

$$\begin{aligned}
1. \quad & \frac{xy^2 - 4x - 3y^2 + 12}{xy - 3y - 2x + 6} + \frac{xy - 2x - y + 2}{x - 1} \\
&= \frac{xy^2 - 3y^2 - 4x + 12}{xy - 3y - 2x + 6} + \frac{xy - y - 2x + 2}{x - 1} \\
&= \frac{y^2 \cdot (x - 3) - 4 \cdot (x - 3)}{y \cdot (x - 3) - 2 \cdot (x - 3)} + \frac{y \cdot (x - 1) - 2 \cdot (x - 1)}{x - 1} \\
&= \frac{\cancel{(x - 3)} \cdot (y^2 - 4)}{\cancel{(x - 3)} \cdot (y - 2)} + \frac{\cancel{(x - 1)} \cdot (y - 2)}{\cancel{x - 1}} \\
&= \frac{(y - 2) \cdot (y + 2)}{y - 2} + y - 2 \\
&= y + 2 + y - 2 = 2y
\end{aligned}$$

Cevap: A

$$\begin{aligned}
2. \quad & \left(\frac{\frac{x}{x} + \frac{1}{x} + \frac{1}{x}}{\frac{1}{x^3} - 1} \right) \cdot (-x^2 + x) \\
&= \frac{\frac{x^2 + x + 1}{x}}{(x - 1) \cdot (x^2 + x + 1)} \cdot x \cdot (-x + 1) \\
&= \frac{\cancel{x^2 + x + 1}}{x} \cdot \frac{1}{\cancel{(x - 1)} \cdot \cancel{(x^2 + x + 1)}} \cdot (-x) \cdot \cancel{(x - 1)} \\
&= -1
\end{aligned}$$

Cevap: B

$$\begin{aligned}
3. \quad & \frac{x^2 - 1}{x + 1} - \frac{2x^2 - 3x + 1}{x - 1} = \frac{(x - 1) \cdot \cancel{(x + 1)}}{\cancel{x + 1}} - \frac{(2x - 1) \cdot \cancel{(x - 1)}}{\cancel{x - 1}} \\
&= (x - 1) - (2x - 1) \\
&= x - 1 - 2x + 1 \\
&= -x
\end{aligned}$$

Cevap: D

$$\begin{aligned}
4. \quad & \frac{16 - (4a - a^2)^2}{a^2 - 4a - 4} \cdot \frac{1}{2 - a} \\
&= \frac{(4 - (4a - a^2)) \cdot (4 + (4a - a^2))}{(a^2 - 4a - 4)} \cdot \frac{1}{2 - a} \\
&= \frac{(4 - 4a + a^2) \cdot (4 + 4a - a^2)}{a^2 - 4a - 4} \cdot \frac{1}{2 - a} \\
&= -(a^2 - 4a + 4) \cdot \frac{1}{2 - a} \\
&= -(a - 2)^2 \cdot \frac{-1}{a - 2} = a - 2 = -2 + a
\end{aligned}$$

Cevap: A

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$$\begin{aligned}
5. \quad & m - n = 5 \\
& n + 2r = 4 \\
& \Rightarrow n^2 - 2mr - mn + 2nr = n^2 - mn - 2mr + 2nr \\
& \quad \quad \quad = -n(m - n) - 2r(m - n) \\
& \quad \quad \quad = (m - n) \cdot (-n - 2r) \\
& \quad \quad \quad = \underbrace{-(m - n)}_5 \cdot \underbrace{(n + 2r)}_4 \\
& \quad \quad \quad = -20
\end{aligned}$$

Cevap: C

$$\begin{aligned}
6. \quad & \left(\frac{1+k}{1-k} - \frac{1-k}{1+k} \right) \cdot \left(k - \frac{1}{k} \right) \\
&= \frac{(1+k)^2 - (1-k)^2}{(1-k) \cdot (1+k)} \cdot \frac{k^2 - 1}{k} \\
&= \frac{(1+2k+k^2) - (1-2k+k^2)}{\cancel{1 - k^2}} \cdot \frac{\cancel{k^2 - 1}}{k} \\
&= (1 + 2k + k^2 - 1 - 2k - k^2) \cdot \frac{-1}{k} = 4k \cdot \frac{-1}{k} = -4
\end{aligned}$$

Cevap: B

$$\begin{aligned}
7. & \left(\frac{1}{a+\sqrt{b}} - \frac{1}{a-\sqrt{b}} \right) \cdot \left(\frac{a^2-b}{\sqrt{b}} \right) \\
&= \frac{(a-\sqrt{b}) - (a+\sqrt{b})}{(a-\sqrt{b})(a+\sqrt{b})} \cdot \frac{a^2-b}{\sqrt{b}} \\
&= \frac{(a-\sqrt{b}) - (a+\sqrt{b})}{a^2 - (\sqrt{b})^2} \cdot \frac{a^2-b}{\sqrt{b}} \\
&= \frac{a-\sqrt{b}-a-\sqrt{b}}{a^2-b} \cdot \frac{a^2-b}{\sqrt{b}} \\
&= \frac{-2\sqrt{b}}{\sqrt{b}} = -2
\end{aligned}$$

