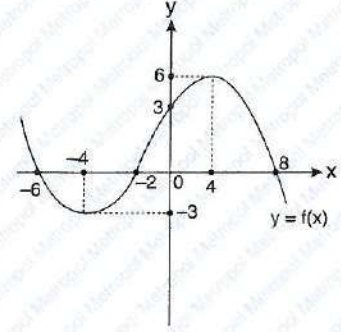
$(h \circ f)(x) = 5f(x) + 3$

ise / if $f(0) + (f \circ h)(-2) = ?$

- A) -32 B) -16 C) 0 D) 16 E) 32

[ONDOKUZ MAYIS ÜNİVERSİTESİ - YÖS 2020]

5.



$$g(x-1) = 2f(x-4) - (x+1) \cdot f(x+4) \Rightarrow g(-1) = ?$$

- A) -12 B) -9 C) -6 D) 0 E) 2

[İSTANBUL ÜNİVERSİTESİ - YÖS 2019]

6.

$$g(x) = \frac{3g(x)-1}{2-x} \Rightarrow 2(g^{-1}(2))^2 = ?$$

- A) 0 B)
- $\frac{1}{2}$
- C) 1 D)
- $\frac{3}{2}$
- E)
- $\frac{9}{2}$

[İSTANBUL ÜNİVERSİTESİ - YÖS 2019]

$$7. \left. \begin{aligned} f(x-1) &= \frac{5}{7} + f(x) \\ f(1) &= 28 - f(29) \end{aligned} \right\} \Rightarrow f(1) = ?$$

- A) 24 B) 28 C) 38 D) 44 E) 48

[İSTANBUL ÜNİVERSİTESİ - YÖS 2019]

$$8. f(x) = \begin{cases} 1 & ; x = 1 \\ f(x+1) = x \cdot f(x) & ; x \geq 1 \end{cases} \Rightarrow f(101) = ?$$

- A) 101! B) 100! C) 101·100
-
- D) 100·99 E) 99!

[YILDIZ TEKNİK ÜNİVERSİTESİ - YÖS 2019]

9. $6 \cdot f\left(\frac{x}{7}\right) = f\left(\frac{7}{x}\right) + 3x + a$
 $f(1) = 5 \Rightarrow a = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2019]

10. $f\left(\frac{2}{x}\right) = \frac{3x}{2x+1} \Rightarrow f(x) = ?$

- A) $\frac{3}{x+1}$ B) $\frac{6}{x+4}$ C) $\frac{2x+1}{3x}$

- D) $\frac{4x+2}{6x}$ E) $\frac{x+1}{5}$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

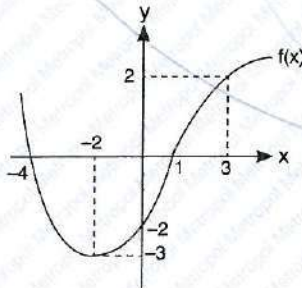
11. $x = \frac{3 \cdot f(x) + 2}{2 \cdot f(x) - 4} \Rightarrow f^{-1}(x) = ?$

- A) $\frac{2x-4}{3x-2}$ B) $\frac{3x-4}{2x-5}$ C) $\frac{3x+2}{2x-4}$

- D) $\frac{4x-3}{3x-2}$ E) $\frac{1}{x}$

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

12.



$\Rightarrow f^{-1}(2) + (f \circ f)(1) = ?$

- A) 4 B) 3 C) 1 D) -1 E) -2

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

13. $f: \mathbb{R} \rightarrow \mathbb{R}, g: \mathbb{R} \rightarrow \mathbb{R}$

$f(x+1) = -2x^4 - 8x^3 - 12x^2 - 8x - 2$

$g(x) = x^3 - 8 \Rightarrow (g \circ f)(-1) = ?$

- A) 16 B) 7 C) 0 D) -7 E) -16

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2018]

14. $f\left(\frac{x}{3}\right) + 2f\left(\frac{3}{x}\right) = 2x - 1 \Rightarrow f(2) + f(1) = ?$

- A) $-\frac{10}{3}$ B) $-\frac{2}{3}$ C) $-\frac{7}{3}$ D) -2 E) -3

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2018]

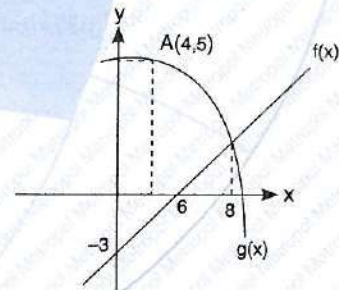
15. $f(x-1) = \frac{2}{3} + f(x)$

$f(0) = 36 - f(21) \Rightarrow f(0) = ?$

- A) 20 B) 25 C) 30 D) 35 E) 40

[İSTANBUL ÜNİVERSİTESİ – YÖS 2017]

16.



$\Rightarrow (g \circ f^{-1})(-1) + (f^{-1} \circ g)(8) = ?$

- A) 10 B) 12 C) 13 D) 14 E) 16

[İSTANBUL ÜNİVERSİTESİ – YÖS 2017]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	B	C	A	A	B	A	E
9	10	11	12	13	14	15	16
D	B	C	C	E	B	B	C

BÖLÜM CHAPTER

14

TARİHSEL NOT / HISTORICAL NOTE

Borel Felix Edouard Justin Emile [1871 - 1956]

Yunan gökbilimci ve matematikçi. Bessel fonksiyonları, diferansiyel denklemlerin elde edilmesinde, fonksiyonlardan sonra mühendislik ve fizik alanında sık kullanılır.

German astronomer and mathematician who made a major contribution to mathematics in the development of what are now called Bessel functions. These functions, which satisfy certain differential equations, and probably the most commonly occurring functions in physics and engineering after the elementary functions.

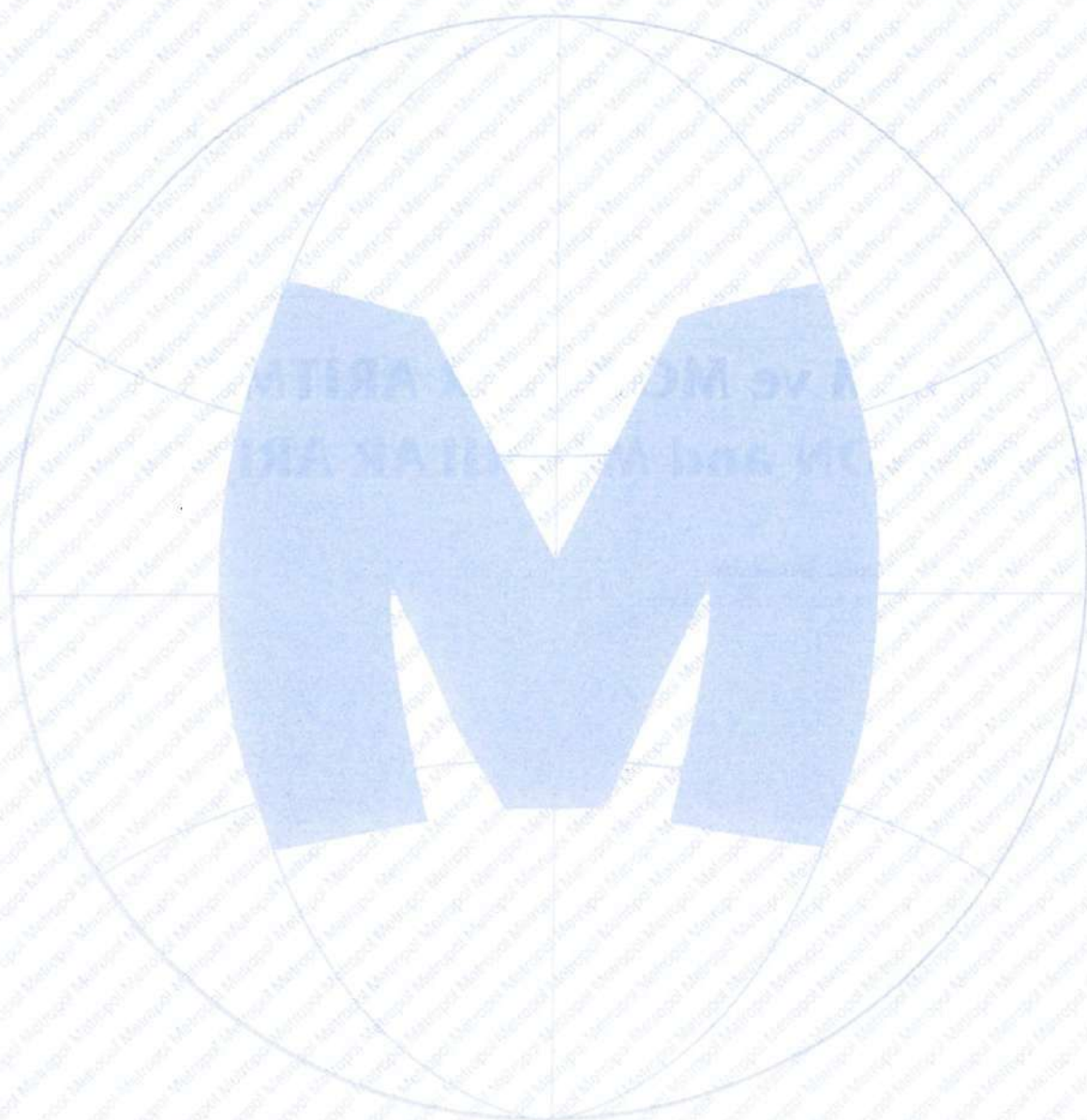
İŞLEM ve MODÜLER ARİTMETİK OPERATION and MODULAR ARITHMETIC

Bu bölüm 143 test sorusu ve 16 YÖS sorusu içermektedir.
This chapter includes 143 test questions and 16 YÖS questions.

BÖLÜM / CHAPTER 14

İŞLEM ve MODÜLER ARİTMETİK / OPERATION and MODULAR ARITHMETIC

- İşlem ve Modüler Aritmetik / Operation and Modular Arithmetic 377 - 398



BÖLÜM
14
CHAPTER

İŞLEM ve MODÜLER ARİTMETİK
OPERATION and MODULAR ARITHMETIC

Bölüm / Chapter **14**

İşlem ve Modüler Aritmetik / Operation and Modular Arithmetic

Test **1**

1. $x \bullet y = (x - y)^2 + xy$
 $\Rightarrow (2 \bullet -1) \bullet 1 = ?$

- A) 20 B) 23 C) 30 D) 37 E) 43

2. $a \square b = 2a - b^2$
 $a \Delta b = a^b + b$
 $\Rightarrow (2 \Delta 1) \square (3 \Delta 2) = ?$

- A) -110 B) -113 C) -115
D) -120 E) -125

3. $a \Delta b = \sqrt{a+b-2\sqrt{ab}}$
 $\Rightarrow 121 \Delta 16 = ?$

- A) 1 B) 3 C) 5 D) 7 E) 9

4. $a, b \in \mathbb{R}^+$
 $\frac{1}{a-1} \circ \frac{1}{b^2} = a+b-2$
 $\Rightarrow -2 \circ 4 = ?$

- A) -2 B) $-\frac{1}{2}$ C) -1 D) $\frac{1}{2}$ E) 1

5. $x \square y = x - y + 2$
 $x \Delta y = x + y + (y \square x)$
 $\Rightarrow 15 \Delta 5 = ?$

- A) 5 B) 12 C) 15 D) 20 E) 25

6. $x \heartsuit y = x - y + 2$
 $x \blacksquare y = x + y + 2$
 $2 \heartsuit (3 \blacksquare m) = -2 \Rightarrow m = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

