



Exercise 8B

$$\Rightarrow x + 17 = 2(x + 1) \quad (\text{by cross multiplication})$$

$$\Rightarrow x + 17 = 2x + 2$$

$$\Rightarrow x - 2x = 2 - 17$$

$$\Rightarrow -x = -15$$

$$\Rightarrow x = 15$$

Therefore, the numerator is 15.

$$\text{Denominator} = (x + 7) = (15 + 7) = 22$$

$$\therefore \text{Original number} = \frac{15}{22}$$

Q14.

Denominator, $d = x$

It is given that twice the numerator is equal to two more than the denominator.

$$\therefore \text{Twice of numerator, } 2n = x + 2$$

$$\therefore \text{Numerator, } n = \frac{x+2}{2}$$

$$\therefore \frac{n+3}{d+3} = \frac{2}{3}$$

$$\Rightarrow 3(n + 3) = 2(d + 3) \quad (\text{by cross multiplication})$$

$$\Rightarrow 3n + 9 = 2d + 6$$

$$\Rightarrow 3n - 2d = 6 - 9$$

$$\Rightarrow 3n - 2d = -3$$

On replace d by x and n by $\frac{x+2}{2}$:

$$\Rightarrow 3\left(\frac{x+2}{2}\right) - 2x = -3$$

$$\Rightarrow \frac{3x+6-4x}{2} = -3 \quad (\text{taking the L.C.M. of 2 and 1 as 2})$$

$$\Rightarrow 6 - x = -6 \quad (\text{by cross multiplication})$$

$$\Rightarrow -x = -6 - 6$$

$$\Rightarrow x = 12$$

The denominator is 12.

$$\therefore \text{ Numerator} = \frac{x+2}{2} = \frac{12+2}{2} = \frac{14}{2} = 7$$

$$\therefore \text{ Original fraction} = \frac{7}{12}$$

Q15.

Answer :

Let the breadth of the original rectangle be x cm.

Then, its length will be $(x + 7)$ cm.

The area of the rectangle will be $(x)(x + 7)$ cm².

$$\therefore (x + 3)(x + 7 - 4) = (x)(x + 7)$$

$$\Rightarrow (x + 3)(x + 3) = x^2 + 7x$$

$$\Rightarrow x^2 + 3x + 3x + 9 = x^2 + 7x$$

$$\Rightarrow x^2 + 6x + 9 = x^2 + 7x$$

$$\Rightarrow 9 = x^2 - x^2 + 7x - 6x$$

$$\Rightarrow 9 = x$$

$$\Rightarrow x = 9 \quad (\text{by transposition})$$

Breadth of the original rectangle = 9 cm

Length of the original rectangle = $(x + 7) = (9 + 7) = 16$ cm

Q16.

Answer :

Let the width of the rectangle be x cm.

It is $\frac{2}{3}$ of the length of the rectangle.

This means that the length of the rectangle will be $\frac{3}{2}x$.

$$\text{Perimeter of the rectangle} = 2(x) + 2\left(\frac{3}{2}x\right) = 180 \text{ m}$$

$$\therefore 2x + \frac{6x}{2} = 180$$

$$\Rightarrow \frac{4x + 6x}{2} = 180 \quad \left(\text{taking the L.C.M. of 1 on the L.H.S. of the equation} \right)$$

$$\Rightarrow 10x = 2 \times 180 \quad (\text{by cross multiplication})$$

$$\Rightarrow 10x = 360$$

$$\Rightarrow x = \frac{360}{10} = 36$$

Therefore, the width of the rectangle is 36 m.

Length of the rectangle will be = $\frac{3}{2}x = \frac{3}{2}(36) = 54$ m

Q17.

Let the length of the base of the triangle be x cm.

Then, its altitude will be $\frac{5}{3}x$ cm.

$$\text{Area of the triangle} = \frac{1}{2}(x)\left(\frac{5}{3}x\right) = \frac{5}{6}x^2$$

$$\therefore \frac{1}{2}(x - 2)\left(\frac{5}{3}x + 4\right) = \frac{5}{6}x^2$$

$$\Rightarrow \left(\frac{x-2}{2}\right)\left(\frac{5x+12}{3}\right) = \frac{5x^2}{6}$$

$$\Rightarrow \frac{(x-2)(5x+12)}{6} = \frac{5x^2}{6}$$

$$\Rightarrow \frac{5x^2 + 12x - 10x - 24}{6} = \frac{5x^2}{6}$$

$$\Rightarrow 5x^2 + 2x - 24 = 5x^2 \quad \left(\text{cancelling the denominators from both} \right.$$

the sides since they are same)

$$\begin{aligned}\Rightarrow 5x^2 - 5x^2 + 2x &= 24 \\ \Rightarrow 2x &= 24 \\ \Rightarrow x &= \frac{24}{2} = 12 \text{ m}\end{aligned}$$

Therefore, the base of the triangle is 12 m.

$$\text{Altitude of the triangle} = \frac{5}{3}x = \frac{5}{3}(12) = 20 \text{ m}$$

Q18

Answer :

Let the common multiple of all the three angles be x .

