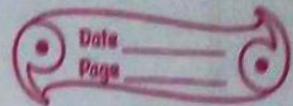


EXERCISE 403



$$10) 2x^2 - 7x + 3 = 0$$

$$a = 2 \quad b = -7 \quad c = 3$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(3)}}{2(2)}$$

$$= \frac{7 \pm \sqrt{49 - 24}}{4}$$

$$= \frac{7 \pm 5}{4}$$

$$= \frac{7+5}{4} \quad \Bigg| \quad \frac{7-5}{4}$$

$$= \frac{12}{4} \quad \Bigg| \quad \frac{2}{4}$$

$$(11) 2x^2 + x - 4 = 0$$

$$a = 2 \quad b = 1 \quad c = -4$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-1 \pm \sqrt{(1)^2 - 4(2)(-4)}}{2(2)}$$

$$= \frac{-1 \pm \sqrt{1 + 16}}{4}$$

$$= \frac{-1 \pm \sqrt{17}}{4}$$

$$(iii) \quad 4x^2 + 4\sqrt{3}x + 3 = 0$$

$$a = 4 \quad b = 4\sqrt{3} \quad c = 3$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-4\sqrt{3} \pm \sqrt{(4\sqrt{3})^2 - 4(4)(3)}}{2(4)}$$

$$= \frac{-4\sqrt{3} \pm \sqrt{48 - 48}}{8}$$

$$= \frac{-4\sqrt{3} \pm 0}{8}$$

$$(iv) \quad 2x^2 + x + 4 = 0$$

$$a = 2 \quad b = 1 \quad c = 4$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$= \frac{-(1) \pm \sqrt{(1)^2 - 4(2)(4)}}{2(2)}$$

$$= \frac{-1 \pm \sqrt{1 - 32}}{4}$$

$$= \frac{-1 \pm \sqrt{-31}}{4}$$

$$2 \text{ (i) } 2x^2 - 7x + 3$$

$$a = 2 \quad b = -7 \quad c = 3$$

$$\begin{aligned} D &= b^2 - 4ac \\ &= (-7)^2 - 4(2)(3) \\ &= (-7 \times -7) - (4 \times 2 \times 3) \\ &= 49 - 24 \\ &= 25 \end{aligned}$$

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$= \frac{-(-7) \pm \sqrt{25}}{2 \times 2}$$

$$= \frac{7 \pm \sqrt{5^2}}{4}$$

$$= \frac{7 \pm 5}{4}$$

$$= \frac{7 + 5}{4}$$

$$= \frac{12}{4}$$

$$= 3$$

$$x = \frac{7 - 5}{4}$$

$$= \frac{2}{4}$$

~~(1) 2~~

$$9 \quad (i) \quad x - \frac{1}{x} = 3$$

$$= \frac{x(x) - 1}{x} = 3$$

$$= \frac{x^2 - 1}{x} = 3$$

$$= x^2 - 1 = 3x$$

$$= x^2 - 3x - 1 = 0$$

$$a = 1 \quad b = -3 \quad c = -1$$

$$D = b^2 - 4ac$$

$$= (-3)^2 - 4(1)(-1)$$

$$= 9 + 4$$

$$= 13$$

$$x = \frac{-b \pm \sqrt{D}}{2a}$$

$$= \frac{-(-3) \pm \sqrt{13}}{2 \times 1}$$

$$= \frac{3 \pm \sqrt{13}}{2}$$

4 Let present age = x
 3 yr ago = $x - 3$
 5 yr after = $x + 5$

So,

$$\frac{1}{x-3} + \frac{1}{x+5} = \frac{1}{3}$$

$$\Rightarrow \frac{(x+5) + (x-3)}{(x-3)(x+5)} = \frac{1}{3}$$

$$\Rightarrow \frac{2x+2}{(x-3)(x+5)} = \frac{1}{3}$$

$$\Rightarrow \frac{2x+2}{(x-3)(x+5)} \times 3 = 1$$

$$\Rightarrow 2x + 2 \times 3 = (x-3)(x+5)$$

$$\Rightarrow 6x + 6 = (x)(x+5) - \frac{3}{(x+5)}$$

$$\Rightarrow 6x + 6 = x^2 + 2x - 15$$

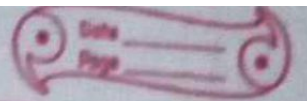
$$\Rightarrow x^2 + 2x - 15 - 6x - 6 = 0$$