7. $x^3 \blacktriangle y^2 = x^3 - 3x^2y + 3xy^2 - y^3$
 $\Rightarrow 27 \blacktriangle 16 = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

8. $(2a + 1) \blacktriangle (2b - 1) = a^2 - b + ab$
 $\Rightarrow 3 \blacktriangle 3 = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

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9. $\sqrt[3]{x} \circ \sqrt[4]{y} = x - 2y + 4$
 $\Rightarrow 5 \circ 3 = ?$
 A) -25 B) -30 C) -33 D) -38 E) -42

10. $y \in \mathbb{R}^+$
 $\frac{1}{x} \bullet \frac{1}{y^2} = \frac{x+y}{x-y}$
 $\Rightarrow 3 \bullet 4 = ?$
 A) -1 B) -2 C) -3 D) -4 E) -5

11. $(x+y) \Delta (x-y) = x^2 - y^2 + 1$
 $\Rightarrow 4 \Delta 8 = ?$
 A) 30 B) 31 C) 32 D) 33 E) 34

12. $x \Delta y = y \Delta x$
 $2(x \Delta y) = x^2 + xy - (y \Delta x)$
 $\Rightarrow 1 \Delta 2 = ?$
 A) -1 B) 0 C) 1 D) 2 E) 3

13. $x \diamond y = 2(y \diamond x) + 2x - y$
 $\Rightarrow 4 \diamond 5 = ?$
 A) -5 B) -4 C) -3 D) -2 E) -1

14. $A = \{G, E, Z, I\}$

Δ	G	E	Z	I
G	I	G	E	Z
E	G	E	Z	I
Z	E	Z	I	G
I	Z	I	G	E

- $x \Delta x = x^2 \Rightarrow (G \Delta I)^2 \Delta (Z \Delta E)^2 = ?$
 A) $G \Delta Z$ B) $E \Delta Z$ C) $Z \Delta I$
 D) $I \Delta E$ E) $Z \Delta Z$

15. $A = \{A, B, C, D, E\}$

Δ	A	B	C	D	E
A	C	D	E	A	B
B	D	E	A	B	C
C	E	A	B	C	D
D	A	B	C	D	E
E	B	C	D	E	A

- $x \Delta x = x^2 \Rightarrow (E \Delta D)^{-1} \Delta B = ?$
 A) A B) B C) C D) D E) E

16. $A = \{1, 2, 3, 4, 5\}$

Δ	1	2	3	4	5
1	2	3	4	5	1
2	3	4	5	1	2
3	4	5	1	2	3
4	5	1	2	3	4
5	1	2	3	4	5

- $x \Delta x = x^2 \Rightarrow (1 \Delta 5)^{-2} = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	C	D	C	B	A	B	A
9	10	11	12	13	14	15	16
C	E	D	C	A	A	A	C

1. $a \star b = b^a - a^4$
 $\Rightarrow (-1) \star 2 = ?$

- A) $\frac{1}{2}$ B) $-\frac{1}{2}$ C) 2
 D) -1 E) $\frac{5}{2}$

2. $a \blacktriangle b = b - a$,
 $2 \blacktriangle (1 \blacktriangle k) = 5 \Rightarrow k = ?$

- A) 2 B) $\frac{3}{4}$ C) 5
 D) $-\frac{6}{5}$ E) 8

3. $a \odot b = a^b - \frac{a}{b}$
 $\Rightarrow (4 \odot 2) \odot (-1) = ?$

- A) -13 B) 14 C) $\frac{197}{14}$
 D) $\frac{195}{14}$ E) $\frac{13}{14}$

4. $a \square b = 2a + b - 1$,
 $a \blacklozenge b = a + 2b - 1$,
 $(3 \square m) \blacklozenge (m \square 3) = 98$
 $\Rightarrow m = ?$

- A) 14 B) 16 C) 18
 D) 20 E) 22

5. $a \circ b = a + b - 9$,
 $a \blacksquare b = (a \circ b) + 3$
 $\Rightarrow \frac{2^{a \blacksquare b}}{2^{a \circ b}} = ?$

- A) 8 B) 16 C) 32
 D) 64 E) 128

6. $a \blacktriangle b = \begin{cases} 0, & a < b \\ 1, & a = b \\ 2, & a > b \end{cases}$
 $\Rightarrow (2 \blacktriangle 3) \blacktriangle (2 \blacktriangle -1) = ?$

- A) 4 B) 3 C) 2
 D) 1 E) 0

7. $\frac{1}{a \blacktriangle b} = b^a - a \cdot b$,
 $2 \blacktriangle b = -1 \Rightarrow b = ?$

- A) 1 B) 2 C) 3
 D) 4 E) 5

8. $a \Delta b = 3a + 3b + 2ab + 3$,
 $a \Delta e = a \Rightarrow e = ?$

- A) -2 B) -1 C) 0
 D) 1 E) 2

9. $x \star y = \frac{x-y}{x+y}$
 $x \blacksquare y = 2xy - 1$
 $(1 \blacksquare 5) \star m = \frac{2}{3} \Rightarrow m = ?$

- A) 7 B) 12 C) $\frac{1}{2}$
 D) $\frac{9}{5}$ E) $-\frac{4}{5}$

10.

★	M	E	H	R	A	N
M	M	E	H	R	A	N
E	E	H	R	A	N	M
H	H	R	A	N	M	E
R	R	A	N	M	E	H
A	A	N	M	E	H	R
N	N	M	E	H	R	N

$(M \star N) \star x = H \Rightarrow x = ?$

- A) M B) N C) H
 D) R E) A

11.

★	U	L	R	İ	C	H
U	L	R	C	H	İ	U
L	R	İ	H	U	C	L
R	İ	C	U	L	H	R
İ	C	H	L	R	U	İ
C	H	U	R	İ	L	C
H	U	L	İ	C	R	H

$\Rightarrow (U \star L) \star (R \star C) = ?$

- A) U B) L C) R
 D) İ E) C

12.

A	R	M	Z	N
R	N	Z	M	R
M	Z	M	R	N
Z	M	R	N	Z
N	R	N	Z	M

$\Rightarrow (R A M) A (Z A N) = ?$

- A) R B) M C) Z
 D) N E) R^{-1}

13. $a \star a = a^2$

★	a	b	c	d	e
a	b	c	d	a	e
b	c	d	a	e	b
c	d	a	e	b	c
d	a	e	b	c	d
e	e	b	c	d	a

$\Rightarrow (a \star e) \star (e^2 \star b^2) = ?$

- A) e B) d C) c
 D) b E) a

14. $y \circ y = y^2$

○	1	2	3	4	5
1	1	2	3	4	5
2	2	3	4	5	1
3	3	4	5	1	2
4	4	5	1	y	3
5	5	x	2	3	4

$\Rightarrow (x \circ 1)^{-1} \circ (y^2 \circ 3) = ?$

- A) 1 B) 2 C) 3
 D) 4 E) 5

15. $a \Delta b = b \Delta a$
 $a \Delta b = 3a + 3b - 2(b \Delta a)$
 $\Rightarrow \frac{2}{5} \Delta \frac{3}{5} = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5



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1	2	3	4	5	6	7	8
B	E	C	C	A	E	A	B
9	10	11	12	13	14	15	
D	D	C	D	A	E	A	

1. $x \Delta y = x^2 - xy \Rightarrow (2 \Delta 1) \Delta 3 = ?$
A) -4 B) -2 C) 2 D) 4 E) 6

2. $a \Delta b = a^2 - b^2$
 $a \square b = a \cdot b - a + b$
 $\Rightarrow (3 \Delta 2) \square (2 \Delta 1) = ?$
A) 10 B) 11 C) 12 D) 13 E) 14

3. $x \Delta y = 2x + y - 2m + 3$
 $2 \Delta 3 = -4 \Rightarrow m = ?$
A) 5 B) 6 C) 7 D) 8 E) 10

4. $x \Delta y = x + 2y - 3$
 $x \square y = 3x + (y \Delta x)$
 $\Rightarrow (2 \Delta 1) \square 3 = ?$
A) 5 B) 6 C) 7 D) 8 E) 10

5. $x \Delta y = x - y + x \cdot y$
 $2 \Delta m = 8 \Rightarrow m = ?$
A) 4 B) 5 C) 6 D) 7 E) 8

6. $x \Delta y = x^2 - y - 3$
 $(3 \Delta 4) \Delta m = -12 \Rightarrow m = ?$
A) 9 B) 10 C) 11 D) 12 E) 13

7. $x \square y = x + y - 4$
 $x \Delta y = x + y + 2xy$
 $3 \square (2 \Delta m) = 16 \Rightarrow m = ?$
A) 2 B) 3 C) 4 D) 5 E) 6

8. $(a - 1) \Delta (b + 1) = a \cdot b + 2 \Rightarrow 4 \Delta 6 = ?$
A) 24 B) 25 C) 26 D) 27 E) 28

9. $x \Delta (x + y) = x^2 + 2xy - 1 \Rightarrow 2 \Delta 5 = ?$

- A) 10 B) 11 C) 13 D) 14 E) 15

10. $\sqrt{x} \Delta \sqrt[3]{y} = 2x - 3y + x \cdot y \Rightarrow 3 \Delta 2 = ?$

- A) 66 B) 68 C) 70 D) 72 E) 74

11. $\frac{1}{x} \Delta \frac{1}{y} = \frac{x+y}{x \cdot y}$

$\Rightarrow 2 \Delta 3 = ?$

- A) 4 B) 5 C) 6 D) 8 E) 10

12. $a, b \in \mathbb{R}^+$

$x \square y = \frac{x}{y} + \frac{y}{x}$

$a \cdot b = 3$

$a \square b = 14 \Rightarrow a - b = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

13. $x \Delta y = \begin{cases} x^3, & x < y \\ y^2, & x \geq y \end{cases}$

$\Rightarrow (-2 \Delta 3) \Delta (5 \Delta 2) = ?$

- A) -512 B) -8 C) 0 D) 8 E) 512

14. $a \square b = a^2 + b^2$

$15 \square 20 = m \square 7 \Rightarrow m = ?$

- A) 18 B) 19 C) 21 D) 23 E) 24

15.