Then, the first angle will be $4x$.

And the second angle *will* be $5x$.

In a triangle, sum of all the three angles will be equal to 180° .

$$\therefore \text{Third angle} = 180 - (4x + 5x) = 180 - 9x$$

$$\therefore 4x + 5x = 180 - 9x$$

$$\Rightarrow 9x = 180 - 9x$$

$$\Rightarrow 9x + 9x = 180$$

$$\Rightarrow 18x = 180$$

$$\Rightarrow x = \frac{180}{18} = 10$$

$$\text{First angle} = 4x = 4 \times 10 = 40^\circ$$

$$\text{Second angle} = 5x = 5 \times 10 = 50^\circ$$

$$\text{Third angle} = 4x + 5x = 9x = 9 \times 10 = 90^\circ$$

Q19

Answer :

Let the speed of the steamer in still water be x km/h.

$$\text{Speed (downstream)} = (x + 1) \text{ km/h}$$

$$\text{Speed (upstream)} = (x - 1) \text{ km/h}$$

$$\text{Distance covered in 9 hours while going downstream} = 9(x + 1) \text{ km}$$

$$\text{Distance covered in 10 hours while going upstream} = 10(x - 1) \text{ km}$$

But both of these distances will be same.

$$9(x + 1) = 10(x - 1)$$

$$\Rightarrow 9x + 9 = 10x - 10$$

$$\Rightarrow 9 + 10 = 10x - 9x$$

$$\Rightarrow 19 = x$$

$$\Rightarrow x = 19$$

Therefore, the speed of the steamer in still water is 19 km/h.

$$\text{Distance between the ports} = 9(x + 1) = 9(19 + 1) = 9 \times 20 = 180 \text{ km}$$

Q20

Answer :

Let the speed of one motorcyclist be x km/h.

So, the speed of the other motorcyclist will be $(x + 7)$ km/h.

$$\text{Distance travelled by the first motorcyclist in 2 hours} = 2x \text{ km}$$

$$\text{Distance travelled by the second motorcyclist in 2 hours} = 2(x + 7) \text{ km}$$

Therefore,

$$300 - (2x + (2x + 14)) = 34$$

$$\Rightarrow 300 - (2x + 2x + 14) = 34$$

$$\Rightarrow 300 - 4x - 14 = 34$$

$$\Rightarrow 286 - 4x = 34$$

$$\Rightarrow 286 - 34 = 4x$$

$$\Rightarrow 252 = 4x$$

$$\Rightarrow x = \frac{252}{4} = 63$$

Therefore, the speed of the first motorcyclist is 63 km/h.

The speed of the second motorcyclist is $(x+7) = (63+7) = 70 \text{ km/h}$.

Check :

The distance covered by the first motorcyclist in 2 hours $= 63 \times 2 = 126 \text{ km}$

The distance covered by the second motorcyclist in 2 hours $= 70 \times 2 = 140 \text{ km}$

The distance between the motorcyclists after 2 hours $= 300 - (126 + 140) = 34 \text{ km}$ (which is the same as given)

Therefore, the speeds of the motorcyclists are 63 km/h and 70 km/h, respectively.

Q21

Answer :

Let the first number be x .

Then, the second number will be $\frac{5}{6}x$.

Third number $= \frac{4}{5} \left(\frac{5}{6}x \right) = \frac{2}{3}x$

$$\therefore x + \frac{5x}{6} + \frac{2x}{3} = 150$$

$$\Rightarrow \frac{6x + 5x + 4x}{6} = 150 \quad \left(\text{multiplying the L.H.S. by 6, which is the L.C.M. of 1, 6 and 3} \right)$$

$$\Rightarrow 15x = 150 \times 6 \quad \left(\text{by cross multiplication} \right)$$

$$\Rightarrow 15x = 900$$

$$\Rightarrow x = \frac{900}{15} = 60$$

Therefore, the first number is 60.

$$\text{Second number} = \frac{5}{6}x = \frac{5}{6}(60) = 50$$

$$\text{Third number} = \frac{2}{3}x = \frac{2}{3}(60) = 40$$

Q22

Answer :

Let the first part be x .

