1.
$$a * b = \begin{cases} a + b & a > b \\ a - b & a \le b \end{cases}$$

$(1 * 1) * (2 * 1) = ?$

i) $1 * 1 = a - b = 1 - 1 = 0$
$a = b$

ii) $2 * 1 = 2 + 1 = 3$
$a > b$

iii) $0 * 3 = 0 - 3 = -3$
$a < b$

Cevap: C

2. $(x, y) \otimes (z, t) = (x.t + 1 , \ y.z + x)$

$(-3, 2) \otimes \left(4, \dfrac{1}{2}\right) = \left(-3.\dfrac{1}{2} + 1, \ 2.4 - 3\right)$

$= \left(-\dfrac{3}{2} + 1, \ 8 - 3\right)$

$= \left(-\dfrac{1}{2}, \ 5\right)$

Cevap: E

3. $a \ \square \ b = \sqrt[4]{a.b}$

$a \oplus b = a^2 b - 2(a \oplus b) + 3$

$3(a \oplus b) = a^2 b + 3$

$a \oplus b = \dfrac{a^2 b + 3}{3}$'dir.

i) $1 \oplus 3 = \dfrac{1^2.3 + 3}{3} = \dfrac{6}{3} = 2$

ii) $2 \ \square \ 8 = \sqrt[4]{2.8}$

$= \sqrt[4]{16} = \sqrt[4]{2^4} = 2$ bulunur.

Cevap: C

4. $\dfrac{a + b}{2} \ \Delta \ (2a - b) = a^b$

$2 \ \Delta \ 5 = ?$

i) $\dfrac{a + b}{2} = 2$ \qquad ii) $2a - b = 5$

$a + b = 4$

i ve ii'den

$\qquad a + b = 4$
$+ \quad 2a - b = 5$
$\overline{\qquad 3a = 9}$

$a = 3 \ \Rightarrow \ b = 1$

O halde

$2 \ \Delta \ 5 = 3^1 = 3$ bulunur.

Cevap: A

5. $\left(\dfrac{a + 2}{2}\right) \otimes \left(\dfrac{b}{3}\right) = a.b$

$3 \otimes 2 = ?$

$\dfrac{a + 2}{2} = 3 , \qquad \dfrac{b}{3} = 2$

$a + 2 = 6 \qquad\qquad b = 6$

$a = 4$

$3 \otimes 2 = a.b = 4.6 = 24$ bulunur.

Cevap: D

6. I. $(a, b) \odot (c, d) = (ad - c, bd - c)$

$(a, b) \square (c, d) = \left(\dfrac{a - c}{b - d}, \dfrac{a + c}{b + d} \right)$

$[(8, 3) \square (7, 2)] \odot (1, 1)] = ?$

i) $\underset{a,\ b}{(8, 3)} \square \underset{c,\ d}{(7, 2)} = \left(\dfrac{8 - 7}{3 - 2}, \dfrac{8 + 7}{3 + 2} \right)$

$= (1, 3)$

ii) $\underset{(a,\ b)}{(1, 3)} \odot \underset{(c,\ d)}{(1, 1)} = (1.1 - 1,\ \ 3.1 - 1)$

$= (0, 2)$

Cevap: C

7. $a * b = \begin{cases} a - 2b & a < b \\ 3ab & b \leq a \end{cases}$

$[(-1) * 0] * (-2)$

i) $(-1) * 0 = a - 2b = -1 - 2.0 = -1$

$a < b$

ii) $(-1) * (-2) = 3ab = 3(-1).(-2) = 6$

$a > b$

Cevap: D

8. $a \oplus b = a.b - (a \oplus b) - 1$

$2(a \oplus b) = a.b - 1$

$a \oplus b = \dfrac{a.b - 1}{2}$

$3 \oplus 7 = \dfrac{3.7 - 1}{2} = \dfrac{20}{2} = 10$

Cevap: D

9. $\dfrac{a}{3} \oplus (b + 1) = a.b$

$2 \oplus 3 = ?$

$\dfrac{a}{3} = 2 \Rightarrow a = 6$

$b + 1 = 3 \Rightarrow b = 2$

$2 \oplus 3 = a.b = 6.2 = 12$

Cevap: E

10. $a \Delta b = a.b$

$a * b = (a + 2).b$

$(2 \Delta 3) * 5 = ?$

- $2 \Delta 3 = 2.3 = 6$

- $6 * 5 = (6 + 2).5$

$= 8.5 = 40$ bulunur.

