

Bu testte 40 soru vardır.

This test consists of 40 questions.

1.

$$1 - \frac{2}{\frac{2 - \frac{3}{4}}{1 - \frac{6}{11}}} = ? \rightarrow 1 - \frac{\frac{2}{\frac{5}{4}}}{\frac{5}{11}} = 1 - \frac{2 \cdot 11}{5 \cdot 4} = 1 - \frac{22}{20} = \frac{2}{20} = \frac{1}{10}$$

- A)  $\frac{1}{11}$  B) 1 C) 2 D)  $\frac{3}{11}$  E) 11

2.

$$1 - \frac{1}{2 - \frac{1}{3 - \frac{1}{4}}} = ? \rightarrow 1 - \frac{1}{\frac{11}{4}} = 1 - \frac{4}{11} = \frac{7}{11}$$

- A)  $\frac{8}{9}$  B)  $\frac{9}{10}$  C)  $\frac{10}{11}$  D)  $\frac{7}{18}$  E)  $\frac{9}{14}$

3.

$$1 + \frac{2 - \frac{1}{3}}{4 - \frac{1}{4}} = ? \rightarrow 1 + \frac{\frac{5}{3}}{\frac{15}{4}} = 1 + \frac{5 \cdot 4}{3 \cdot 15} = 1 + \frac{20}{45} = \frac{65}{45} = \frac{13}{9}$$

- A)  $\frac{9}{13}$  B) 1 C)  $\frac{13}{9}$  D)  $\frac{1}{19}$  E) 13

4.

$$8^2 \cdot (4 \cdot 2^{-3} + 2 \cdot 4^{-3}) = ?$$

$$2^7 \cdot (2^2 \cdot 2^{-3} + 2 \cdot 2^2 \cdot 2^{-3}) = 2^7 \cdot (2^{-1} + 2^0) = 2^7 \cdot \frac{3}{2} = 2^6 \cdot 3 = 64 \cdot 3 = 192$$

A) 64 B) 32 C) 16 D) 12 E) 10

5.

$$5 \cdot 3^{2a} + 9^{a+1} = 42 \rightarrow 5 \cdot 3^{2a} + (3^2)^{a+1} = 42$$

$$\Rightarrow a = ?$$

$$5 \cdot 3^{2a} + 3^{2a+2} = 42$$

$$5 \cdot 3^{2a} + 9 \cdot 3^{2a} = 42 \rightarrow 14 \cdot 3^{2a} = 42 \rightarrow 3^{2a} = 3 \rightarrow 2a = 1 \rightarrow a = \frac{1}{2}$$

A)  $\frac{1}{64}$  B) 1 C)  $\frac{1}{2}$  D) 2 E) 4

6.

$$\frac{\sqrt{180} + \sqrt{45}}{\sqrt{20}} = ?$$

- A) 6 B) 5,5 C) 5 D) 4,5 E) 4

$$\frac{\sqrt{180}}{\sqrt{20}} = \sqrt{9 \cdot 4 \cdot 5} = 6\sqrt{5}$$

$$\frac{\sqrt{45}}{\sqrt{20}} = \sqrt{9 \cdot 5} = 3\sqrt{5}$$

$$\frac{6\sqrt{5} + 3\sqrt{5}}{2\sqrt{5}} = \frac{9\sqrt{5}}{2\sqrt{5}} = \frac{9}{2} = 4,5$$

7.

$$\left( \frac{\sqrt[3]{11}}{\sqrt{99}} + \frac{22}{\sqrt{11}} \right) \cdot \frac{84}{\sqrt{44} \cdot \sqrt{11}} = ? \rightarrow$$

- A) 20    B) 11    C) 9    D) 8    E) 4

$$\left( \frac{\sqrt{11} \times \sqrt{11} + \frac{22}{\sqrt{11}}}{\sqrt{11}} \right) \times \frac{4}{\sqrt{11}}$$

$$\left( \frac{11 + \frac{22}{\sqrt{11}}}{\sqrt{11}} \right) \times \frac{4}{\sqrt{11}} = \frac{20}{11} = 20$$

8.

$$\frac{20^2 - 25^2}{11^2 - 14^2} = ? \rightarrow \frac{(20-25)(20+25)}{(11-14)(11+14)}$$

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

$$\frac{(-5)(45)}{(-3)(25)} = 3$$

9.