Δ	C	A	N	E	R
C	R	C	A	N	E
A	C	A	N	E	R
N	A	N	E	R	C
E	N	E	R	C	A
R	E	R	C	A	N

$x \Delta x = x^2 \Rightarrow (N \Delta R)^{-2} = ?$

- A) C B) A C) N D) E E) R

16. $a \Delta b = \min(2a, 1 - b)$

$a \square b = \max(a^2, b + 3)$

$\Rightarrow (2 \Delta 2) \square (2 \square 2) = ?$

- A) 6 B) 8 C) 10 D) 12 E) 14



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1	2	3	4	5	6	7	8
B	D	C	A	C	E	B	D
9	10	11	12	13	14	15	16
E	A	B	C	A	E	D	B

1. $x \Delta y = x^y - y^x + 2xy$

$\Rightarrow 3 \Delta 2 = ?$

- A) 9 B) 11 C) 13 D) 15 E) 17

2. $x \square y = x + 2y$

$x \Delta y = y - x$

$\Rightarrow (1 \square 2) \Delta (1 \square 3) = ?$

- A) 2 B) 4 C) 7 D) 9 E) 11

3. $x \Delta y = x^3 - y^3$

$x \square y = x - y - x - y$

$\Rightarrow (2 \Delta 1) \square (3 \Delta 2) = ?$

- A) 57 B) 68 C) 79 D) 93 E) 107

4. $\frac{3}{x \Delta y} = \frac{1}{x} - \frac{2}{y} \Rightarrow 2 \Delta 5 = ?$

- A) 18 B) 24 C) 30 D) 35 E) 42

5. $x \Delta y = x + 2y - 4$

$2 \Delta m = 8 \Rightarrow m = ?$

- A) 3 B) 5 C) 6 D) 7 E) 8

6. $x \Delta 2y = xy - y$

$\Rightarrow 3 \Delta 2 = ?$

- A) 1 B) 2 C) 3 D) 5 E) 7

7. $x \Delta y = x^2 - y - 3$

$(3 \Delta 4) \Delta a = 2 \Rightarrow a = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

8. $x \Delta y = 2x + 3y$

$a \Delta b = 23, b \Delta a = 22 \Rightarrow a \cdot b = ?$

- A) 14 B) 16 C) 20 D) 25 E) 32

9. $x \Delta y = 2x + y - 4$

$x \square y = x - y + 2xy$

$3 \Delta (2 \square a) = 7 \Rightarrow a = ?$

- A) -2 B) -1 C) 0 D) 1 E) 2

10. $(3a + b) \square (a - 2b) = a^b - b^a + 2$
 $\Rightarrow 14 \square -7 = ?$

- A) 60 B) 80 C) 88 D) 96 E) 120

11. $x \square y = y \cdot (y \square x) + 5$

$\Rightarrow 2 \square 3 = ?$

- A) -4 B) -3 C) 2 D) 3 E) 4

12. $x \Delta y = x^2 - y^2 + xy,$

$(-1 \Delta 2) \Delta x = 1$

$\Rightarrow \sum x = ?$

- A) -9 B) -5 C) -3 D) 5 E) 9

13. $x \square y = x^2 - 2xy + y^2$

$1 \square a = 16 \Rightarrow \sum a = ?$

- A) 2 B) 8 C) 12 D) 16 E) 20

14. $\frac{1}{x} \Delta \frac{1}{y} = 3x + 4y$

$\Rightarrow 3 \Delta 2 = ?$

- A) 3 B) 5 C) 6 D) 9 E) 12

15. $a \star b = (x + y)^2 - 4xy$

$\Rightarrow 2001 \star 2003 = ?$

- A) 1 B) 3 C) 4 D) 9 E) 16

16. $a \bullet b = b^a$

$a \blacksquare b = \sqrt[b]{a}$

$\Rightarrow (4 \bullet 3) \blacksquare 2 = ?$

- A) 2 B) 3 C) 6 D) 9 E) 10


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1	2	3	4	5	6	7	8
C	A	E	C	B	B	B	C
9	10	11	12	13	14	15	16
D	E	A	B	A	A	C	D

1. $(x \Delta y) = 2x + 3(y \Delta x)$
 $\Rightarrow -1 \Delta -1 = ?$
 A) -2 B) -1 C) 1 D) 2 E) 3

2. $(2a - b) \Delta (3a + b) = a^2 - ab + b^2$
 $\Rightarrow 7 \Delta 13 = ?$
 A) 5 B) 7 C) 9 D) 13 E) 15

3. $a \Delta b = \begin{cases} 2a + b & b \equiv 1 \pmod{2} \\ a^2 - b & b \equiv 0 \pmod{2} \end{cases}$
 $\Rightarrow 2 \Delta (3 \Delta 4) = ?$
 A) 4 B) 5 C) 6 D) 9 E) 12

4. $x \Delta y = x + y - 8$
 $x \Delta e = e \Delta x = x \Rightarrow e = ?$
 A) 4 B) 8 C) 10 D) 12 E) 16

5.

Δ	F	E	R	C	A	N
F	C	A	N	F	E	R
E	A	N	F	E	R	C
R	N	F	E	R	C	A
C	F	E	R	C	A	N
A	E	R	C	A	N	F
N	R	C	A	N	F	E

- $x \Delta x = x^2 \Rightarrow (F \Delta A^2) \Delta R = ?$
 A) F B) E C) N D) R E) C

6. $x \Delta e = e \Delta x = x$
 $x \Delta x^{-1} = e$
 $x \Delta y = x \cdot y + 3x + 3y + 6$
 $\Rightarrow 4^{-1} = ?$
 A) $-\frac{20}{7}$ B) $-\frac{10}{7}$ C) $\frac{10}{7}$ D) $\frac{17}{7}$ E) $\frac{20}{7}$

7. $5^{123} \equiv x \pmod{7} \Rightarrow x = ?$
 A) 1 B) 2 C) 4 D) 5 E) 6

8. $3^{192} + 3^{194} \equiv x \pmod{5} \Rightarrow x = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4

9. $47^{171} \equiv x \pmod{7} \Rightarrow x = ?$
 A) 1 B) 3 C) 4 D) 5 E) 6

13. $a = (142)^{142}$
 $b = (317)^{317}$
 $a \cdot b \equiv x \pmod{5} \Rightarrow x = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4

10. $4^{1091} \equiv x \pmod{6} \Rightarrow x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

14. $A = (213)^{214} \Rightarrow$

A	10
-	
	?

A) 2 B) 3 C) 5 D) 6 E) 9

11. $5^{2n+1} \equiv x \pmod{8} \Rightarrow x = ?$
 A) 2 B) 3 C) 5 D) 6 E) 7

15. $A = (513)^{242} \Rightarrow$

A	7
-	
	?

A) 1 B) 2 C) 3 D) 4 E) 5

16. $A = (373)^{100}$
 $B = (241)^{100} \Rightarrow$

A + B	7
-	
	?

A) 1 B) 2 C) 4 D) 5 E) 6

12. $(47)^{4n+3} \equiv x \pmod{5} \Rightarrow x = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4

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1	2	3	4	5	6	7	8
C	D	D	B	B	A	E	A
9	10	11	12	13	14	15	16
E	D	C	D	D	E	D	E

1. $-13 \equiv x \pmod{9} \Rightarrow x = ?$

- A) 2 B) 4 C) 5 D) 6 E) 7

5. $A = 0! + 1! + 2! + 3! + \dots + 73!$

$A \equiv x \pmod{5} \Rightarrow x = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

2.

$$\begin{array}{r} 62 \overline{) A} \\ \underline{\quad} \\ \end{array}$$

$$\begin{array}{r} 107 \overline{) A} \\ \underline{\quad} \\ \end{array}$$

$\Rightarrow \max(A) = ?$

- A) 10 B) 12 C) 15 D) 16 E) 20

6. $2x - 1 \equiv 4 \pmod{7}$

$x \in \mathbb{Z}^+ \Rightarrow \min(x) = ?$

- A) 1 B) 2 C) 3 D) 5 E) 6

3. $A \in \mathbb{N}$,

$A = 3k + 2 = 5m + 2 \Rightarrow \min(A) = ?$

- A) 10 B) 13 C) 14 D) 17 E) 18

7. $x - y \equiv 3 \pmod{8}$

$x \cdot y \equiv 5 \pmod{8}$

$x^2 + y^2 \equiv a \pmod{8}$

$\Rightarrow a = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

4. $\left. \begin{array}{l} 143 \equiv 3 \pmod{x} \\ 256 \equiv 4 \pmod{x} \end{array} \right\} \Rightarrow \max(x) = ?$

- A) 24 B) 28 C) 30 D) 35 E) 42

8. $42! - 33! \equiv x \pmod{11} \Rightarrow x = ?$

- A) 0 B) 2 C) 5 D) 7 E) 9

9. $A = \{x \mid 17 < x < 125, x \equiv 2 \pmod{3}\}$
 $B = \{y \mid 23 < y < 147, y \equiv 4 \pmod{5}\}$
 $\Rightarrow n(A \cap B) = ?$
 A) 3 B) 5 C) 7 D) 9 E) 11

10. $f: Z_{/5} \rightarrow Z_{/5}$
 $f(x) = 2x + 3 \Rightarrow f(3) = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4

11. $f(x) = \begin{cases} 2x+1, & x \equiv 1 \pmod{5} \\ 1-x, & x \equiv 2 \pmod{5} \end{cases} \Rightarrow f(2) + f(6) = ?$
 A) 8 B) 10 C) 12 D) 16 E) 18

12. $(-2)^{1907} \equiv x \pmod{5} \Rightarrow x = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4

13. $2^{10} + 12^{10} + 52^{10} \equiv x \pmod{10} \Rightarrow x = ?$
 A) 2 B) 4 C) 5 D) 6 E) 8

14. $57^{1988} \equiv x \pmod{6} \Rightarrow x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5

15. $x \equiv 3 \pmod{5}$
 $x \equiv 4 \pmod{6}$
 $x \equiv 5 \pmod{7}$
 $\Rightarrow \min(x) = ?$
 A) 108 B) 120 C) 144 D) 196 E) 208

16. $Z_{/5}$
 $f(x-1) = \frac{2x+3}{4} \Rightarrow f^{-1}(x) = ?$
 A) 2x B) 2x+1 C) 2x+2 D) 2x+3 E) 2x+4



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1	2	3	4	5	6	7	8
C	C	D	B	E	E	A	A
9	10	11	12	13	14	15	16
C	E	C	C	A	C	E	A

1. $\mathbb{Z}_{/8}$,
 $3x + 5 \equiv 6 \pmod{8} \Rightarrow x = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
2. $f(x) = \begin{cases} 2x + 1, & x \equiv 0 \pmod{5} \\ x + 1, & x \equiv 1 \pmod{5} \\ 2x - 1, & x \equiv 2 \pmod{5} \end{cases}$
 $\Rightarrow (f \circ f \circ f)(10) = ?$
 A) 40 B) 41 C) 42 D) 43 E) 44
3. $\mathbb{Z}_{/5}$,
 $x + 2 \equiv 3 \pmod{5} \Rightarrow x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
4. $1901^{1917} \equiv x \pmod{6} \Rightarrow x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
5. $2027^{1908} \equiv x \pmod{5} \Rightarrow x = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4
6. $8197^{198} \equiv \dots\dots\dots x \Rightarrow x = ?$
 A) 1 B) 3 C) 5 D) 7 E) 9
7. $3^{8k+2} + 6^{8k+4} \equiv x \pmod{5} \Rightarrow x = ?$
 A) 0 B) 1 C) 2 D) 3 E) 4
8. $\mathbb{Z}_{/5}$,
 $f(x) = \frac{x+3}{2} \Rightarrow f^{-1}(x) = ?$
 A) $2x+4$ B) $x+1$ C) $2x+2$
 D) $3+3x$ E) $x+2$

9. $5^{-1} + 7^{-1} - 2 \cdot 3 \equiv x \pmod{6}$

$\Rightarrow x = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

10. $x^2 + 10x + 24 \equiv 3 \pmod{8}$

$\Rightarrow \text{Ç.K(S.S)} = ?$

- A) {1, 5} B) {1, 3} C) {3, 5}
D) {4, 5} E) {5, 6}

11. $A = \{x \mid 20 < x < 105, x \equiv 1 \pmod{5}\}$

$B = \{x \mid 15 < x < 120, x \equiv 1 \pmod{6}\}$

$\Rightarrow n(A \cap B) = ?$

- A) 2 B) 3 C) 4 D) 5 E) 6

12. $A = \{x \mid 10 < x < 150, x \equiv 4 \pmod{6}\}$

$B = \{x \mid 20 < x < 160, x \equiv 6 \pmod{8}\}$

$\Rightarrow n(A \cap B) = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

13. $f(x) = \begin{cases} x^2 - 1, & x \equiv 1 \pmod{5} \\ x - 3, & x \equiv 3 \pmod{5} \end{cases}$

