

$$1. \quad m \otimes n = (m+n)^2 - (m-n)^2$$

$$(\sqrt{2} \otimes (\sqrt{2} \otimes (\sqrt{2} \otimes \sqrt{2}))) = ?$$

$$\sqrt{2} \otimes \sqrt{2} = (\sqrt{2} + \sqrt{2})^2 - (\sqrt{2} - \sqrt{2})^2$$

$$= (2\sqrt{2})^2 = 8$$

$$\bullet \quad (\sqrt{2} \otimes (\sqrt{2} \otimes 8))$$

$$\sqrt{2} \otimes 8 = (\sqrt{2} + 8)^2 - (\sqrt{2} - 8)^2$$

$$= (\sqrt{2} + 8 + \sqrt{2} - 8) \cdot (\sqrt{2} + 8 - \sqrt{2} + 8)$$

$$= 2\sqrt{2} \cdot 16 = 32\sqrt{2}$$

$$\bullet \quad \sqrt{2} \otimes 32\sqrt{2} = (\sqrt{2} + 32\sqrt{2})^2 - (\sqrt{2} - 32\sqrt{2})^2$$

$$= (\sqrt{2} + 32\sqrt{2} + \sqrt{2} - 32\sqrt{2}) \cdot (\sqrt{2} + 32\sqrt{2} - \sqrt{2} + 32\sqrt{2})$$

$$= (2\sqrt{2}) \cdot (64\sqrt{2})$$

$$= 128 \cdot 2 = 256 = 2^8$$

Cevap: D

$$2. \quad (x, y) \Delta (z, t) = (xt - z, yt + z)$$

$$(m, n) \Delta (5, 1) = (-3, 7)$$

$$(m \cdot 1 - 5, n \cdot 1 + 5) = (-3, 7)$$

$$m - 5 = -3, \quad n + 5 = 7$$

$$m = 2, \quad n = 2$$

$$m + n = 2 + 2 = 4 \text{ bulunur.}$$

Cevap: D

$$3. \quad m \otimes n = mn - 1$$

$$3^{205} \otimes 3^{104} = ?$$

$$i) \quad 2 \otimes 5 = 2 \cdot 5 - 1 = 9$$

$$ii) \quad 1 \otimes 4 = 1 \cdot 4 - 1 = 3$$

$$3^9 \otimes 3^3 = 3^9 \cdot 3^3 - 1$$

$$= 3^{12} - 1$$

Cevap: B

$$4. \quad x \oplus y = (x \cdot y)^{y \cdot x}$$

$$x \otimes y = \left(\frac{y}{x}\right)^x$$

$$1 \otimes (2 \oplus 3) = ?$$

$$2 \oplus 3 = (2 \cdot 3)^{3 \cdot 2} = 6^6$$

$$1 \otimes 6^6 = \left(\frac{6^6}{1}\right)^1 = 6^6$$

Cevap: D

Cevap: D

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5.

$$\frac{1}{b \ominus a} = \frac{1}{2a} - \frac{1}{3b}$$

$$\frac{1}{12(b \ominus a)} = \frac{3b - 2a}{6a \cdot b} = \frac{12 \cdot (3b - 2a)}{6 \cdot a \cdot b} = \frac{6b - 4a}{a \cdot b}$$

$$(b \ominus a) = \frac{a \cdot b}{6b - 4a}$$

$$(1 \ominus 2) = \frac{1 \cdot 2}{6 - 8} = \frac{2}{-2} = -1$$

$$(-1 \ominus 3) = \frac{(-1) \cdot 3}{-6 - 12} = \frac{-3}{-18} = \frac{1}{6}$$

Cevap: E

$$6. \quad m \Delta n = 7m - 3n - 5$$

$$x \Delta x = x \Rightarrow x = ?$$

$$x \Delta x = 7x - 3x - 5 = x$$

$$3x = 5$$

$$x = \frac{5}{3}$$

Cevap: A

7.  $a \square b = a + b$

$$a \triangle b = \begin{cases} a & a.b < 0 \\ -b & a.b \geq 0 \end{cases}$$

$$(2 \triangle 1) \square (2 \triangle (-1)) = ?$$

i)  $2 \triangle 1 = -1$

ii)  $2 \triangle (-1) = 2$

$$-1 \square 2 = -1 + 2 = 1$$

Cevap: D

$$8. \left. \begin{aligned} a \circ b &= a^2 \otimes \frac{a}{b} \\ x \otimes y &= x^y + \frac{1}{y^x} \end{aligned} \right\} \Rightarrow 2 \circ 4 = ?$$