$$2B \equiv 2 \rightarrow B \begin{cases} 2 \\ 7 \end{cases}$$

$$\begin{array}{r} B2AB \ 9 \\ \underline{\phantom{00}8} \end{array} \quad \begin{array}{r} BA2B \ 4 \\ \underline{\phantom{00}2} \end{array}$$

$$A \neq B \Rightarrow A \cdot B = ?$$

- A) 4    B) 18    C) 24    D) 28    E) 32

$$\begin{cases} B2AB \equiv 9 \\ 22A2 \equiv 9 \\ 7+A \equiv 9 \\ B2AB \equiv 4 \\ 7+2+A+7 \equiv 4 \\ 12+A \equiv 4 \end{cases} \Rightarrow \begin{cases} A=3 \\ B=7 \end{cases} \rightarrow 18$$

چون A و B برابر نیستند  
تایید قبول نمی‌شود

10.

$$\begin{array}{r} 24 \\ AB \\ \times CB \\ \hline 336 \end{array} \quad \begin{array}{r} 1 \\ BA \overline{)BC} \\ \underline{\phantom{00}1} \end{array}$$

$$V \times 2 \times 2 \times 2 \times 2$$

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

$$\Rightarrow A \cdot B = ?$$

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

$$\textcircled{1} BA = BC + 1 \rightarrow BA - BC = 1 \rightarrow A - C = 1$$

چون A و B برابر نیستند و C و A برابر نیستند  
در اینجا A و C هم برابر نیستند

$$\begin{array}{r} \times 14 \\ 24 \\ \hline \end{array} \quad \begin{array}{r} \times 17 \\ 24 \\ \hline \end{array}$$

11.

$$\begin{array}{r} A48 \\ + 22B \\ \hline 11BA \end{array}$$

$\Rightarrow A - B = ?$

- A)1    B)2    C)3    D)4    E)5

$$\begin{cases} r+B=A \rightarrow A-B=r \\ r+r=B \rightarrow B=7 \end{cases} \rightarrow \begin{cases} A=9 \\ B=7 \end{cases} \rightarrow A-B=2$$

12.

$x, y \in R$

$$\frac{x}{y} = \frac{1}{2}$$

$y = 2x$

$$2x + y = 8$$

$$\begin{cases} 2x + 2x = 8 \\ x = 2 \\ y = 4 \end{cases} \rightarrow x + y = 6$$

$\Rightarrow x + y = ?$

- A)6    B)3    C)2    D)1    E)0

13.

$$\frac{7!}{9!} \times \frac{9!}{5!} + \frac{5!}{7!} \times \frac{9!}{5!} = \frac{7!}{9!} + \frac{9!}{7!} = \frac{7!}{9!} + \frac{9!}{7!} = \left( \frac{7!}{9!} + \frac{5!}{7!} \right) \cdot \frac{9!}{5!} = ?$$

$7 \times 7 + 9 \times 1 = 116$

- A) 154    B) 128    C) 118  
D) 116     E) 114

14.

$$1 + \left( \frac{1}{-2} \right) = \frac{1}{2}$$

$$1 + \frac{1}{1 - \frac{1}{3-x}} = \frac{1}{2}$$

$$\frac{1}{3-x} = \frac{2}{1} \rightarrow 9 - 2x = 1 \rightarrow x = \frac{4}{2} = 2$$

$\Rightarrow x = ?$

- A)  $\frac{1}{3}$     B)  $\frac{10}{3}$     C) 3    D)  $\frac{1}{9}$      E)  $\frac{8}{3}$

15.

$a, b \in \mathbb{Z}^*$

$$\left. \begin{aligned} a^2 - 8 < 6 \\ 3 < a + 2b < 2a + 1 \end{aligned} \right\} \Rightarrow b = ?$$

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

$a^2 - 8 < 6 \rightarrow a^2 < 14 \rightarrow a = 1, 2, 3$

صفری در آن باشد یا حتی منفی خارج آن است گفته

$3 < a + 2b < 3$

$a + 1$  چون در معادله (۲) صدق نمی‌کند

سین عدد ۳ هیچ عدد صحیح وجود ندارد!

$3 < 2 + 2b < 5 \rightarrow 2 + 2b = 4 \rightarrow b = 1 \leftarrow a = 2$

$a = 3$  هم قطعاً نزنه  $b = 1$  هم

16.

$\frac{a \cdot b}{c} < 0 < b \cdot c < a \cdot c < c^2$

$\Rightarrow ? < ? < ?$

- A)  $a < b < c$     B)  $c < a < b$   
 C)  $b < c < a$     D)  $b < a < c$   
 E)  $c < b < a$

صفتی  $b \cdot c$  مثبت باشد بنابراین در  $\frac{a \cdot b}{c}$  قسیم  $b$  به  $c$

هم مثبت خواهد بود (قطب هم علامت عدد) بنابراین  $a$  منفی خواهد بود

$a \cdot c < 0$  مثبت است چون  $a$  منفی و  $c$  مثبت است

$b \cdot c < 0$  مثبت است چون  $c$  منفی و  $b$  مثبت است

$\rightarrow b \cdot c < a \cdot c$

طرفین قسیم  $c$  چون  $c$  منفی است  $\rightarrow$

$b > a$

برعکس

$c < a < b$

$\rightarrow \frac{a \cdot c}{c} < \frac{c^2}{c} \rightarrow a > c$

17.

