

$$\begin{aligned}
 1. \quad \left(\frac{k}{\sqrt[3]{k^2}}\right)^5 &= \frac{1}{3^{\frac{1}{3}}} \Rightarrow \left(\frac{k}{k^{\frac{2}{3}}}\right)^5 = 3^{-\frac{1}{3}} \\
 &\left(k^{1-\frac{2}{3}}\right)^5 = 3^{-\frac{1}{3}} \\
 &\left(k^{\frac{1}{3}}\right)^5 = 3^{-\frac{1}{3}} \\
 &(k^5)^{\frac{1}{3}} = (3^{-1})^{\frac{1}{3}} \\
 &k^5 = 3^{-1} \\
 &(k^5)^{\frac{1}{5}} = (3^{-1})^{\frac{1}{5}} \\
 &k = 3^{-\frac{1}{5}}
 \end{aligned}$$

$$\begin{aligned}
 2. \quad x \in \mathbb{Z} \\
 \left(\frac{1}{27}\right)^{3x} > (81)^{11} \Rightarrow \max(x) = ? \\
 (3^{-3})^{3x} > (3^4)^{11} \Rightarrow 3^{-9x} > 3^{44} \\
 \Rightarrow \frac{-9x}{-9} > \frac{44}{-9} \\
 \Rightarrow x < -4,8... \\
 \downarrow \\
 \max(x) = -5
 \end{aligned}$$

$$\begin{aligned}
 3. \quad \left(\frac{1}{4}\right)^{-4x} \cdot 16^{x-1} \cdot 64^{1-x} &= 256 \Rightarrow x = ? \\
 (2^{-2})^{-4x} \cdot (2^4)^{x-1} \cdot (2^6)^{1-x} &= 2^8 \\
 2^{8x+4x-4+6-6x} &= 2^8 \\
 2^{6x+2} = 2^8 \Rightarrow 6x+2 &= 8 \\
 6x &= 6 \\
 x &= 1
 \end{aligned}$$

$$\begin{aligned}
 4. \quad \frac{9^{3n+1} + 27^{2n}}{3^{6n-1}} + \frac{4^{3n} - 8^{2n-1}}{2^{6n-5}} \\
 = \frac{(3^2)^{3n+1} + (3^3)^{2n}}{3^{6n-1}} + \frac{(2^2)^{3n} - (2^3)^{2n-1}}{2^{6n-5}} \\
 = \frac{3^{6n+2} + 3^{6n}}{3^{6n-1}} + \frac{2^{6n} - 2^{6n-3}}{2^{6n-5}} \\
 = \frac{3^{6n} \cdot (3^2 + 1)}{3^{6n} \cdot 3^{-1}} + \frac{2^{6n} \cdot (1 - 2^{-3})}{2^{6n} \cdot 2^{-5}} \\
 = \frac{10}{3} + \frac{1 - \frac{1}{8}}{\frac{1}{32}} = 10 \cdot \frac{3}{1} + \frac{7}{8} \cdot \frac{32}{1} = 30 + 28 \\
 = 58
 \end{aligned}$$

Cevap: E

Cevap: A

$$\begin{aligned}
 5. \quad x &= 3 + 2^{a-1} \\
 y &= 5 - 2^{a+1} \Rightarrow \frac{x}{y} = ? \\
 y = 5 - 2^{a+1} \Rightarrow 2^{a+1} &= 5 - y \Rightarrow 2^a \cdot 2 = 5 - y \\
 \Rightarrow 2^a &= \frac{5-y}{2} \\
 x = 3 + 2^{a-1} &= 3 + \frac{2^a}{2} = 3 + \frac{5-y}{4} \\
 \Rightarrow x &= \frac{12+5-y}{4} = \frac{17-y}{4} \\
 \Rightarrow \frac{x}{y} &= \frac{17-y}{4y} = \frac{17-y}{4y}
 \end{aligned}$$

Cevap: B

Cevap: C

$$\begin{aligned}
 6. \quad 3^{x+1} &= \sqrt{2} \Rightarrow 3^{2x} = ? \\
 3^{x+1} = \sqrt{2} \Rightarrow 3^x \cdot 3 &= \sqrt{2} \Rightarrow (3^x)^2 = \left(\frac{\sqrt{2}}{3}\right)^2 \\
 3^{2x} &= \frac{2}{9}
 \end{aligned}$$

Cevap: A

$$7. a = \left(\frac{1}{5}\right)^{-\frac{1}{4}} = (5^{-1})^{-\frac{1}{4}} = 5^{\frac{1}{4}}$$

$$b = \left(\frac{1}{4}\right)^{-\frac{1}{5}} = (4^{-1})^{-\frac{1}{5}} = 4^{\frac{1}{5}}$$

$$c = \left(\frac{1}{3}\right)^{-\frac{1}{6}} = (3^{-1})^{-\frac{1}{6}} = 3^{\frac{1}{6}}$$

$$\Rightarrow 3^{\frac{1}{6}} < 4^{\frac{1}{5}} < 5^{\frac{1}{4}} \Rightarrow c < b < a$$