Let the second part be $(4500 - x)$.

$$\therefore 5\% \text{ of } x = 10\% \text{ of } (4500 - x)$$

$$\Rightarrow \left(\frac{5}{100} \right)x = \left(\frac{10}{100} \right)(4500 - x)$$

$$\Rightarrow \frac{5x}{100} = \frac{45000 - 10x}{100}$$

$$\Rightarrow 5x = 45000 - 10x \quad \left(\text{by cancellation of same denominators from both the sides} \right) \Rightarrow 5x + 10x = 45000 \Rightarrow 15x = 45000 \Rightarrow x = \frac{45000}{15} = 3000$$

$$\text{Therefore, the first part is 3000. Second part} = (4500 - x) = (4500 - 3000) = 1500$$

Q23

Answer :

Let the present age of Rakhi be x .

Then, the present age of Rakhi's mother will be $4x$.

After five years, Rakhi's age will be $(x + 5)$.

After five years, her mother's age will be $(4x + 5)$.

$$4x + 5 = 3(x + 5)$$

$$\Rightarrow 4x + 5 = 3x + 15$$

$$\Rightarrow 4x - 3x = 15 - 5$$

$$\Rightarrow x = 10$$

Present age of Rakhi = 10 years

Present age of Rakhi's mother = $4(x) = 4 \times 10 = 40 \text{ years}$

Q24

Answer :

Let the age of Monu's father be x years.

The age of Monu's grandfather will be $(x + 26)$.

Then, the age of Monu will be $(x - 29)$.

$$\therefore x + (x + 26) + (x - 29) = 135$$

$$\Rightarrow x + x + 26 + x - 29 = 135$$

$$\Rightarrow 3x - 3 = 135$$

$$\Rightarrow 3x = 135 + 3$$

$$\Rightarrow 3x = 138$$

$$\Rightarrow x = \frac{138}{3} = 46$$

\therefore Age of Monu's father = 46 years

Age of Monu's grandfather = $(x + 26) = (46 + 26) = 72$ years

Age of Monu = $(x - 29) = 46 - 29 = 17$ years

Q25

Answer :

Let the age of the grandson be x years.

Then, his grandfather's age will be $10x$.

Also, the grandfather is 54 years older than his grandson.

\therefore Age of the grandson = $x + 54$

$$10x = x + 54$$

$$\Rightarrow 10x - x = 54$$

$$\Rightarrow 9x = 54$$

$$\Rightarrow x = \frac{54}{9} = 6$$

Therefore, the grandson's age is 6 years.

Grandfather's age = $10(x) = 10 \times 6 = 60$ years

Q26

Answer :

Let the age of the younger cousin be x .

Then, the age of the elder cousin will be $(x + 10)$.

15 years ago :

Age of the younger cousin = $(x - 15)$

Age of elder cousin = $(x + 10 - 15)$
 $= (x - 5)$

$$\therefore (x - 5) = 2(x - 15)$$

$$\Rightarrow x - 5 = 2x - 30$$

$$\Rightarrow x - 2x = -30 + 5$$

$$\Rightarrow -x = -25$$

$$\Rightarrow x = 25$$

Therefore, the present age of the younger cousin is 25 years.

Present age of elder cousin = $(x + 10) = (25 + 10) = 35$ years

Q27

Answer :

Let the number of deer in the herd be x .

The number of deer grazing in the field is $\left(\frac{1}{2}\right)x$.

$$\text{Remaining deer} = x - \frac{x}{2} = \frac{x}{2}$$

$$\text{Number of deer playing nearby} = \frac{3}{4}\left(\frac{x}{2}\right) = \frac{3}{8}x$$

The number of deer drinking water from the pond is 9.

$$\therefore 9 + \frac{3}{8}x + \frac{1}{2}x = x$$

$$\Rightarrow \frac{72 + 3x + 4x}{8} = x \quad \left(\text{multiplying the L.H.S. by 8, which is the L.C.M. of} \right.$$

$$1, 8 \text{ and } 2 \left. \right)$$

$$\Rightarrow 72 + 7x = 8x \quad \left(\text{by cross multiplication} \right) \Rightarrow 72 = 8x - 7x \Rightarrow 72 =$$

$$x \Rightarrow x = 72 \text{ Total number of deer in the herd} = 72$$

***** END *****