$a < 0 < b$

$\frac{|b| - |a|}{|a - b|} = \frac{1}{4} \Rightarrow \frac{a}{a + b} = ?$

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

با توجه به اینکه در این حالت  $a$  و  $b$  در دو طرف این دایره قرار می‌گیرند و همین

$\frac{b \rightarrow +}{a \rightarrow -} \rightarrow \frac{|b| - |a|}{|a - b|} = \frac{1}{4}$

$\frac{b + a}{-a + b} = \frac{1}{4} \rightarrow b - a = 4a + 4b \rightarrow -5a = 3b$

حالتی  $\frac{a + b}{a + b} \rightarrow \frac{3}{3 - 5} = -\frac{3}{2}$

18.

$(\sqrt{2x} + \sqrt{y})^2 = 4^2 \rightarrow 2x + y + 2\sqrt{2xy} = 16$

$(\sqrt{x} - \sqrt{2y})^2 = (\sqrt{5})^2 \rightarrow x + 2y - 2\sqrt{2xy} = 5$

$\Rightarrow x + y = ?$

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

$2(x + y) = 21 \rightarrow x + y = 10.5$

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19.

$$x < 0 < y$$

$$\Rightarrow |5 \cdot x| + |x-8| - |6y| = ?$$

- A)  $6x-6y$       B) 0      C)  $6-8x-8y$   
D)  $8-x-y$       E)  $8-6x-6y$

$$\begin{array}{l} |5x| \xrightarrow{\text{منفی } x} -5x \\ |x-8| \xrightarrow{\text{منفی } x} -x+8 \\ |6y| \xrightarrow{\text{منفی } y} -6y \end{array} \left\{ \begin{array}{l} -5x - x + 8 - 6y = \\ -6x - 6y + 8 \end{array} \right.$$

20

$$2X + Y + Z = -3$$

$$2X + Z = 2$$

$$Y + Z = 1$$

$$X - Y + Z = ?$$

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

$$2X + Y + Z = -3 \quad \underline{2X + Z = 2} \rightarrow Y = -5$$

$$Y + Z = 1 \quad \underline{Y = -5} \rightarrow Z = 4$$

$$2X + Z = 2 \quad \underline{Z = 4} \rightarrow X = -1$$

$$X - Y + Z = -1 + 5 + 4 = \boxed{9}$$

21.

$$\left. \begin{array}{l} \textcircled{1} a + 2 \cdot b \cdot c = 38 \\ \textcircled{2} b + 2 \cdot a \cdot c = -18 \\ \textcircled{3} a + b = -4 \end{array} \right\} \Rightarrow a \cdot b \cdot c = ?$$

- A) 9    B) 18    C) 24    D) 36    E) 154

$$\textcircled{1} + \textcircled{2} \rightarrow a+b + 2c(a+b) = 20 \rightarrow c = -2$$

$$\textcircled{2} b + 2ac = -18 \rightarrow b - 4c = -18 \quad \left\{ \begin{array}{l} c = -2 \\ \textcircled{1} a + b = -4 \end{array} \right. +$$

$$\begin{array}{l} a = 2 \\ b = -6 \\ c = -2 \end{array} \left\{ \begin{array}{l} a = 2 \\ b = -6 \\ c = -2 \end{array} \right. \rightarrow \boxed{24}$$

22.

$$A \cap D = \emptyset$$

$$A \cup B = \{1\}$$

$$A \cup C = \{1, 2\}$$

$$B \cup C \cup D = \{2, 3\}$$

$$1, 2 - \emptyset$$

$$\Rightarrow (C \cup D) \setminus (A \cap B) = ? \quad 2, 3$$

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

$$B = \{\emptyset\}$$

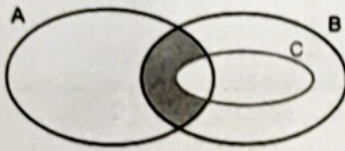
$$A = \{1\}$$

$$C = \{2\}$$

$$D = \{3\}$$

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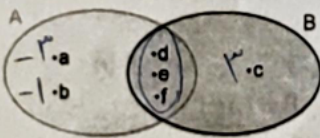
23.



⇒ Taralı Alan ( Shaded Area ) = ?

- A)  $C \cup D$       B)  $A \cap B$       C)  $(A \cap B) \setminus C$   
 D)  $C \cap D$       E)  $(A \cup B) \setminus C$

24.