Cevap: E

11. $a \otimes b = \begin{cases} a^3 + b^3 & a < b \\ 3ab - 15 & a \geq b \end{cases}$

$(-2) \otimes (3 \otimes 2) = ?$

i) $3 \otimes 2 = 3ab - 15 = 3.3.2 - 15 = 3$

ii) $(-2) \otimes 3 = a^3 + b^3 = (-2)^3 + (3)^3$

$= -8 + 27$

$= 19$ bulunur.

Cevap: E

12. $\triangle.® = 30$

$®.© = 45 \qquad \min(\triangle + ©) = ?$

$\triangle = a \quad ® = b \quad$ ve $\quad © = c$ olsun $\qquad a, b, c \in Z^+$

$2 \leftarrow \boxed{a} . \boxed{b} = 30$

$\boxed{b} . \boxed{c} = 45$ $\qquad$ a ve c'nin en küçük olması için b büyük olmalı

$\quad\downarrow \qquad \downarrow$

$\quad 15 \qquad 3$

$(a + c)_{min} = 2 + 3 = 5$

Cevap: B

13. $a \circ b = a - b$

$a * b = \dfrac{a}{b}$

$a \, \Delta \, b = a.b$

$9 \circ [(6 * 3) \, \Delta \, 2] = 9 \circ [2 \, \Delta \, 2]$

$6 * 3 = \dfrac{6}{3} = 2 \qquad 2 \, \Delta \, 2 = 2.2 = 4$

$9 \circ 4 = 9 - 4 = 5$

Cevap: C

14.
$$a * b = \begin{cases} a.b - a^b & a < b \\ b^a - \dfrac{a}{b} & a \geq b \end{cases}$$

$(2 * 3) * (1 * 1)$

i) $\quad 2 * 3 = 2.3 - 2^3 = 6 - 8 = -2$

$\quad a < b$

ii) $\quad 1 * 1 = 1^1 - \dfrac{1}{1} = 1 - 1 = 0$

$\quad a = b$

$-2 * 0 = -2.0 - (-2)^0$

$\quad a < b = 0 - 1$

$\qquad\quad = -1$ bulunur.

Cevap: B

15. I. $\quad 2 \, \square \, 3 = 3 \rightarrow \dfrac{2.3}{2} = 3$

II. $\quad 3 \, \square \, 4 = 6 \rightarrow \dfrac{3.4}{2} = 6$

III. $\quad 4 \, \square \, 5 = 10$

$\square$ işlemi sayıların çarpımının yarısı olmalı

O halde

IV. $5 \, \square \, 6 = \dfrac{5.6}{2} = 15$ bulunur.

Cevap: C

16. $2^{x⊛y} = 4x + 5y$

$3 ⊛ 4 = ?$

$2^{3⊛4} = 4.3 + 5.4 = 12 + 20 = 32$

$2^{3⊛4} = 2^5$

$3 ⊛ 4 = 5$ bulunur.

Cevap: B

17. $x \otimes y = -2(y \triangle x) + 2y$

$y \triangle x = 3y - 2x$

$4 \otimes 3 = ?$

$4 \otimes 3 = -2(3 \triangle 4) + 2.3$

$\boxed{3 \triangle 4 = 3.3 - 2.4 = 9 - 8 = 1}$

O halde

$= -2.1 + 6$

$= 4$ olur.

Cevap: E

18. $a \ominus b = a^2 + 2b - ab$

$a \obullet b = b^2 + 2a - ab$

$(1 \ominus 0) \obullet (1 \ominus (-1))$

i) $1 \ominus 0 = 1^2 + 2.0 - 1.0 = 1$

ii) $1 \ominus (-1) = 1^2 + 2.(-1) - 1.(-1) = 1 - 2 + 1 = 0$

iii) $1 \obullet 0 = 0^2 + 2.1 - 0.1$

$= 2$

Cevap: D

19. $a*b = \begin{cases} a - b & a \le b \\ a + b & a > b \end{cases}$

$(2 * 0) * (1 * 3)$

i) $2 * 0 = a + b = 2 + 0 = 2$

$a > b$

ii) $1 * 3 = a - b = 1 - 3 = -2$

$a < b$

iii) $2 * (-2) = a + b = 2 - 2 = 0$

$a > b$

Cevap: C

20. $X \stackrel{\star}{} y = x^y$

$X \blacktriangle y = x + y$

$X \stackrel{\star}{} (x \blacktriangle 1) = 81 \Rightarrow x = ?$

i) $x \blacktriangle 1 = x + 1$

ii) $x \stackrel{\star}{} (x + 1) = x^{(x+1)} = 81 \Rightarrow x = 3$ bulunur.

$3^4 = 81$'dir.

Cevap: B