$$2 \circ 4 = 2^2 \otimes \frac{2}{4} = 4 \otimes \frac{1}{2}$$

$$4 \otimes \frac{1}{2} = (4)^{\frac{1}{2}} + \frac{1}{\left(\frac{1}{2}\right)^4} = \sqrt{4} + \frac{1}{\frac{1}{16}} = 2 + 16 = 18$$

Cevap: B

9.  $a \otimes b = 2a + 4b - 2(b \otimes a)$

$$\Rightarrow 2 \otimes 1 = 2.2 + 4.1 - 2(1 \otimes 2)$$

$$1 \otimes 2 = 2.1 + 4.2 - 2(2 \otimes 1)$$

$$(1 \otimes 2) = 10 - 2(2 \otimes 1)$$

O halde

$$2 \otimes 1 = 4 + 4 - 2.(10 - 2(2 \otimes 1))$$

$$2 \otimes 1 = 8 - 20 + 4(2 \otimes 1)$$

$$12 = 3(2 \otimes 1)$$

$$4 = 2 \otimes 1 \text{ bulunur.}$$

Cevap: B

10.  $a \nabla c \square d \circ b = \frac{a.c + b - d.a}{d - a^2 + c.b}$

$$2 \nabla 1 \square 3 \circ 5 = \frac{2.1 + 5 - 3.2}{3 - 2^2 + 1.5} = \frac{7 - 6}{3 - 4 + 5} = \frac{1}{4}$$

Cevap: B

$$11. m \diamond n = \begin{cases} \frac{m}{n} & n \geq m \\ \frac{n}{m} & n < m \end{cases}$$

$$\left(-\frac{1}{3} \diamond \frac{1}{-2}\right) \diamond \frac{1}{4}$$

$$\bullet \left(-\frac{1}{3} \diamond \frac{1}{-2}\right) = \frac{-\frac{1}{2}}{-\frac{1}{3}} = \frac{3}{2}$$

$$\bullet \frac{3}{2} \diamond \frac{1}{4} = \frac{\frac{3}{4}}{\frac{1}{2}} = \frac{3}{2}$$

Cevap: E

12.  $x \Delta y = \frac{2x}{3y}$

$$(1 \Delta k) \Delta (k \Delta 1) = ?$$

$$\bullet 1 \Delta k = \frac{2.1}{3.k} = \frac{2}{3k}$$

$$\bullet k \Delta 1 = \frac{2.k}{3.1} = \frac{2k}{3}$$

$$\frac{2}{3k} \Delta \frac{2k}{3} = \frac{2 \cdot \frac{2k}{3}}{3 \cdot \frac{2k}{3}} = \frac{4}{3k} \cdot \frac{1}{2k} = \frac{2}{3k^2}$$

Cevap: D

13.  $(x-2) \nabla (1-y) = x-y+4$

$$\frac{2 \nabla 3}{3 \nabla 2} = ?$$

•  $2 \nabla 3 = 4 - (-2) + 4 = 4 + 2 + 4 = 10$

$$\begin{array}{l} \swarrow \quad \searrow \\ x-2=2 \quad 1-y=3 \\ x=4 \quad -2=y \end{array}$$

•  $3 \nabla 2 = 5 - (-1) + 4 = 5 + 1 + 4 = 10$

$$\begin{array}{l} \swarrow \quad \searrow \\ x-2=3 \quad 1-y=2 \\ x=5 \quad -1=y \end{array}$$

O halde  $\frac{10}{10} = 1$  bulunur.