$g(x) = \begin{cases} x - 5, & x \equiv 0 \pmod{7} \\ x - 3, & x \equiv 1 \pmod{7} \end{cases}$

$\Rightarrow (f \circ g)(1) + (g \circ f)(6) = ?$

- A) 1 B) 15 C) 20 D) 25 E) 30

14. $\left(\frac{7}{9}\right)^{-105} \equiv (\text{mod } 5) \Rightarrow x = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

15. $1^{41} + 2^{41} + 3^{41} + \dots + 39^{41} \equiv x \pmod{40}$

$\Rightarrow x = ?$

- A) 0 B) 1 C) 2 D) 3 E) 4

16. $3^x \equiv 6 \pmod{7}$

$9 < x < 100 \Rightarrow \min(x) = ?$

- A) 12 B) 15 C) 18 D) 21 E) 24



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1	2	3	4	5	6	7	8
B	D	A	E	B	E	A	C
9	10	11	12	13	14	15	16
A	A	B	D	D	C	A	B

1. $1215 \equiv x \pmod{6} \Rightarrow x = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

2. $-1318 \equiv a \pmod{3} \Rightarrow a = ?$

- A) 1 B) 2 C) 3
D) 4 E) 0

3. $1316 \equiv x \pmod{2}$,
 $-1915 \equiv y \pmod{5}$
 $\Rightarrow x + y = ?$

- A) 0 B) 1 C) 2
D) 3 E) 4

4. $0 < x < 8$,
 $x + y \equiv 5 \pmod{8}$,
 $x - y \equiv 3 \pmod{8}$
 $\Rightarrow x = ?$

- A) 1 B) 3 C) 4
D) 5 E) 6

5. $f: \mathbb{Z}_{15} \rightarrow \mathbb{Z}_{15}$,

$f(x) = 2x + 4 \Rightarrow f(\bar{6}) = ?$

- A) $\bar{0}$ B) $\bar{1}$ C) $\bar{2}$
D) $\bar{3}$ E) $\bar{4}$

6. $f: \mathbb{Z}_{11} \rightarrow \mathbb{Z}_{11}$,

$f(3x + \bar{1}) = \bar{3}x + \bar{4} \Rightarrow f(\bar{4}) = ?$

- A) $\bar{0}$ B) $\bar{1}$ C) $\bar{2}$
D) $\bar{3}$ E) $\bar{4}$

7. $f: \mathbb{Z}_{16} \rightarrow \mathbb{Z}_{16}$,

$f(x) = x + \bar{1} \Rightarrow f^{-1}(x) = ?$

- A) $x + \bar{5}$ B) $x + \bar{4}$ C) $x + \bar{3}$
D) $x + \bar{2}$ E) $x + \bar{1}$

8. $f: \mathbb{Z}_{14} \rightarrow \mathbb{Z}_{14}$,

$f(x) = \bar{3}x + \bar{2} \Rightarrow f^{-1}(x) = ?$

- A) x B) $x + \bar{1}$ C) $3x + 2$
D) $x + \bar{3}$ E) $\bar{2}x + \bar{2}$

9. $1915^{193} \equiv x \pmod{5} \Rightarrow x = ?$

- A) 0 B) 1 C) 2
D) 3 E) 4

10. $319^5 \equiv x \pmod{6} \Rightarrow x = ?$

- A) 0 B) 1 C) 2
D) 3 E) 4

11. $129^{6x+1} \equiv a \pmod{5} \Rightarrow a = ?$

- A) 0 B) 1 C) 2
D) 3 E) 4

12. $174^{1391} \equiv \dots A \Rightarrow A = ?$

- A) 0 B) 1 C) 2
D) 6 E) 4

13. $1293^{415} \equiv x \pmod{5} \Rightarrow x = ?$

- A) 4 B) 3 C) 2
D) 1 E) 0

14. $A = 0! + 1! + 2! + \dots + 1987!$,

$A \equiv x \pmod{5} \Rightarrow x = ?$

- A) 4 B) 3 C) 2
D) 1 E) 0

15. $1213^{497} + 1517^{318} \equiv x \pmod{9} \Rightarrow x = ?$

- A) 1 B) 3 C) 5
D) 7 E) 8

16. $18^{18} + 19^{19}$ sayısının 5 ile bölümünden kalan kaçtır?

What is the remainder of the number $18^{18} + 19^{19}$ divided by 5?

- A) 1 B) 2 C) 3 D) 4 E) 5


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1	2	3	4	5	6	7	8
C	B	A	C	B	A	A	C
9	10	11	12	13	14	15	16
A	B	E	E	C	A	C	C

1. \mathbb{Z}_{17} ,
 $x + 5 \equiv 3 \pmod{7} \Rightarrow x = ?$
 A) 2 B) 3 C) 4 D) 5 E) 6
2. $2013^{1923} \equiv x \pmod{9} \Rightarrow x = ?$
 A) 0 B) 1 C) 3 D) 6 E) 8
3. $f(x) = \begin{cases} 3x-1 & x \equiv 0 \pmod{2} \\ x+1 & x \equiv 1 \pmod{2} \end{cases}$
 $g(x) = \begin{cases} 4x+1 & x \equiv 0 \pmod{3} \\ x^2-1 & x \equiv 1 \pmod{3} \\ 3x+1 & x \equiv 2 \pmod{3} \end{cases}$
 $\Rightarrow (g \circ f)(5) + (f \circ g)(5) = ?$
 A) 68 B) 70 C) 72 D) 74 E) 78
4. $\left(-\frac{2}{3}\right)^{55} \equiv x \pmod{4} \Rightarrow x = ?$
 A) 0 B) 1 C) 2 D) 3 E) $\frac{2}{3}$
5. $(107)^{-84} \equiv x \pmod{7} \Rightarrow x = ?$
 A) 0 B) 1 C) 3 D) 4 E) 6
6. \mathbb{Z}_{18} ,
 $x + 7 \equiv 3 \pmod{8} \Rightarrow x = ?$
 A) 3 B) 4 C) 5 D) 6 E) 7
7. $3x + 4 \equiv 1 \pmod{5} \Rightarrow x = ?$
 A) 1 B) 2 C) 3 D) 4 E) 5
8. $f(x) = \begin{cases} x^2-2, & x \equiv 0 \pmod{3} \\ 2x+3, & x \equiv 1 \pmod{3} \\ 3x-1, & x \equiv 2 \pmod{3} \end{cases}$
 $\Rightarrow (f \circ f \circ f)(3) = ?$
 A) 48 B) 49 C) 50 D) 51 E) 52

9. $Z_{75} \rightarrow Z_{75}$,

$$f(x) = 2x + 1, (f \circ g)(x) = x + 4 \Rightarrow g(4) = ?$$

- A) 0 B) 1 C) 2 D) 3 E) 4

10. $Z_{77} \rightarrow Z_{77}$,

$$f(x) = 2x + 3 \Rightarrow f^{-1}(x) = ?$$

- A) $4x + 2$ B) $4x + 3$ C) $4x + 4$
D) $4x + 5$ E) $4x + 6$

11. $(3x + 4) \cdot (2x + 1) \equiv 4 \pmod{5} \Rightarrow \text{Ç.K(S.S)} = ?$

- A) $\{0, 2\}$ B) $\{0, 3\}$ C) $\{0, 4\}$
D) $\{1, 3\}$ E) $\{1, 4\}$

12. $(2011)^{6n+5} \equiv x \pmod{7} \Rightarrow x = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $5^{-1} + 3^{-1} + 2^5 + 5^2 \equiv x \pmod{8} \Rightarrow x = ?$

- A) 1 B) 3 C) 4 D) 6 E) 7

14. $\left(\frac{4}{7}\right)^{-75} \equiv x \pmod{7} \Rightarrow x = ?$

- A) 2 B) 3 C) 4 D) 5 E) 0

15. $6^{20x+3} \equiv x \pmod{11}$

$$\Rightarrow x = ?$$

- A) 5 B) 6 C) 7 D) 8 E) 9

16. $(19197)^2 \cdot (1923)^3 \equiv x \pmod{9}$

$$\Rightarrow x = ?$$

- A) 0 B) 3 C) 4 D) 5 E) 7


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	A	C	A	B	B	D	C
9	10	11	12	13	14	15	16
B	A	C	D	A	E	C	A

1. $x \triangle y = 2x + 3y$

$a * b = a - 2b$

$k \triangle (k * 3) = 2 \Rightarrow k = ?$

- A) 4 B) -4 C) -3 D) 3 E) 2

[ANKARA ÜNİVERSİTESİ – YÖS 2020]

2. Bugün günlerden Pazartesi ise 115 gün önce hangi gündür?

If today is Monday, which day is the 115th day?

- A) Pazartesi / Monday
-
- B) Salı / Tuesday
-
- C) Çarşamba / Wednesday
-
- D) Perşembe / Thursday
-
- E) Cuma / Friday

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2020]

3. $m \triangle n = \begin{cases} m^2 + n, & m \cdot n > 0 \\ 3m - n, & m \cdot n \leq 0 \end{cases} \Rightarrow 2 \triangle (3 \triangle -1) = ?$

- A) 8 B) 16 C) 14 D) 10 E) 12

[GAZİANTEP ÜNİVERSİTESİ – YÖS 2020]

4. $\frac{x+y}{1+\frac{1}{x \otimes y}} = 1 \Rightarrow (-2) \otimes 4 = ?$

- A) -2 B) -1 C) 0
-
- D) 1 E) 2

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2019]

5 – 6. soruları aşağıdaki tabloya göre cevaplayınız.

Answer questions 5 – 6 in accordance with the table given below.

*	a	b	c	d	e	f
a	c	d	e	f	a	b
b	d	e	f	a	b	c
c	e	f	a	b	c	d
d	f	a	b	c	d	e
e	a	b	c	d	e	f
f	b	c	d	e	f	a

Tabloda * işleminin görevi belirlenmiştir.

The operation of * is established in the table.

Örnekler (Examples):

$c * e = c$

$f * d = e$

5. $(f * x) * d = f$

$\Rightarrow x = ?$

- A) a B) b C) c
-
- D) d E) f

[YÜZÜNCÜ YIL ÜNİVERSİTESİ – YÖS 2019]

6. $(a * b^{-1}) * (c * f^{-1}) = ?$

- A) a B) b C) d
-
- D) e E) f

[YÜZÜNCÜ YIL ÜNİVERSİTESİ – YÖS 2019]

7 – 8. soruları aşağıdaki tabloya göre cevaplayınız.

Answer questions 7 – 8 in accordance with the table given below.

*	a	b	c	d	e
a	e	c	a	b	d
b	d	e	b	a	c
c	a	b	c	d	e
d	c	a	d	e	b
e	b	d	e	c	a

Tabloda * işleminin görevi belirlenmiştir.

The operation of * is established in the table.

