1. $a * b = 2a.b - a + \sqrt{b}$

$x * 9 = 2.x.9 - x + \sqrt{9} = 37$

$\qquad 18x - x + 3 = 37$

$\qquad\qquad 17x = 37 - 3$

$\qquad\qquad 17x = 34$

$\qquad\qquad\quad x = 2 \text{ bulunur.}$

<div align="right">

Cevap: B

</div>

2. $x \triangle y = \dfrac{2x - y}{x + y}$

$x = a + 2b, \quad y = 3a - b$

$(a + 2b) \triangle (3a - b) = \dfrac{2.(a + 2b) - (3a - b)}{a + 2b + 3a - b}$

$\qquad\qquad\qquad = \dfrac{2a + 4b - 3a + b}{4a + b}$

$\qquad \dfrac{5b - a}{4a + b} = \dfrac{4}{3} \Rightarrow 15b - 3a = 16a + 4b$

$$11b = 19a$$
$$\downarrow \qquad \downarrow$$
$$19 \qquad 11$$

$a \triangle b = 11 \triangle 19 = \dfrac{2.11 - 19}{11 + 19} = \dfrac{22 - 19}{30}$

$\qquad\qquad\qquad = \dfrac{3}{30} = \dfrac{1}{10}$

<div align="right">

Cevap: B

</div>

3. $\left(\dfrac{1}{4} \square \dfrac{1}{6}\right)$

$x = \dfrac{1}{4} > y = \dfrac{1}{6}$ olduğunda

$\dfrac{1}{4} \square \dfrac{1}{6} = \dfrac{3y}{x} = \dfrac{3.\frac{1}{6}}{\frac{1}{4}} = \dfrac{\frac{1}{2}}{\frac{1}{4}} = \dfrac{4}{2} = 2$

- $2 \square 3$

  $x = 2 < y = 3$ olduğundan

  $2 \square 3 = \dfrac{2x}{y} = \dfrac{2.2}{3} = \dfrac{4}{3}$

<div align="right">

Cevap: C

</div>

4. $a * b = a^2 - ab$

- $2 * 1 = 2^2 - 2.1 = 4 - 2 = 2$

- $3 * 2 = 3^2 - 3.2 = 9 - 6 = 3$

- $x * 3 = x^2 - 3x = 10$

  $x^2 - 3x - 10 = 0$

  $(x - 5)(x + 2) = 0$

  $x - 5 = 0 \qquad x + 2 = 0$

  $x = 5 \qquad\qquad x \neq -2$

<div align="right">

Cevap: E

</div>

5. $a \triangle b = -4(b \triangle a) + b$

$3 \triangle 5 = -4(5 \triangle 3) + 5$

$5 \triangle 3 = -4(3 \triangle 5) + 3$

işleminde $(5 \triangle 3)$ yerine yazılır ise

$\qquad 3 \triangle 5 = -4(-4(3 \triangle 5) + 3) + 5$

$\qquad 3 \triangle 5 = 16(3 \triangle 5) - 12 + 5$

$\qquad\quad 7 = 15(3 \triangle 5)$

$\qquad \dfrac{7}{15} = (3 \triangle 5) \text{ bulunur.}$

<div align="right">

Cevap: D

</div>

6. $x \odot y = \dfrac{x.y}{x+y}$

• $\dfrac{1}{3} \odot \dfrac{2}{5} = 2 \odot \dfrac{1}{a}$

$$\dfrac{\dfrac{1}{3} \cdot \dfrac{2}{5}}{\underset{(5)}{\dfrac{1}{3}} + \underset{(3)}{\dfrac{2}{5}}} = \dfrac{2 \cdot \dfrac{1}{a}}{2 + \dfrac{1}{a}}$$

$$\dfrac{\dfrac{2}{15}}{\dfrac{5+6}{15}} = \dfrac{\dfrac{2}{a}}{\dfrac{2a+1}{a}}$$

$$\dfrac{2}{\cancel{15}} \cdot \dfrac{\cancel{15}}{11} = \dfrac{2}{\cancel{a}} \cdot \dfrac{\cancel{a}}{2a+1}$$