Cevap: D

$$8. \left(\frac{4}{x^2}\right)^{-1} = \left(\frac{2}{49}\right)^{-2}; x > 0 \text{ ise } x = ?$$

$$\Rightarrow \frac{x^2}{4} = \left(\frac{49}{2}\right)^2$$

$$\Rightarrow \frac{x^2}{4} = \frac{49^2}{4}$$

$$\Rightarrow x^2 = 49^2$$

$$\Rightarrow x = 49$$

Cevap: E

$$9. \frac{64^x - 16^x}{8^x + 4^x} = 4^x \xrightarrow{\substack{\text{içler dışlar} \\ \text{çarpımı}}} 64^x - 16^x = 32^x + 16^x$$

$$2^{6x} - 2^{4x} = 2^{5x} + 2^{4x}$$

$$2^{4x} \cdot (2^{2x} - 1) = 2^{4x} \cdot (2^x + 1)$$

$$2^{2x} - 2^x = 2$$

$$x = 1$$

Cevap: E

$$10. 2^x = a$$

$$3^x = b$$

$$48^x = (16 \cdot 3)^x = 2^{4x} \cdot 3^x = (2^x)^4 \cdot 3^x = a^4 \cdot b$$

Cevap: D

$$11. 2^{-a+1} = \sqrt{3} \Rightarrow 2^{-a} \cdot 2 = \sqrt{3} \Rightarrow 2^{-a} = \frac{\sqrt{3}}{2}$$

$$\Rightarrow 2^a = \frac{2}{\sqrt{3}}$$

$$\Rightarrow 2^{2a} = (2^a)^2 = \left(\frac{2}{\sqrt{3}}\right)^2$$

$$= \frac{4}{3}$$

Cevap: C

$$12. \left(\frac{1}{27}\right)^{2-x} = 9^{x-1} \Rightarrow (3^{-3})^{2-x} = (3^2)^{x-1}$$

$$3^{-6+3x} = 3^{2x-2}$$

$$-6 + 3x = 2x - 2$$

$$3x - 2x = -2 + 6$$

$$x = 4$$

Cevap: D

$$13. \frac{12^x + 18^x}{3^x + 2^x} = 36 \Rightarrow \frac{6^x \cdot (2^x + 3^x)}{3^x + 2^x} = 36$$

$$6^x = 6^2$$

$$x = 2$$

Cevap: A

$$14. 5^x = 3^y \Rightarrow (5^x)^{\frac{1}{x}} = (3^y)^{\frac{1}{x}} \Rightarrow 3^{\frac{y}{x}} = 5$$

$$\Rightarrow (5^x)^{\frac{1}{y}} = (3^y)^{\frac{1}{y}} \Rightarrow 5^{\frac{x}{y}} = 3$$

$$\Rightarrow 3^{\frac{y}{x}} + 5^{\frac{x}{y}} = 5 + 3 = 8$$

Cevap: A

15.  $a, b \in \mathbb{R}$ 

$$\frac{5^{a-b}}{27^{a+b}} = 135 \Rightarrow \frac{5^{a-b}}{27^{a+b}} = 5 \cdot 27$$

$$\Rightarrow 5^{a-b-1} = 27^{a+b+1}$$

$$\left. \begin{array}{l} a-b-1=0 \rightarrow a-b=1 \\ a+b+1=0 \rightarrow a+b=-1 \end{array} \right\} \Rightarrow a^2 - b^2 = (a-b) \cdot (a+b)$$

$$= 1 \cdot (-1)$$

$$= -1$$

Cevap: B

16.  $x = 3^{n+2}$ 

$$3x = 9^{n+3} \Rightarrow 3^1 \cdot 3^{n+2} = 9^{n+2}$$

$$3^{n+3} = (3^2)^{n+2}$$

$$3^{n+3} = 3^{2n+4}$$

$$n+3 = 2n+4$$

$$n = -1$$

Cevap: B

$$\begin{aligned} 17. \frac{2^{2x+2} - 2^4}{2^x + 2} \cdot \frac{2^x - 2}{8} - 1 &= \frac{2^{2x} \cdot 2^2 - 2^4}{2^x + 2} \cdot \frac{8}{2^x - 2} - 1 \\ &= \frac{2^2 \cdot (2^{2x} - 2^2)}{2^x + 2} \cdot \frac{8}{2^x - 2} - 1 \\ &= 4 \cdot 8 - 1 = 32 - 1 = 31 \end{aligned}$$

Cevap: B

$$18. 3^{2x} = 25 \Rightarrow (3^x)^2 = 5^2 \Rightarrow 3^x = 5$$

$$5^y = 27 \Rightarrow 5^y = 27 \Rightarrow (3^x)^y = 27$$

$$3^{x \cdot y} = 3^3$$

$$x \cdot y = 3$$

Cevap: E

19.  $ab$  ve  $ba$  iki basamaklı sayılar;

$$\frac{3^{21} \cdot 3^{21} \cdot 3^{21} \cdot 3^{21}}{9^3 \cdot 9^3} = (ab)^{ba} \Rightarrow a \cdot b = ?$$

$$\frac{(3^{21})^4}{(9^3)^2} = \frac{3^{84}}{9^6} = \frac{3^{84}}{(3^2)^6} = \frac{3^{84}}{3^{12}}$$

$$= 3^{84-12}$$

$$= 3^{72}$$

$$= (3^4)^{18}$$

$$= (81)^{18} = (ab)^{ba}$$

$$\Rightarrow a = 8, b = 1 \Rightarrow a \cdot b = 8 \cdot 1 = 8$$

Cevap: C

$$20. 2^a = 81 = 3^4 \Rightarrow (2^a)^{\frac{1}{4}} = (3^4)^{\frac{1}{4}} \Rightarrow 2^{\frac{a}{4}} = 3$$

$$3^b = 32 = 2^5 \Rightarrow 3^b = 2^5 \Rightarrow \left(2^{\frac{a}{4}}\right)^b = 2^5$$

$$2^{\frac{a \cdot b}{4}} = 2^5$$

$$\frac{a \cdot b}{4} = 5 \Rightarrow a \cdot b = 20$$

Cevap: A