Örnekler (Examples):

$a * c = a$

$b * e = c$

7. $(c * d) * (e * d) = ?$

- A) e B) b C) c
-
- D) d E) e

[ATATÜRK ÜNİVERSİTESİ – YÖS 2018]

8. $a * (d * x) = e$

$x = ?$

- A) a B) b C) c
-
- D) d E) e

[ATATÜRK ÜNİVERSİTESİ – YÖS 2018]

9. $\left(\frac{a+7}{3}\right)\Delta\left(\frac{a+b}{3}\right) = a^2 - b^2$

$\Rightarrow 4\Delta 3 = ?$

- A) 2 B) 3 C) 5
D) 7 E) 9

[ATATÜRK ÜNİVERSİTESİ – YÖS 2017]

10. I. $x\Delta y = \begin{cases} y-x, & |x| > |y| \\ x-y, & |x| = |y| \\ 2(x+y), & |x| < |y| \end{cases}$

II. $[(1\Delta(-1))\Delta(3\Delta 0)] = ?$

- A) -2 B) -1 C) 0
D) 1 E) 2

[SÜLEYMAN DEMİREL ÜNİVERSİTESİ – YÖS 2017]

11. $a\Delta b = a^2 + 2b - ab$

$a\Box b = b^2 + 2a - ab$

$\Rightarrow (1\Delta 0)\Box[1\Delta(-1)] = ?$

- A) 5 B) 4 C) 3
D) 2 E) 1

[BALIKESİR ÜNİVERSİTESİ – YÖS 2017]

12. $(2017)^{2016} \equiv x \pmod{13} \Rightarrow x = ?$

- A) 0 B) 1 C) 2
D) 3 E) 4

[BALIKESİR ÜNİVERSİTESİ – YÖS 2017]

13. $\sqrt{a\blacksquare b} = \sqrt{a} + \sqrt{b}$

$\frac{1}{a\Delta b} = \frac{1}{a} + \frac{1}{b}$

$\Rightarrow (1\blacksquare 4)\Delta 9 = ?$

- A) $\frac{2}{9}$ B) $\frac{4}{9}$ C) 1
D) $\frac{9}{4}$ E) $\frac{9}{2}$

[İSTANBUL ÜNİVERSİTESİ – YÖS 2015]

14. $a\blacksquare b = a + b$

$a\Delta b = \begin{cases} a, & a \cdot b < 0 \\ -b, & a \cdot b \geq 0 \end{cases}$

$\Rightarrow (2\Delta 1)\blacksquare(2\Delta(-1)) = ?$

- A) -2 B) -1 C) 0
D) 1 E) 2

[GİRESUN ÜNİVERSİTESİ – YÖS 2014]

15. $6^{2n+4} + 2^{3n+2} + 6 \equiv ? \pmod{7}$

- A) 2 B) 3 C) 4
D) 5 E) 6

[AKDENİZ ÜNİVERSİTESİ – YÖS 2013]

16. $x\Box y = 2x^2 + 4y$

$[2\Box(-1)]\Box a = 0 \Rightarrow a = ?$

- A) -16 B) -8 C) 8 D) 12 E) 16

[İSTANBUL ÜNİVERSİTESİ – YÖS 2013]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	E	C	D	E	A	D	B
9	10	11	12	13	14	15	16
E	A	D	B	E	D	C	B

BÖLÜM CHAPTER

15

TARİHSEL NOT / HISTORICAL NOTE

Cantor, Georg (Ferdinand Ludwig Philipp) [1845 - 1918]

St. Petersburg'da doğmuş, hayatının büyük bir kısmını Almanya'da Halle Üniversitesi'nde geçirmiştir. 1873'de rasyonel sayılar kümesinin sayılamaz olduğunu göstermiştir. Aynı zamanda reel sayılar kümesinin de sayılamaz sonsuzlukta olduğunu göstermiştir. Daha sonra sonsuz kümeler kuramını geliştirmiştir.

He was born in St Petersburg, but spent most of his life at the University of Halle in Germany. In 1873, he showed that the set of rational numbers is denumerable. He also showed that the set of all real numbers is not. Later he fully developed his theory of infinite sets.

SAYMA İLKELERİ (Permütasyon, Kombinasyon), BİNOM AÇILIMI ve OLASILIK COUNTING PRINCIPLES (Permutations, Combinations), BINOMIAL EXPANSION and PROBABILITY

Bu bölüm 114 test sorusu, 16 YÖS sorusu içermektedir.

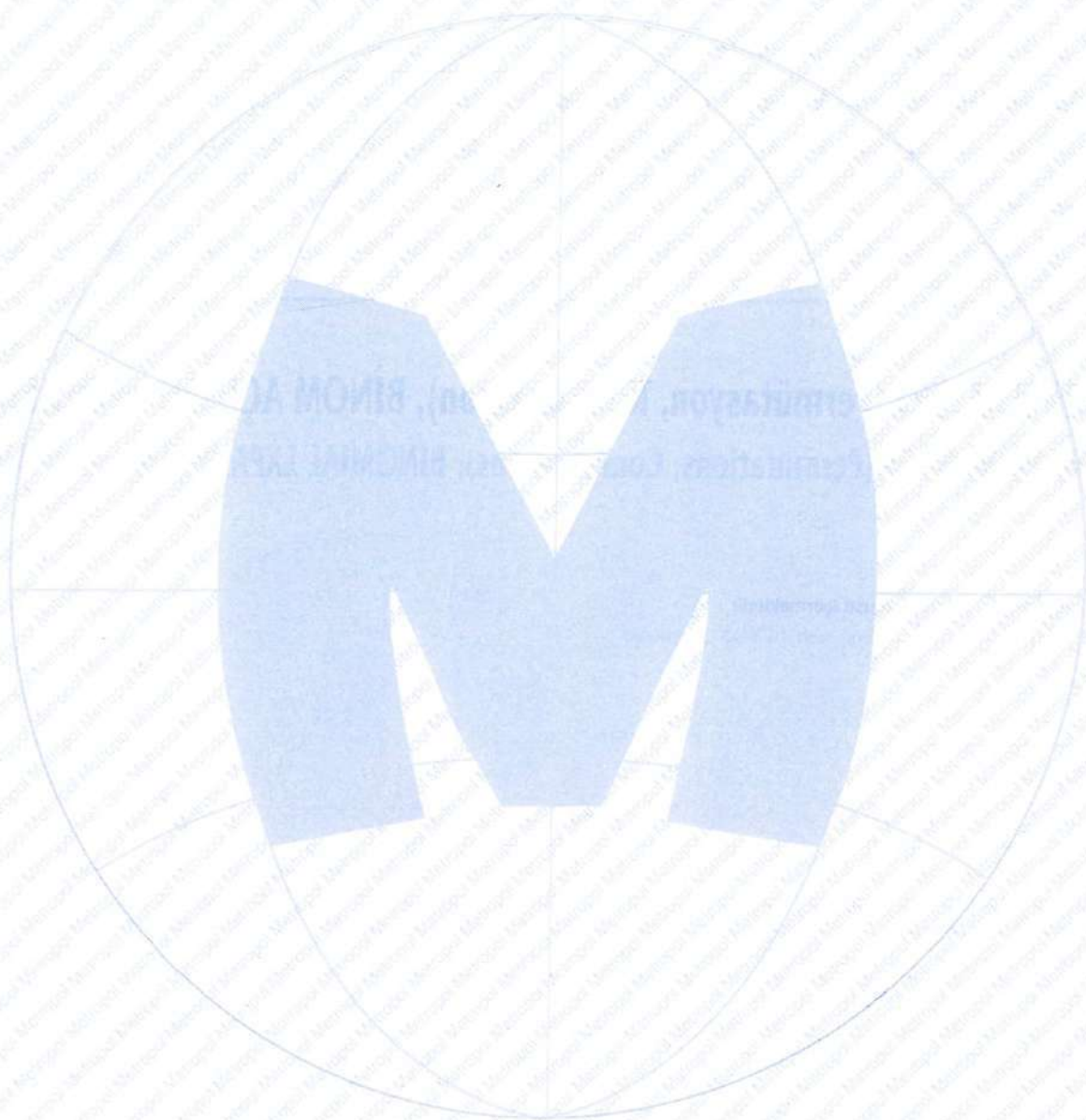
This chapter includes 114, test questions, and 16 YÖS questions.

BÖLÜM / CHAPTER 1

SAYMA İLKELERİ (Permütasyon, Kombinasyon), BİNOM AÇILIMI ve OLASILIK COUNTING PRINCIPLES (Permutations, Combinations), BINOMIAL EXPANSION and PROBABILITY

- Sayma İlkeleri (Permütasyon, Kombinasyon), Binom Açılımı ve Olasılık

Counting Principles (Permutations, Combinations), Binomial Expansion and Probability. 399 - 418



BÖLÜM 15 CHAPTER

SAYMA İLKELERİ (Permütasyon, Kombinasyon), BİNOM AÇILIMI ve OLASILIK
COUNTING PRINCIPLES (Permutations, Combinations), BINOMIAL EXPANSION and PROBABILITY

Bölüm / Chapter **15**

Sayma İlkeleri (Permütasyon, Kombinasyon) / Counting Principles (Permutations, Combinations)

Test **1**

1. $P(6, 3) + P(5, 4) + P(3, 1) = ?$

- A) 143 B) 158 C) 192
D) 200 E) 243

2. $P(n, r) = 60 \Rightarrow \max(n) = ?$

- A) 5 B) 10 C) 20
D) 30 E) 60

3. $P(7, r) = 42 \Rightarrow r = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

4. $P(n, 1) + n^2 - 6 = 0 \Rightarrow n = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

5. $P(2n + 1, 2n) = 120 \Rightarrow n = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

6. $P(x, y) = 120 \Rightarrow \max(x + y) = ?$

- A) 5 B) 6 C) 9
D) 120 E) 121

7. $P(n, 5) = 90 \cdot 56 \cdot 6 \Rightarrow n = ?$

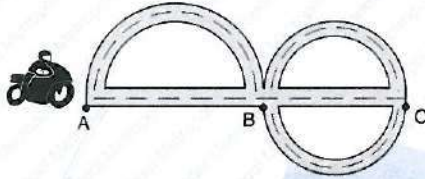
- A) 7 B) 8 C) 9
D) 10 E) 11

8. $\frac{P(n, 4)}{P(n, 2)} = n^2 - 4n \Rightarrow n = ?$

- A) 5 B) 6 C) 7
D) 8 E) 9

9. 10 kişilik bir matematik öğretmeni grubundan, önce bir zümre başkanı daha sonra da zümre başkan yardımcısı seçilecektir. **Bu seçim kaç farklı şekilde yapılabilir?**
From among a group of 10 Mathematics teachers, first the head of department and later assistant head will be selected. In how many different ways can this selection be done?
A) 10 B) 19 C) 81 D) 90 E) 120

10.



Şekildeki hareketli, her seferinde B'den geçmek koşulu ile A noktasından C noktasına kaç farklı şekilde gidebilir?

In how many different ways can the motorcycle rider in the figure travel from point A to point C with passing through point B?

- A) 2 B) 4 C) 6 D) 8 E) 10

11. $A = \{1, 3, 4, 8\}$ kümesinin elemanları ile 3 basamaklı kaç sayı yazılabilir?

How many three-digit numbers can be written by using the members of the set $A = \{1, 3, 4, 8\}$, if repetition is not allowed?

- A) 4 B) 12 C) 24 D) 64 E) 128

12. $A = \{1, 2, 3, 4, 5\}$ kümesinin elemanları ile rakamları birbirinden farklı 3 basamaklı kaç tane sayı yazılabilir?

How many three-digit numbers with different digits can be written by using the members of the set $A = \{1, 2, 3, 4, 5\}$?

- A) 15 B) 30 C) 60 D) 70 E) 85

13. $A = \{1, 2, 3, 4, 5\}$ kümesinin elemanları ile rakamları birbirinden farklı 4 basamaklı kaç çift sayı yazılabilir?

How many four-digit even numbers can be written by using the members of the set $A = \{1, 2, 3, 4, 5\}$, if repetition is not allowed?

- A) 12 B) 16 C) 20 D) 24 E) 48

14. 5 kişi yuvarlak bir masa etrafında kaç farklı şekilde oturabilir?

In how many different ways can 5 people sit around a round table?

- A) 12 B) 16 C) 18 D) 24 E) 48

15. "METROPOL" sözcüğündeki harflerin yerleri değiştirilerek, anlamlı ya da anlamsız 8 harfli kaç sözcük yazılabilir?