Cevap: B

$$\begin{aligned}
8. & \frac{x^4+x^2+1}{x^3+1} = \frac{(x^2)^2+x^2+1}{x^3+1} \\
&= \frac{(x^2+1)^2-x^2}{x^3+1} \\
&= \frac{(x^2+1-x) \cdot (x^2+1+x)}{(x+1) \cdot (x^2-x+1)} \\
&= \frac{x^2+x+1}{x+1}
\end{aligned}$$

Cevap: B

9. $y \neq \pm 1, x \neq 0$

$$\begin{aligned}
\left(\frac{x-\frac{x}{y}}{y-\frac{1}{y}} \right) : \left(\frac{x}{y^2-1} \right) + 1 &= \left(\frac{\frac{x \cdot y - x}{y}}{y^2-1} \right) : \left(\frac{x}{y^2-1} \right) + 1 \\
&= \frac{x \cdot y - x}{y} \cdot \frac{y}{y^2-1} \cdot \frac{y^2-1}{x} + 1 \\
&= \frac{x \cdot y - x}{x} + 1 \\
&= \frac{x \cdot y}{x} - \frac{x}{x} + 1 \\
&= y - 1 + 1 = y
\end{aligned}$$

Cevap: A

10. $2x^2 - 6x + 3 = 0 \Rightarrow ax^2 + bx + c = 2x^2 - 6x + 3 = 0$

$a = 2, b = -6, c = 3$

$\Delta = b^2 - 4ac = (-6)^2 - 4 \cdot 2 \cdot 3 = 36 - 24 = 12$

$$\begin{aligned}
x_{1,2} &= \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-(-6) \pm \sqrt{12}}{2 \cdot 2} = \frac{6 \pm 2\sqrt{3}}{4} \\
&= \frac{3 \pm \sqrt{3}}{2}
\end{aligned}$$

$$\Rightarrow x_1 = \frac{3-\sqrt{3}}{2}, \quad x_2 = \frac{3+\sqrt{3}}{2}$$

Cevap: B

$$\begin{aligned}
11. & \frac{(a^2-1)^2}{1-a-a^2+a^3} = \frac{(a^2-1)^2}{1-a-a^2 \cdot (1-a)} \\
&= \frac{(1-a^2)^2}{(1-a) \cdot (1-a^2)} \\
&= \frac{(1-a^2) \cdot (1-a^2)}{(1-a) \cdot (1-a^2)} \\
&= \frac{(1-a) \cdot (1+a)}{1-a} \\
&= a+1
\end{aligned}$$

Cevap: D

$$\begin{aligned}
12. & \left(\frac{x^3+y^3}{x^3-y^3} : \frac{x^2-xy+y^2}{x-y} \right) (x^2+xy+y^2) \\
&= \frac{(x+y) \cdot (x^2-xy+y^2)}{(x-y) \cdot (x^2+xy+y^2)} \cdot \frac{x-y}{x^2-xy+y^2} \cdot x^2+xy+y^2 \\
&= x+y
\end{aligned}$$

Cevap: D

$$\begin{aligned}
 13. \quad x \neq y \Rightarrow \frac{1}{\frac{x}{y^2} - \frac{1}{y}} + \frac{1}{\frac{y}{x^2} - \frac{1}{x}} &= \frac{1}{\frac{x-y}{y^2}} + \frac{1}{\frac{y-x}{x^2}} \\
 &= \frac{y^2}{x-y} + \frac{x^2}{y-x} \\
 &= \frac{y^2}{x-y} - \frac{x^2}{x-y} \\
 &= \frac{y^2 - x^2}{x-y} \\
 &= \frac{(y-x)(y+x)}{x-y} \\
 &= -(x+y) \\
 &= -x-y
 \end{aligned}$$

Cevap: C

$$\begin{aligned}
 14. \quad \frac{m^2 + n^2 - 2mn}{\frac{1}{m} - \frac{1}{n}} \cdot \frac{m+n}{\frac{1}{m \cdot n}} &= \frac{m^2 - 2m \cdot n + n^2}{\frac{n-m}{m \cdot n}} : (m+n) \cdot m \cdot n \\
 &= (m-n)^2 \cdot \frac{m \cdot n}{n-m} \cdot \frac{1}{(m+n) \cdot m \cdot n} \\
 &= \frac{(m-n)(m-n)}{(n-m)(m+n)} \\
 &= \frac{-(m-n)}{m+n} \\
 &= \frac{n-m}{n+m}
 \end{aligned}$$