$$\Rightarrow x^2 - 4x - 21 = 0$$

$$\Rightarrow x^2 + 3x - 7x - 21 = 0$$

$$\Rightarrow x(x+3) - 7(x+3)$$

$$\Rightarrow (x+3)(x-7)$$



5 Let marks in mathematics = x
 30 marks in English = $30 - x$

ATQ

$$\Rightarrow (x + 2)(30 - x - 3) = 210$$

$$\Rightarrow (x + 2)(27 - x) = 210$$

$$\Rightarrow (x)(27 - x) + (2)(27 - x) = 210$$

$$\Rightarrow 27x - x^2 + 54 - 2x = 210$$

$$\Rightarrow -x^2 + 27x - 2x + 54 - 210 = 0$$

$$\Rightarrow -x^2 + 25x - 156 = 0$$

$$\Rightarrow -(x^2 - 25x + 156) = 0$$

$$\Rightarrow x^2 - 13x - 12x + 156 = 0$$

$$\Rightarrow x(x - 13) - 12(x - 13) = 0$$

$$\Rightarrow (x - 13)(x - 12)$$

So $x = 13$ or $x = 12$

6 Let shorter side = x
 larger side = $x + 30$
 and diagonal = $x + 60$

$$r^2 = b^2 + p^2$$

$$\Rightarrow (x + 60)^2 = (x + 30)^2 + (x)^2$$

$$\Rightarrow (x)^2 + 2(x)(60) + 60^2 = (x)^2 + 2(x)(30) + 30^2 + (x)^2$$

$$\Rightarrow x^2 + 120x + 3600 = x^2 + 60x + 900 + x^2$$

$$\Rightarrow x^2 + 120x + 3600 - 2x^2 - 60x - 900 = 0$$

$$\Rightarrow -x^2 - 60x + 2700$$

$$\Rightarrow -(x^2 + 60x - 2700)$$

$$\Rightarrow x(x + 90) - 30(x + 90)$$

$$\Rightarrow (x + 90)(x - 30)$$

$$30 - x = -90, x = 30$$

$$x + 30 = 30 + 30 = 60$$

$$x + 60 = 30 + 60 = 90$$

8 Total dis by train = 360 km
let the speed = x km/hr

$$\text{Time taken} = \frac{360}{x}$$

$$\text{New speed} = x + 5 \text{ km/hr}$$

$$\text{Time taken} = \frac{360}{x} - 1$$

90,

$$(x + 5) \times \left(\frac{360}{x} - 1 \right) = 360$$

$$\Rightarrow (x + 5) \left(\frac{360}{x} - 1 \right) = 360$$

$$\Rightarrow (x) \left(\frac{360}{x} - 1 \right) + (5) \left(\frac{360}{x} - 1 \right) = 360$$

$$\Rightarrow 360 - x + \frac{1800}{x} - 5 = 360$$

$$\Rightarrow 360x - x^2 + 1800 - 5x = 360x$$

$$\Rightarrow 360x - x^2 + 1800 - 5x = 360x$$

$$\Rightarrow -x^2 - 5x + 1800$$

$$i) \quad (x^2 + 5x - 1800)$$

$$ii) \quad x^2 + 45x - 40x - 1800 = 0$$

$$iii) \quad x(x + 45) - 40(x + 45)$$

$$iv) \quad (x + 45) - 40(x + 45)$$

$$v) \quad (x + 45)(x - 40)$$

$$x = -45, \quad x = 40$$

So speed of train = 40 km/hr.