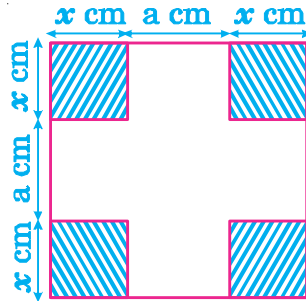


01

Find the formula for the area of the unshaded region.



$$\begin{aligned}\text{Area (A)} &= (a + 2x)^2 - 4x^2 \\ &= a^2 + 4ax + 4x^2 - 4x^2 \\ &= a^2 + 4ax\end{aligned}$$

∴ The area of the unshaded region is $a^2 + 4ax$

02

Find the product of $(4x^2 - 9)$ and $(2x^2 - 3x + 1)$ and divide the product by $(4x^3 - 7x + 3)$. Is $(4x^3 - 7x + 3)$ a factor of the product.

$$\begin{aligned}(4x^2 - 9) \times (2x^2 - 3x + 1) \\ &= 8x^4 - 12x^3 + 4x^2 - 18x^2 + 27x - 9 \\ &= 8x^4 - 12x^3 - 14x^2 + 27x - 9 \\ 4x^3 - 7x + 3 \quad & \overline{) 8x^4 - 12x^3 - 14x^2 + 27x - 9} \quad (2x - 3 \\ & \quad \underline{8x^4 \quad \quad 0 \quad -14x^2 + 6x} \\ & \quad \quad (-) \quad (-) \quad \quad (+) \quad (-) \\ & \quad \quad \quad \underline{-12x^3 + 0 + 21x - 9} \\ & \quad \quad \quad \underline{-12x^3 + 0 + 21x - 9} \\ & \quad \quad \quad \quad (+) \quad (-) \quad (-) \quad (+) \\ & \quad \quad \quad \quad \quad \underline{\quad \quad \quad \quad 0} \\ & \quad \quad \quad \quad \quad \quad \underline{\quad \quad \quad \quad \quad \quad 0}\end{aligned}$$

∴ $4x^3 - 7x + 3$ is a factor of the product

03 If the sides of a rectangle are $(x^2 - x + 2)$ and $(x^2 + x - 2)$, find the area of the rectangle.

$$\begin{aligned} \text{Area} &= (x^2 - x + 2)(x^2 + x - 2) \\ &= [x^2 - (x - 2)][x^2 + (x - 2)] \\ &= x^4 - (x - 2)^2 \\ &= x^4 - [x^2 - 4x + 4] \\ &= x^4 - x^2 + 4x - 4 \end{aligned}$$

04 If $x + \frac{1}{x} = 5$, find $x^4 + \frac{1}{x^4}$.

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

$$\text{Squaring both sides, } \left(x + \frac{1}{x}\right)^2 = 25$$

$$\Rightarrow x^2 + 2 + \frac{1}{x^2} = 25$$

$$\therefore x^2 + \frac{1}{x^2} = 23$$

05

Simplify $\left(\frac{a}{2} + \frac{b}{8} - \frac{c}{5}\right)\left(\frac{a^2}{4} + \frac{b^2}{64} + \frac{c^2}{25} - \frac{ab}{16} + \frac{bc}{40} + \frac{ca}{10}\right)$

$$\left(\frac{a}{2} + \frac{b}{8} - \frac{c}{5}\right)\left(\frac{a^2}{4} + \frac{b^2}{64} + \frac{c^2}{25} - \frac{ab}{16} + \frac{bc}{40} + \frac{ca}{10}\right)$$

$$= \left[\frac{a}{2} + \frac{b}{8} + \left(\frac{-c}{5}\right)\right]$$

$$\left[\left(\frac{a}{2}\right)^2 + \left(\frac{b}{8}\right)^2 + \left(\frac{-c}{5}\right)^2 - \left(\frac{a}{2}\right)\left(\frac{b}{8}\right) - \left(\frac{b}{8}\right)\left(\frac{-c}{5}\right) - \left(\frac{-c}{5}\right)\left(\frac{a}{2}\right)\right]$$

$$= \left(\frac{a}{2}\right)^3 + \left(\frac{b}{8}\right)^3 + \left(\frac{-c}{5}\right)^3 - 3\left(\frac{a}{2}\right)\left(\frac{b}{8}\right)\left(\frac{-c}{5}\right)$$

$$= \frac{a^3}{8} + \frac{b^3}{512} - \frac{c^3}{125} + \frac{3abc}{80}$$