$$\dfrac{\cancel{2}}{11} = \dfrac{\cancel{2}}{2a+1} \Rightarrow 2a+1 = 11$$

$$2a = 10$$
$$a = 5 \text{ bulunur.}$$

Cevap: B

7. $\boxed{x} = \dfrac{2+x}{3x}$

$2 \ast 3 = \dfrac{\boxed{2} - \boxed{3}}{\boxed{2} + \boxed{3}}$

$\boxed{2} = \dfrac{2+2}{3.2} = \dfrac{4}{6} = \dfrac{2}{3}$

$\boxed{3} = \dfrac{2+3}{3.3} = \dfrac{5}{9}$

$2 \ast 3 = \dfrac{\underset{(3)}{\dfrac{2}{3}} - \underset{(1)}{\dfrac{5}{9}}}{\underset{(3)}{\dfrac{2}{3}} + \underset{1}{\dfrac{5}{9}}} = \dfrac{\dfrac{6-5}{\cancel{9}}}{\dfrac{6+5}{\cancel{9}}} = \dfrac{1}{11}$

Cevap: C

8. $x \triangle y = \begin{cases} x+y & x \le y & \text{ise} \\ x.y & x > y & \text{ise} \end{cases}$

$8 \triangle \underbrace{(2 \triangle a)}_{k \text{ olsun}} = 16$

i) $8 > k$ olsa

$8 \triangle k = x.y = 8.k = 16$
$$k = 2$$

ii) $8 \le k$ olsa

$8 \triangle k = x + y = 8 + k = 16$
$$k = 8$$

✴ $k = 2$ için

$2 \triangle a = 2$
$2 > a$
$2.a = 2$
$a = 1$

$k = 8$ için

$2 \triangle a = 8$
$2 < a$
$2 + a = 8$
$a = 6$

O halde a'nın alabileceği değerlerin toplamı

$1 + 6 = 7$ bulunur.

Cevap: C

9. $a \triangle b = a^2 + a.b + a^b$

$3 \triangle 4 = 1 \triangle x$

$3^2 + 3.4 + 3^4 = 1^2 + 1.x + 1^x$

$9 + 12 + 81 = 1 + x + 1$

$100 = x$ bulunur.

Cevap: E

10.

$$a ✳ b = 3.(a^2 + b^2) - 12$$

$$4 ✳ x = 48$$

$$3.(4^2 + x^2) - 12 = 48$$

$$3.(16 + x^2) = 60$$

$$16 + x^2 = 20$$

$$x^2 = 4$$

$$x = \mp 2$$

$$x = 2 \quad ve \quad x = -2 \quad olur.$$

Bu değerlerin çarpımı $(-2).(2) = -4$

Cevap: C

12.

$$a \triangle b = 2a.b + a - b^2$$

$$5 \triangle 3 = 2.5.3 + 5 - 3^2$$

$$= 30 + 5 - 9$$

$$5 \triangle 3 = 26$$

$$a \odot b = 5(a \triangle b) - 20$$

$$5 \odot 3 = 5.(5 \triangle 3) - 20$$

$$= 5.26 - 20$$

$$= 130 - 20$$

$$= 110 \text{ bulunur.}$$

Cevap: D

11. $a \triangle b = (a + 1)!.(b - 1)!$

$$\frac{(x-1) \triangle x}{x \triangle (x-1)} = \frac{(x-1+1)!.(x-1)!}{(x+1)!.(x-1-1)!} = \frac{5}{7}$$

$$= \frac{x!.(x-1)!}{(x+1)!.(x-2)!} = \frac{5}{7}$$

$$= \frac{x!.(x-2)!.(x-1)}{x!.(x+1).(x-2)!} = \frac{5}{7}$$

$$= \frac{x-1}{x+1} = \frac{5}{7}$$

$$7x - 7 = 5x + 5$$

$$7x - 5x = 5 + 7$$

$$2x = 12$$

$$x = 6 \quad \text{bulunur.}$$

Cevap: D