$f: A \rightarrow B$        $f(x) = |x|$

$A = \{-3, -1, 0, 1, 2\}$        $B = \{2, 1, 0, 3\}$

⇒  $a \cdot b \cdot c = ?$        $(-3)(-1)(3) = 9$

- A) -6      B) -3      C) 0      D) 2      E) 9

25.

$$f(x) = g(x+1)$$

$$g(x+3) = x+5$$

$$\Rightarrow (g \circ f)(1) = ?$$

- A) 19      B) 17      C) 16      D) 6      E) 5

$$g(f(1)) = g(2) \xrightarrow{x=1.5} g(2) = 1.5 + 5 = 6.5$$

$$f(1) = g(2) = 2$$

$$g(2) = -1 + 5 = 4$$

26.

$$f\left(\frac{x+2}{3}\right) = \frac{4x+5}{6} + \frac{7}{a} \quad \left\{ \begin{array}{l} \frac{x+2}{3} = \frac{1}{3} \rightarrow x = -1 \\ f\left(\frac{1}{3}\right) = \frac{9}{a} \end{array} \right.$$

$$\Rightarrow a = ?$$

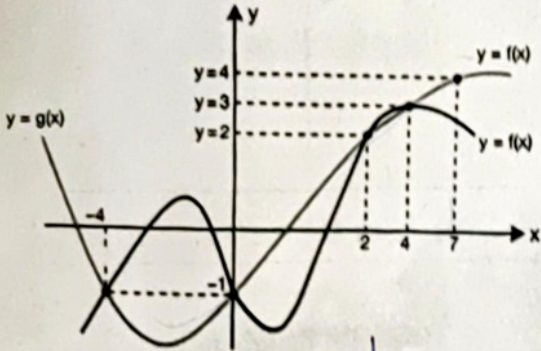
- A) 12      B) 14      C) 19      D) 29      E) 58

$$x = -1 \rightarrow f\left(\frac{1}{3}\right) = \frac{-2+5}{6} + \frac{7}{a}$$

$$\frac{9}{a} = \frac{1}{2} + \frac{7}{a}$$

$$\frac{2}{a} = \frac{7}{2} \rightarrow a = \frac{4}{7}$$

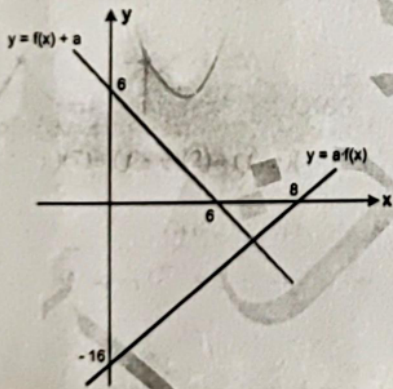
27.



$\Rightarrow (f \circ g)(7) + (f \circ g)(2) + (f \circ g)(-4) = ?$

A) 3    B) 4    C) 6    D) 8    E) 10

28.



$\Rightarrow a = ?$

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

$y = f(x) \rightarrow \frac{17}{8}(x) - 17 \rightarrow 2x - 17$

$y = g(x) + a \rightarrow \frac{7}{8}(x) + 7 \rightarrow x + 7$

$a \cdot f(x) = 2x - 17$

$f(x) + a = -x + 7$

$a(-x + 7 - a) = 2x - 17$

$-ax + 7a - a^2 = 2x - 17$

$a^2 = -ax + 7a - 2x + 17$

$a^2 = -ax - 2x + 7a + 17 \rightarrow -a = -2 \rightarrow a = 2$

29.

$P(x) = a \cdot x^2 + 4 \cdot x + b$

$P(0) = P(1)$

$P(2) = 12$

$\Rightarrow a + b = ?$

- A) 12    B) 16    C) 24    D) 28    E) 32

$P(0) \rightarrow a \cdot 0 + 4 \cdot 0 + b = P(1) \rightarrow a + 4 + b$

$P(1) \rightarrow a + 4 + b = a + 4 + b \rightarrow b = a + 4 + b \rightarrow a = -4$

$P(x) = -4x^2 + 4x + b$

$P(2) = 12$

$a + b \rightarrow -4 + 4 = 0$

30.

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

$P(x) = a \cdot x^2 + b \cdot x + a \cdot b$

$P(1) + P(-1) = 14$

$\Rightarrow a + 2b = ?$

- A) 11    B) 12    C) 13    D) 18    E) 22

$P(1) = a + b + ab = 7$

$P(-1) = a - b + ab = 7$

$2a + 2ab = 14$

$a + ab = 7$

$a(1+b) = 7$

$a + ab = 7$

$1 + 2 \cdot 3 = 7$