How many different, meaningful or meaningless words, can be written by using the letters of the word 'METROPOL'?

- A) 19180 B) 19800 C) 20160
D) 20180 E) 20260

16. 5 sayı tabanını göstermek üzere $(xyz)_5$ olacak şekilde üç basamaklı kaç sayı yazılabilir?

How many different three-digit numbers can be formed with the base of five $(xyz)_5$?

- A) 120 B) 108 C) 100
D) 96 E) 72



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
E	E	B	B	B	E	D	B
9	10	11	12	13	14	15	16
D	C	D	C	E	D	C	C

1. $P(4,2) + C(5,2) = 2x \Rightarrow \binom{x}{9} = ?$

- A) 40 B) 45 C) 50
D) 55 E) 60

2. $P(5,3) - C(5,3) = ?$

- A) 10 B) 20 C) 30
D) 40 E) 50

3. $\binom{10}{x+3} = \binom{10}{2x+1} \Rightarrow x = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

4. $\binom{n}{1} + \binom{n}{2} + \dots + \binom{n}{n} = 63 \Rightarrow n = ?$

- A) 4 B) 5 C) 6
D) 7 E) 8

5. $\binom{n}{3} = 56 \Rightarrow n = ?$

- A) 4 B) 5 C) 6
D) 7 E) 8

6. $\binom{n}{4} = \binom{n}{3} \Rightarrow n = ?$

- A) 5 B) 6 C) 7
D) 8 E) 9

7. $\binom{7}{1} + \binom{7}{2} + \dots + \binom{7}{6} = ?$

- A) 2^6 B) 2^7 C) $2^7 - 2$
D) $2^7 - 6$ E) $2^7 - 8$

8. $\binom{n}{0} + \binom{n}{1} = 2n - 4 \Rightarrow n = ?$

- A) 1 B) 2 C) 3
D) 4 E) 5

9. Bir hastanede çalıştırılmak üzere 3 doktor, 2 hemşire ve 4 hasta bakıcı içerisinden 1 doktor, 1 hemşire ve 2 hasta bakıcı kaç farklı şekilde seçilebilir?

In how many different ways can 1 doctor, 1 nurse and 2 caregivers be accepted for a job in a hospital from among 3 doctors, 2 nurses and 4 caregivers?

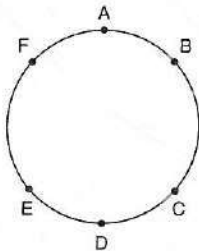
- A) 8 B) 12 C) 24 D) 36 E) 48

10. 6 öğrencinin katıldığı bir matematik sınavı, başarı yönünden kaç farklı şekilde sonuçlanabilir?

In how many different ways the results of a math test applied to 6 students can be, in manner of pass or fail?

- A) 16 B) 24 C) 32 D) 64 E) 90

11.

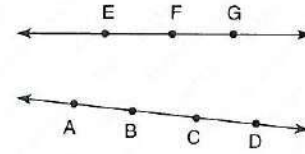


Şekildeki çemberin üzerinde bulunan 6 nokta kullanılarak kaç farklı üçgen çizilebilir?

How many different triangles can be drawn with using the 6 points on the circle in the figure above as the edges of triangles?

- A) 6 B) 9 C) 12 D) 18 E) 20

12.



Şekilde verilen doğrular üzerindeki noktalar kullanılarak kaç farklı üçgen çizilebilir?

How many different triangles can be drawn with using the points on the lines in the figure as the edges of triangles?

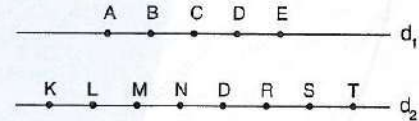
- A) 32 B) 30 C) 28 D) 26 E) 24

13. 10 soruluk bir sınavda öğrencilerin 6 soruyu çözmesi isteniyor. Buna göre, sınava giren bir öğrenci kaç farklı seçim yapabilir?

In an examination comprising of 10 questions, students must solve 6 questions out of 10 in a test. According to that how many different choices can be made by a student who takes the test?

- A) 180 B) 190 C) 200 D) 210 E) 220

14.



$d_1 \parallel d_2$, d_1 doğrusu üzerinde 5 farklı nokta, d_2 doğrusu üzerinde 8 farklı nokta vardır. Bu 13 nokta ile kaç farklı üçgen oluşturulabilir?

There are 5 different points on the line d_1 , there are 8 different points on the line d_2 and $d_1 \parallel d_2$. How many different triangles can be drawn by using these 13 points?

- A) 180 B) 190 C) 200 D) 210 E) 220



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
D	E	B	C	E	C	C	E
9	10	11	12	13	14		
D	D	E	B	D	E		

1. $P(n, 3) = 60 \Rightarrow n = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

2. $P(n, 3) : P(n, 2) = 20 \Rightarrow n = ?$

- A) 18 B) 19 C) 20 D) 21 E) 22

3. $P(n, 0) + P(n, 1) + P(n, 2) = 10 \Rightarrow n = ?$

- A) 3 B) 4 C) 5 D) 6 E) 7

4. $P(n, 3) = 20 \cdot P(n, 1) \Rightarrow n = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

5. $C(8, 5) + \binom{8}{3} = ?$

- A) 96 B) 106 C) 108 D) 112 E) 120

6. $\binom{n}{0} + \binom{n}{n} = x \Rightarrow C(5, x) = ?$

- A) 5 B) 8 C) 10 D) 15 E) 18

7. $\binom{5}{0} + \binom{5}{1} + \dots + \binom{5}{5} = ?$

- A) 16 B) 20 C) 24 D) 30 E) 32

8. $\binom{14}{2x} = \binom{14}{x+2} \Rightarrow \sum x = ?$

- A) 6 B) 7 C) 8 D) 9 E) 10

9. $\frac{1}{5} \cdot P(5,4) - \frac{1}{3} \cdot P(3,2) = ?$

- A) 20 B) 22 C) 24 D) 26 E) 28

10. "SERRA" sözcüğünün harfleri ile anlamlı ya da anlamsız 5 harfli kaç farklı sözcük yazılabilir?

How many different words can be made from the letters of the word 'SERRA' when all are taken at a time?

- A) 30 B) 45 C) 48 D) 60 E) 72

11. $A = \{0, 3, 5, 7, 8\}$ kümesinin elemanları ile rakamları birbirinden farklı 3 basamaklı kaç sayı yazılabilir?

How many three-digit numbers, repetition is not allowed, can be written by using the members of the set $A = \{0, 3, 5, 7, 8\}$?

- A) 32 B) 45 C) 48 D) 54 E) 60

12. $A = \{0, 1, 2, 3, 4, 5\}$ kümesinin elemanları ile rakamları farklı 4000'den büyük 4 basamaklı kaç sayı yazılabilir?

How many four-digit numbers which are greater than 4000, can be written by using the members of the set $A = \{0, 1, 2, 3, 4, 5\}$?

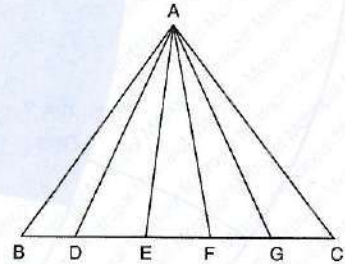
- A) 60 B) 80 C) 100 D) 112 E) 120

13. 10 avcının katıldığı bir hedefi vurma yarışmasında sonuç kaç farklı şekilde olabilir?

10 hunters participated in a shooting contest. How many different results may appear?

- A) 2^8 B) 2^{10} C) 2^{12} D) 2^{14} E) 2^{16}

14.



Yukarıdaki şekilde kaç tane üçgen vardır?

How many triangles exist in the figure?

- A) 8 B) 10 C) 12 D) 15 E) 18



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	E	A	C	D	C	E	A
9	10	11	12	13	14		
B	D	C	E	B	D		

1. $(x+y)^n = \dots + Ax^3y^2 + \dots \Rightarrow n = ?$

- A) 1 B) 3 C) 5 D) 7 E) 9

2. $(x-y)^k = \dots + Axy^4 + \dots \Rightarrow k = ?$

- A) 5 B) 4 C) 3 D) 2 E) 1

3. $(x-1)^4 + (x-1)^5 = \dots + Tx^3 + \dots \Rightarrow T = ?$

- A) 4 B) 6 C) 9 D) 10 E) 11

4. $(x+1)^n = \dots + 6x^2 + \dots \Rightarrow n = ?$

- A) 4 B) 5 C) 6 D) 7 E) 8

5. $(x^2+2y)^n = \dots + Ax^4y + \dots \Rightarrow n = ?$

- A) 7 B) 5 C) 3 D) 2 E) 1

6. $(4x^2+y)^3 = A \cdot x^6 + B \cdot x^4 \cdot y + C \cdot x^2 \cdot y^2 + D \cdot y^3$
 $\Rightarrow A + B + C + D = ?$

- A) 32 B) 64 C) 75 D) 100 E) 125

7. $(x+2y)^5 = \dots + A \cdot x^2 \cdot y^3 + \dots \Rightarrow A = ?$

- A) -80 B) 70 C) 60 D) -60 E) 80

8. $(x+y)^6 = \dots + A \cdot x^4y^2 + \dots \Rightarrow A = ?$

- A) 15 B) 20 C) -15 D) -25 E) -20

9. $(x+y)^7 = \dots + A \cdot x^5 y^1 + \dots \Rightarrow A + n = ?$

- A) 21 B) 23 C) 24 D) 25 E) 26

10. $(x-y)^5 = \dots + Ax^2 y^3 + \dots \Rightarrow A = ?$

- A) -20 B) -10 C) -5 D) -1 E) 0

11. $(x+y)^n = \dots + Ax^2 y^2 + \dots \Rightarrow n + A = ?$

- A) 4 B) 10 C) 15 D) 20 E) 25

12. $(x^2 + Ay^n)^6 = \dots + 160 \cdot x^6 y^9 + \dots \Rightarrow A + n = ?$

- A) 1 B) 2 C) 3 D) 4 E) 5

13. $(1 - \sqrt{2})^5 = A + B\sqrt{2} \Rightarrow A + B = ?$

- A) 12 B) 15 C) 18 D) 21 E) 24

14. $(x - \frac{1}{x})^4 = \dots + Ax^2 + \dots \Rightarrow A = ?$

- A) -5 B) -4 C) 20 D) 4 E) -20

15. $(x + \frac{1}{x})^6 = \dots + A + \dots \Rightarrow A = ?$

- A) 10 B) 20 C) 30 D) 40 E) 50

16. $(\frac{2}{x} - x^2)^7 = \dots + A \cdot x^8 + \dots \Rightarrow A = ?$

- A) 84 B) 48 C) 28 D) -48 E) -84


YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
C	A	B	A	C	E	E	A
9	10	11	12	13	14	15	16
B	B	B	E	A	B	B	E

1. $(x-2)^6 = Ax^6 + Bx^5 + Cx^4 + Dx^3 + Ex^2 + Fx + K$
 $\Rightarrow C = ?$

- A) 30 B) 60 C) 90 D) 120 E) 180

2. $(2x - \frac{1}{x})^{10} = \dots + Cx^{-6} + \dots \Rightarrow C = ?$

- A) 100 B) 180 C) 260 D) 340 E) 400

3. $(x^2 - \frac{1}{x})^6 = \dots + C + \dots \Rightarrow C = ?$

- A) 5 B) -10 C) 15 D) -20 E) 25

4. $(x^2 + \frac{1}{x})^6 = \dots + A + \dots \Rightarrow A = ?$

- A) 10 B) 15 C) 18 D) 20 E) 24

5. $(\frac{1}{x^2} - 2x)^6 = \dots + A + \dots \Rightarrow A = ?$

- A) -240 B) -120 C) -60 D) 120 E) 240

6. $(x^2 - \frac{2}{\sqrt{x}})^6 = \dots + Ax^7 + \dots \Rightarrow A = ?$

- A) -120 B) -80 C) 60 D) 80 E) 120

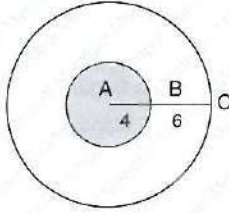
7. $(\sqrt{x} + \frac{1}{\sqrt{x}})^6 = \dots + Ax + \dots \Rightarrow A = ?$

- A) 15 B) 8 C) 4 D) 1 E) 3

8. $(\sqrt{x} + \frac{1}{\sqrt{x}})^8 = \dots + Ax^{-2} + \dots \Rightarrow A = ?$

- A) 14 B) 28 C) 35 D) 49 E) 56

7.