Cevap: D

14.  $2^a \Delta 3^b = a \cdot b + 2$

$16 \Delta 9 = ?$

•  $2^a = 16$

$3^b = 9$

$2^a = 2^4 \Rightarrow a = 4$

$3^b = 3^2 \Rightarrow b = 2$

O halde

$16 \Delta 9 = 4 \cdot 2 + 2 = 8 + 2 = 10$  olur.

Cevap: E

15.  $a \Delta b = \begin{cases} a+b & a \leq b \\ b-a & a > b \end{cases}$

$(-2 \Delta 4) \Delta (-1)$

i)  $-2 \Delta 4 = a + b = -2 + 4 = 2$

$a < b$

ii)  $2 \Delta (-1) = b - a = -1 - 2 = -3$

$a > b$

Cevap: A

16.  $x \oplus y = \frac{1}{y^2} \otimes \frac{1}{x^2}$

$x \otimes y = \frac{x+y}{x \cdot y}$

$$\frac{1}{y^2} \oplus \frac{1}{x^2} = \frac{\frac{1}{y^2} + \frac{1}{x^2}}{\frac{1}{y^2} \cdot \frac{1}{x^2}} = \frac{\frac{x^2+y^2}{x^2 \cdot y^2}}{\frac{1}{x^2 \cdot y^2}} = x^2 + y^2$$

Cevap: B

17.  $a > 0 \quad b > 0$

$a * b = \frac{a \cdot b}{a + b}$

$\frac{1}{3} * \frac{2}{5} = \frac{1}{2} * m$

$$\frac{\frac{1}{3} \cdot \frac{2}{5}}{\frac{1}{3} + \frac{2}{5}} = \frac{\frac{1}{2} \cdot m}{\frac{1}{2} + m}$$

$$\frac{\frac{2}{15}}{\frac{5+6}{15}} = \frac{\frac{m}{2}}{\frac{2m+1}{2}}$$

$\frac{2}{11} = \frac{m}{2m+1} \Rightarrow 4m + 2 = 11m$

$2 = 7m$

$\frac{2}{7} = m$

Cevap: C

$$18. \frac{3}{x} \Delta \frac{y}{2} = 6x - y + 5$$

$$6 \Delta a = 14 \Rightarrow a = ?$$

$$\frac{3}{x} = 6 \quad \frac{y}{2} = a$$

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

$$6 \Delta a = 6 \cdot \frac{1}{2} - 2a + 5 = 14$$

$$3 - 2a + 5 = 14$$

$$-6 = 2a$$

$$-3 = a \text{ olur.}$$

Cevap: B

$$20. a \circ b = \begin{cases} a - 2b & a < b \\ 2a - b & a \geq b \end{cases}$$

$$[2 \circ (-3)] \circ 8 = ?$$

$$2 \circ (-3) = 2a - b = 2 \cdot 2 - (-3) = 4 + 3 = 7$$

$$a > b$$

$$7 \circ 8 = a - 2b = 7 - 2 \cdot 8 = 7 - 16 = -9$$

$$a < b$$

Cevap: B

$$19. (\sqrt{a \cdot b})^2 = (\sqrt{a} + \sqrt{b})^2 \Rightarrow a \cdot b = a + b + 2\sqrt{a \cdot b} \text{ 'dir.}$$

$$\frac{1}{a \oplus b} = \frac{1}{a} + \frac{1}{b} = \frac{a+b}{a \cdot b} \Rightarrow a \oplus b = \frac{a \cdot b}{a+b} \text{ 'dir.}$$

$$(1 * 4) \oplus 9 = ?$$

$$i) 1 * 4 = 1 + 4 + 2 \cdot \sqrt{1 \cdot 4} = 1 + 4 + 2 \cdot 2 = 9$$

$$ii) 9 \oplus 9 = \frac{9 \cdot 9}{9 + 9} = \frac{81}{18} = \frac{9}{2}$$

Cevap: E