Cevap: B

$$\begin{aligned}
 15. \quad \frac{x^2 + 5x + 6}{x^3 + x^2 - 2x} \cdot \frac{x^3 - x}{x^2 + 6x + 5} \\
 \begin{array}{cc} x & 3 \\ x & 2 \\ \uparrow & \uparrow \\ x^2 + 5x + 6 & x^3 - x \\ \downarrow & \downarrow \\ x & 5 \\ x & 1 \end{array} \\
 = \frac{(x+3) \cdot (x+2)}{x \cdot (x^2 + x - 2)} \cdot \frac{x \cdot (x^2 - 1)}{(x+5) \cdot (x+1)} \\
 \begin{array}{cc} x & 2 \\ \downarrow & \downarrow \\ x & -1 \end{array} \\
 = \frac{(x+3) \cdot (x+2)}{(x+2) \cdot (x-1)} \cdot \frac{(x-1) \cdot (x+1)}{(x+5) \cdot (x+1)} \\
 = \frac{x+3}{x+5}
 \end{aligned}$$

Cevap: E

$$\begin{aligned}
 16. \quad \frac{x^2 - 2x - 3}{6x^2 + 7x - 3} : \frac{x^2 - x - 2}{2x^2 - x - 6} \\
 \begin{array}{cc} x & -3 & x & -2 \\ x & 1 & x & 1 \\ \uparrow & \uparrow & \uparrow & \uparrow \\ x^2 - 2x - 3 & x^2 - x - 2 \\ \downarrow & \downarrow & \downarrow & \downarrow \\ 3x & -1 & 2x & 3 \\ 2x & 3 & x & -2 \end{array} \\
 = \frac{(x-3) \cdot (x+1)}{(3x-1) \cdot (2x+3)} \cdot \frac{(2x+3) \cdot (x-2)}{(x-2) \cdot (x+1)} \\
 = \frac{x-3}{3x-1}
 \end{aligned}$$

Cevap: D

$$\begin{aligned}
 17. \quad a &= \sqrt{5} + \sqrt{3} \\
 a^2 - 2\sqrt{3}a + 3 &= a \cdot (a - 2\sqrt{3}) + 3 \\
 &= (\sqrt{5} + \sqrt{3}) \cdot (\sqrt{5} + \sqrt{3} - 2\sqrt{3}) + 3 \\
 &= (\sqrt{5} + \sqrt{3}) \cdot (\sqrt{5} - \sqrt{3}) + 3 \\
 &= (\sqrt{5})^2 - (\sqrt{3})^2 + 3 \\
 &= 5 - 3 + 3 = 5
 \end{aligned}$$

Cevap: C

$$18. \frac{a^2+b^2}{a.b} = 3 \Rightarrow \frac{a^2}{b^2} + \frac{b^2}{a^2} = \left(\frac{a}{b}\right)^2 + \left(\frac{b}{a}\right)^2 = ?$$

$$\frac{a^2+b^2}{a.b} = 3 \Rightarrow \frac{a^2}{a.b} + \frac{b^2}{a.b} = 3 \Rightarrow \frac{a}{b} + \frac{b}{a} = 3$$

$$\left(\frac{a}{b} + \frac{b}{a}\right)^2 = 3^2 \Rightarrow \left(\frac{a}{b}\right)^2 + 2 \cdot \frac{a}{b} \cdot \frac{b}{a} + \left(\frac{b}{a}\right)^2 = 9$$

$$\left(\frac{a}{b}\right)^2 + \left(\frac{b}{a}\right)^2 = 9 - 2 = 7$$

Cevap: C

$$19. a + b = \frac{1}{6} \Rightarrow \frac{(a-b)^2 + ab}{3a^3 + 3b^3} = \frac{a^2 - 2ab + b^2 + ab}{3.(a^3 + b^3)}$$

$$= \frac{a^2 - \cancel{ab} + b^2}{3.(a+b).(\cancel{a^2 - ab} + b^2)}$$

$$= \frac{1}{\cancel{3} \cdot \frac{1}{\cancel{6}} \cdot \frac{1}{2}} = \frac{1}{\frac{1}{2}} = 2$$

Cevap: B

$$20. \frac{a^5 + b^3 a^2}{a^2 - b^2} \cdot \frac{\frac{a^2 + b^2}{b} - a}{\frac{1}{b} - \frac{1}{a}}$$

$$= \frac{a^2.(a^3 + b^3)}{(a-b).(a+b)} \cdot \frac{\frac{a-b}{a.b}}{\frac{a^2 + b^2 - a.b}{b}}$$

$$= \frac{a^2.(a+b).(\cancel{a^2 - ab} + b^2)}{(\cancel{a-b}).(a+b)} \cdot \frac{\cancel{a-b}}{a.b} \cdot \frac{b}{\cancel{a^2 - ab} + b^2}$$

$$= \frac{a^2}{a} = a$$

Cevap: D