A noktası şekildeki her iki dairenin merkezidir.

$IABI = 4$ birim, $IBCI = 6$ birim ve şekli hedef olarak belirleyen bir atıcının ilk atışta hedefi vurduğu biliniyor. **Buna göre atıcının küçük daireyi vurmuş olma olasılığı kaçtır?**

In the figure above the point A is the center of both circles and $IABI = 4$, $IBCI = 6$. It is known that a shooter who accepted the figure as the target, hit the target at the first shoot. What is the probability for this shooter to hit the smaller circle?

- A) $\frac{2}{5}$ B) $\frac{4}{15}$ C) $\frac{3}{5}$ D) $\frac{4}{25}$ E) $\frac{9}{25}$

8. Caner'in bir hedefi vurma olasılığı $\frac{1}{4}$ 'tür. **Buna göre iki atış yapan Caner'in hedefi ilk defa ikinci atışta vurma olasılığı kaçtır?**

The probability of hitting the target for Caner is $\frac{1}{4}$. What is the probability of hitting the target for the first time at the second shot for him?

- A) $\frac{1}{16}$ B) $\frac{1}{8}$ C) $\frac{3}{16}$ D) $\frac{1}{4}$ E) $\frac{1}{2}$

9. Bir torbada 2 mavi, 4 sarı ve 6 siyah bilye vardır. **Buna göre torbadan rastgele seçilen iki bilyenin de renginin sarı olma olasılığı kaçtır?**

There are 2 blue, 4 yellow and 6 black marbles in a pouch. What is the probability of picking 2 yellow marbles when 2 marbles are picked from the pouch randomly?

- A) $\frac{1}{12}$ B) $\frac{1}{11}$ C) $\frac{2}{11}$ D) $\frac{5}{12}$ E) $\frac{3}{11}$

10. $A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$ kümesinden rastgele seçilen bir sayının asal sayı veya 6'dan küçük olma olasılığı kaçtır?

What is the probability of choosing a number which is a prime number or smaller than six from the set

$A = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$?

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{1}{3}$ D) $\frac{2}{3}$ E) $\frac{3}{4}$

11. İki zar atıldığında üst yüze gelen sayılar toplamının 6 olma olasılığı kaçtır?

What is the probability of getting two numbers that add up to 6 when 2 dice are rolled?

- A) $\frac{1}{12}$ B) $\frac{1}{9}$ C) $\frac{5}{36}$ D) $\frac{1}{6}$ E) $\frac{7}{36}$

12. Bir zar atıldığında üst yüze asal sayı geldiği bilindiğine göre, çift sayı gelme olasılığı kaçtır?

What is the probability of getting an even number if getting a prime number is known when a dice is rolled?

- A) $\frac{1}{2}$ B) $\frac{1}{3}$ C) $\frac{1}{4}$ D) $\frac{1}{5}$ E) $\frac{1}{6}$


YANITLAR / ANSWERS

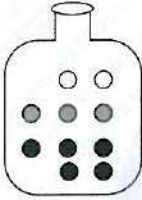
1	2	3	4	5	6	7	8	9	10	11	12
C	E	E	B	C	E	D	C	B	D	C	B

1. Bir zar ile bir metal para aynı anda havaya atılıyor. **Paranın tura ve zarın üst yüzüne 5 gelme olasılığı kaçtır?**

A dice is rolled and a coin is tossed at the same time. What is the probability of getting a head and getting 5?

- A) $\frac{1}{12}$ B) $\frac{1}{10}$ C) $\frac{1}{8}$ D) $\frac{1}{6}$ E) $\frac{1}{4}$

2.

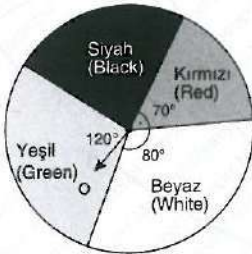


Bir kavanozda 5 siyah, 3 sarı ve 2 beyaz renkli bilye vardır. Kavanoza geri atmamak koşulu ile arka arkaya 3 bilye çekiliyor. **Bilyelerin farklı renkte olma olasılığı kaçtır?**

There are 5 black, 3 yellow, and 2 white marbles in a jar. 3 marbles are picked consecutively with the condition of not putting back in the jar. What is the probability of getting the marbles with different colors?

- A) $\frac{1}{10}$ B) $\frac{1}{9}$ C) $\frac{1}{6}$ D) $\frac{1}{4}$ E) $\frac{1}{3}$

3.



Bir atıcı şekildeki O merkezli daireyi her atışta vurabiliyor. **İki atış yapan bu atıcının her iki atışta da siyah renkli daire dilimini vurma olasılığı kaçtır?**

A shooter can shoot the disc that has the center O in the figure, each time he tries. What is the probability of shooting the black painted area at both 2 shots when he shoots twice?

- A) $\frac{1}{16}$ B) $\frac{1}{9}$ C) $\frac{2}{9}$ D) $\frac{1}{6}$ E) $\frac{2}{3}$

4. **Bir çift zar atılıyor. Her iki zarın üst yüzüne de asal sayı gelme olasılığı kaçtır?**

2 coins are tossed. What is the probability of getting 2 prime numbers?

- A) $\frac{1}{12}$ B) $\frac{1}{10}$ C) $\frac{1}{8}$ D) $\frac{1}{6}$ E) $\frac{1}{4}$

5. Bir torbaya 1'den 10'a kadar numaralandırılmış 10 top konuyor. **Rastgele seçilen bir topun çift ya da 5'ten küçük sayı gelme olasılığı kaçtır?**

10 balls that enumerated from 1 to 10 are put in a pouch. What is the probability of getting an even number or a number smaller than 5 when a ball is picked randomly?

- A) $\frac{1}{5}$ B) $\frac{2}{5}$ C) $\frac{1}{2}$ D) $\frac{9}{10}$ E) $\frac{7}{10}$

6. **5 tane metal para aynı anda havaya atıldığında 2'sinin yazı 3'ünün tura gelme olasılığı kaçtır?**

What is the probability of getting 2 heads and 3 tails when 5 coins are tossed at the same time?

- A) $\frac{1}{16}$ B) $\frac{1}{8}$ C) $\frac{3}{16}$ D) $\frac{1}{4}$ E) $\frac{5}{16}$

7. $A = \{N, İ, L, Ü, F, E, R\}$ kümesinin alt kümelerinin tamamı aynı büyüklükte birer karta yazılıp bir torbaya atılıyor. **Bu torbadan rastgele çekilen bir kartın üzerinde 3 harf olma olasılığı kaçtır?**

All of the subsets of the set $A = \{N, İ, L, Ü, F, E, R\}$ are written on same sized cards and then put in a pouch. What is the probability of getting a card which has 3 letters written on when a card is randomly picked?

- A) $\frac{3}{128}$ B) $\frac{7}{128}$ C) $\frac{21}{128}$ D) $\frac{35}{128}$ E) $\frac{43}{128}$

8. 8 evli çift arasından rastgele seçilen 2 kişinin evli olma olasılığı kaçtır?

What is the probability of choosing a married couple when 2 persons are chosen randomly from among 8 married couples?

- A) $\frac{1}{32}$ B) $\frac{1}{16}$ C) $\frac{1}{15}$ D) $\frac{1}{8}$ E) $\frac{2}{9}$

9. Bir çift zar atılıyor. **Üst yüzlere gelen sayıların toplamının 8 olma olasılığı kaçtır?**

What is the probability of getting 2 numbers which add up to 8 when 2 dice are tossed?

- A) $\frac{1}{12}$ B) $\frac{5}{18}$ C) $\frac{1}{6}$ D) $\frac{5}{36}$ E) $\frac{1}{9}$

10. Bir metal para ile bir zar birlikte havaya atılıyor. **Paranın tura, zarın tek sayı gelme olasılığı kaçtır?**

A coin is tossed and a dice is rolled at the same time. What is the probability of getting a head and getting an odd number?

- A) $\frac{1}{6}$ B) $\frac{1}{4}$ C) $\frac{1}{3}$ D) $\frac{1}{2}$ E) $\frac{5}{12}$

11. Hilesiz bir zarın 2 yüzü beyaz, 3 yüzü mavi ve 1 yüzü sarıya boyanıyor. **Zar peş peşe iki kez atıldığında, her defasında üst yüze beyaz gelme olasılığı kaçtır?**

2 sides of a dice are painted white, 3 sides of it are painted blue and one side of it is painted yellow. What is the probability of getting white sides at both of the times when a dice is rolled twice?

- A) $\frac{1}{18}$ B) $\frac{5}{18}$ C) $\frac{5}{12}$ D) $\frac{1}{9}$ E) $\frac{2}{9}$

12. Bir zar ile bir metal para aynı anda havaya atılıyor. **Zarın üste gelen yüzünün 4 veya 4'ten büyük, paranın ise tura gelme olasılığı kaçtır?**

A dice is rolled and a coin is tossed at the same time. What is the probability of getting a number equal to 4 greater than 4, and getting a head?

- A) $\frac{5}{6}$ B) $\frac{2}{3}$ C) $\frac{1}{3}$ D) $\frac{1}{4}$ E) $\frac{1}{2}$



YANITLAR / ANSWERS

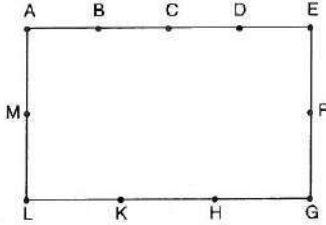
1	2	3	4	5	6	7	8	9	10	11	12
A	D	A	E	E	E	D	C	D	B	D	D

1. $P(n + 1, 3) = 4 \cdot P(n, 2)$

$\Rightarrow n! = ?$

- A) 1 B) 6 C) 24 D) 120 E) 720

2.

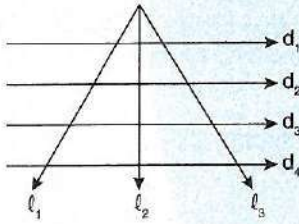


Yukarıdaki dikdörtgen üzerinde verilen 11 noktayı köşe kabul eden kaç üçgen çizilebilir?

How many triangles can be drawn by using 11 points located on the rectangle in the figure as the edges of the triangles?

- A) 125 B) 132 C) 142 D) 149 E) 154

3.



Düzlemde bir noktadan geçen 3 doğruyu, birbirine paralel 4 doğru şekildeki gibi kesmiştir. Buna göre, bu şekilde kaç tane yamuk vardır?

3 lines that passes through one point are intersected by 4 parallel lines. According to that, how many trapezoids are there in the figure?

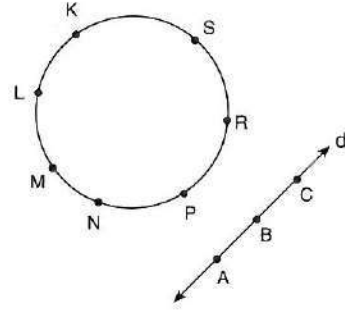
- A) 10 B) 12 C) 18 D) 20 E) 24

4. 12 kişilik bir sınıftan, bilgi yarışmasına katılması için üç öğrenci seçilecektir. Bu seçim kaç farklı şekilde yapılabilir?

3 students will be chosen from among a class of 12 students to participate in a knowledge contest. In how many ways can this selection be done?

- A) 180 B) 200 C) 210 D) 220 E) 230

5.



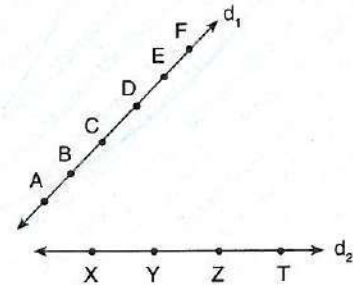
Yukarıdaki şekilde, çember üzerinde 7 nokta ile çembere kesmeyen doğru üzerinde 3 nokta veriliyor. Köşeleri bu 10 noktadan üçü olan kaç farklı üçgen çizilebilir?

7 points located on a circle and 3 points located on a line that does not intersect the circle is given above in the figure. How many different triangles can be drawn by using these 10 points as the edges of the triangles?

- A) 96 B) 114 C) 119 D) 124 E) 127

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6.

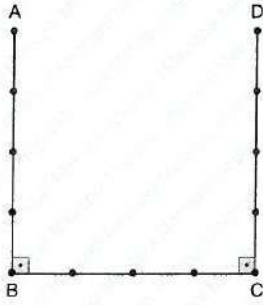


d_1 doğrusu üzerinde 6, d_2 doğrusu üzerinde 4 nokta veriliyor. Köşeleri bu noktalar olan kaç üçgen çizilebilir?

6 points located on the line d_1 and 4 points located on the line d_2 are given in the figure above. How many triangles can be drawn by using these points as the edges of the triangles?

- A) 96 B) 104 C) 108 D) 110 E) 118

7.

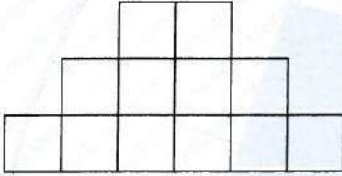


Şekilde $[AB] \perp [BC]$, $[BC] \perp [CD]$ dir. Köşeleri şekildeki noktalardan oluşan kaç farklı dik üçgen çizilebilir?

In the figure above, $AB \perp BC$ and $BC \perp CD$. How many right triangles can be drawn by using these points as the edges of the triangles?

- A) 24 B) 32 C) 36 D) 42 E) 48

8.



Şekildeki eş karelerden 6 tanesi sarı diğerleri mavi olmak üzere kareler rastgele boyanırsa, kaç farklı görüntü oluşur?

6 of the equally shaped squares above are going to be painted yellow randomly, and the rest are going to be painted blue. How many different images can be obtained?

- A) 924 B) 954 C) 968 D) 1008 E) 1024

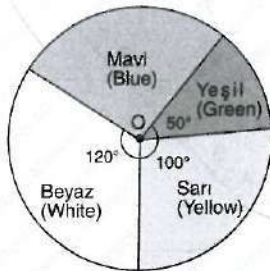
9.

$$(2x - y)^5 = \dots + k \cdot x^4y + \dots$$

$$\Rightarrow k = ?$$

- A) 80 B) 70 C) 0 D) -70 E) -80

10.



Şekildeki O merkezli dairesel hedef tahtasını her atışta vuran bir atıcının ilk atışta mavi bölmei vurma olasılığı kaçtır?

What is the probability of shooting the blue painted area for a shooter that shoots the circle formed target in the figure each time he tries?

- A) $\frac{1}{4}$ B) $\frac{1}{2}$ C) $\frac{2}{5}$ D) $\frac{3}{5}$ E) $\frac{3}{4}$

11. $E = \{A, B, C\}$,

$$P(A) = \frac{1}{2}, P(B) = \frac{1}{3} \Rightarrow P(C) = ?$$

- A) $\frac{1}{12}$ B) $\frac{1}{9}$ C) $\frac{1}{8}$ D) $\frac{1}{6}$ E) $\frac{1}{3}$

12. Bir avcının hedefi vurma olasılığı $\frac{2}{7}$ ise bu avcının hedefi vuramama olasılığı kaçtır?

If the probability of a hunter's hitting the target is $\frac{2}{7}$, what is the probability of him not hitting the target?

- A) $\frac{2}{7}$ B) $\frac{3}{7}$ C) $\frac{4}{7}$ D) $\frac{5}{7}$ E) $\frac{6}{7}$

13. Bir madeni para ile bir zar aynı anda havaya atılıyor. Buna göre, paranın tura ve zarın 4'ten büyük gelme olasılığı kaçtır?

A coin is tossed and a dice is rolled at the same time. What is the probability of getting a head and getting a number greater than 4?

- A) $\frac{1}{24}$ B) $\frac{1}{18}$ C) $\frac{1}{12}$ D) $\frac{1}{9}$ E) $\frac{1}{6}$

14. $P(A) = \frac{3}{4}$, $P(B) = \frac{1}{4}$, $P(A \cup B) = \frac{4}{5} \Rightarrow P(A \cap B) = ?$

- A) $\frac{1}{5}$ B) $\frac{2}{5}$ C) $\frac{3}{5}$ D) $\frac{1}{4}$ E) $\frac{3}{4}$



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
B	D	C	D	C	A	B	A
9	10	11	12	13	14		
E	A	D	D	E	A		

$$1. \binom{n}{n-1} + \binom{n+1}{1} = \binom{6}{2} \Rightarrow n = ?$$

- A) 7 B) 12 C) 15 D) 16 E) 89

[ATATÜRK ÜNİVERSİTESİ – YÖS 2018]

$$2. \frac{9! - 8!}{7! + 6!} = ?$$

- A) 52 B) 54 C) 56 D) 58 E) 60

[KARADENİZ TEKNİK ÜNİVERSİTESİ – YÖS 2018]

3. Anne, baba ve 4 çocuktan oluşan bir aile yuvarlak masa etrafında yemek yiyeceklerdir. Buna göre anne ve babanın arasına en küçük çocuk oturmak şartı ile kaç farklı şekilde yemek yiyebilirler?

A family consisting of mom, dad, and their 4 children are going to eat food on a round table. Accordingly, in how many different ways can the family sit around the table if the youngest child sits between mom and dad?

- A) 24 B) 16 C) 14 D) 12 E) 10

[FIRAT ÜNİVERSİTESİ – YÖS 2018]

$$4. \binom{4}{0} \cdot 2^4 + \binom{4}{1} \cdot 2^3 + \binom{4}{2} \cdot 2^2 + \binom{4}{3} \cdot 2^1 + \binom{4}{4} \cdot 2^0 = ?$$

- A) 2^3 B) 4^3 C) 3^4 D) 3^5 E) 4^4

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2018]

$$5. \frac{4 \cdot 8 \cdot 12 \cdot 16 \dots 40 \cdot 44}{12!} = ?$$

- A) 4^{21} B) 4^{20} C) $\frac{2^{20}}{3}$
D) $2^{11} \cdot 3$ E) $\frac{4^{12}}{3}$

[DUMLUPINAR ÜNİVERSİTESİ – YÖS 2018]

$$6. \frac{(n+1)!}{(n-1)!} = 420 \Rightarrow n = ?$$

- A) 16 B) 20 C) 24 D) 28 E) 32

[İNÖNÜ ÜNİVERSİTESİ – YÖS 2018]

$$7. n! = n \cdot (n-1) \cdot (n-2) \cdot \dots \cdot 3 \cdot 2 \cdot 1$$

$$\frac{(n+2)!}{n!} = 15 - \frac{(n+1)!}{n!} \Rightarrow n = ?$$

- A) 1 B) 2 C) 3 D) 4 E) 5

[ATATÜRK ÜNİVERSİTESİ – YÖS 2017]

8. 4 kişinin düz bir masaya sıralanma sayısı a, yuvarlak bir masaya sıralanma sayısı b olduğuna göre a + b kaçtır?

The number of ways 4 people can sit around a normal table is a and the number of ways these people can sit around a round table is b. Accordingly, what is the value of a + b?

- A) 8 B) 30 C) 48 D) 120 E) 144

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2017]

$$9. \binom{n}{r} = \frac{n!}{(n-r)! \cdot r!}$$

$$\Rightarrow \binom{n+1}{n} - \binom{n}{n-1} = ?$$

- A) -n B) -1 C) 0
D) 1 E) n

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2017]

$$10. \frac{4! \cdot (x-5)!}{5! \cdot (x-6)!} = 5! \Rightarrow x = ?$$

- A) 605 B) 595 C) 125
D) 115 E) 65

[ERCİYES ÜNİVERSİTESİ – YÖS 2017]

$$11. n! = 1 \cdot 2 \cdot 3 \cdot \dots \cdot (n-1) \cdot n$$

$$\frac{(n+1)! - n(n-1)!}{n! - (n-1)!} = ?$$

- A) $\frac{n}{n-1}$ B) $\frac{n^2}{n-1}$ C) $\frac{1}{n-1}$
D) $\frac{n^2}{n+1}$ E) $\frac{n-1}{n}$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2016]

$$12. \binom{n}{r} = \frac{n!}{(n-r)! \cdot r!}$$

$$\Rightarrow \binom{11}{1} + \binom{11}{2} + \binom{11}{3} + \dots + \binom{11}{10} = ?$$

- A) 256 B) 2^{10} C) 768
D) $2^{12} - 10$ E) $2^{11} - 2$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2015]

$$13. \frac{(n+1)! + n!}{(n-1)!} = 35 \Rightarrow n = ?$$

- A) 3 B) 5 C) 7 D) 9 E) 11

[ONDOKUZ MAYIS ÜNİVERSİTESİ – YÖS 2014]

$$14. n! = 1 \cdot 2 \cdot 3 \cdot 4 \cdot \dots \cdot (n-1) \cdot n$$

$$\frac{5! - 4!}{5! + 4!} = ?$$

- A) $\frac{1}{3}$ B) $\frac{2}{3}$ C) 1
D) $1\frac{1}{3}$ E) $1\frac{2}{3}$

[ONSEKİZ MART ÜNİVERSİTESİ – YÖS 2014]

$$15. x \in \mathbb{R}^+$$

$$\frac{12!x^3}{4!9!} = \frac{1}{24} \cdot \frac{6!x^8}{3!}$$

$$\Rightarrow x = ?$$

- A) $\sqrt[5]{11}$ B) $\sqrt[10]{12}$ C) $3\sqrt{5}$
D) $\sqrt[12]{17}$ E) $\sqrt[7]{7}$

[YILDIZ TEKNİK ÜNİVERSİTESİ – YÖS 2013]

$$16. C(n,r) = \frac{n!}{r! \cdot (n-r)!}$$

$$C(5,3) = C(k,2) \Rightarrow k = ?$$

- A) 7 B) 6 C) 5 D) 4 E) 3

[YÖS 2000]



YANITLAR / ANSWERS

1	2	3	4	5	6	7	8
A	C	D	C	C	B	B	B
9	10	11	12	13	14	15	16
D	A	B	E	B	B	A	C

