Exercise 8B

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

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

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

$\Rightarrow -x = -15$

$\Rightarrow x = 15$

Therefore, the numerator is 15.

Denominator $= \left(x + 7\right) = \left(15 + 7\right) = 22$

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

Q14.

Denominator, $d = x$

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

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

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

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

$\Rightarrow 3\left(n + 3\right) = 2\left(d + 3\right)$ $\left(\textit{by cross multiplication}\right)$

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

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

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

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

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

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

$\Rightarrow 6 - x = -6$ $\left(\text{by cross multiplicton}\right)$

$\Rightarrow -x = -6-6$

$\Rightarrow x = 12$

The denominator is 12.

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

$\therefore$ 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 $(x)(x+7)$ cm^2.

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

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

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

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

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

$\Rightarrow 9 = x$

$\Rightarrow x = 9$ (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 $\frac{3}{2}x$.

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

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

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

$\Rightarrow 10x = 2 \times 180$ (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.

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

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

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

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

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

$\Rightarrow 5x^2+2x-24 = 5x^2$ (cancelling the denominators from both the sides since they are same)

$\Rightarrow 5x^2 - 5x^2 + 2x = 24$
$\Rightarrow 2x = 24$
$\Rightarrow x = \frac{24}{2} = 12\,m$
Therefore, the base of the triangle is 12 m.
Altitude of the triangle $= \frac{5}{3}x = \frac{5}{3}\left(12\right) = 20\,m$

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°.
$\therefore$ *T*hird angle $= 180 - \left(4x + 5x\right) = 180 - 9x$
$\therefore 4x + 5x = 180 - 9x$
$\Rightarrow 9x = 180 - 9x$
$\Rightarrow 9x + 9x = 180$
$\Rightarrow 18x = 180$
$\Rightarrow x = \frac{180}{18} = 10$
First angle $= 4x = 4 \times 10 = 40^\circ$
Second angle $= 5x = 5 \times 10 = 50^\circ$
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.
Speed (downstream) $= (x + 1)$ km/h
Speed (upstream) $= (x - 1)$ km/h
Distance covered in 9 hours while going downstream $= 9(x+1)$ km
Distance covered in 10 hours while going upstream $= 10(x-1)$ 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.
Distance between the ports $= 9(x+1) = 9(19+1) = 9 \times 20 = 180$ km

Q20

Answer:

Let the speed of one motorcyclist be x km/h.
So, the speed of the other motorcyclist will be $\left(x+7\right)$ km/h.
Distance travelled by the first motorcyclist in 2 hours $= 2x$ km
Distance travelled by the second motorcyclist in 2 hours $= 2\left(x+7\right)$ km
Therefore,
$300 - \left(2x + \left(2x + 14\right)\right) = 34$
$\Rightarrow 300 - \left(2x + 2x + 14\right) = 34$
$\Rightarrow 300 - 4x - 14 = 34$
$\Rightarrow 286 - 4x = 34$
$\Rightarrow 286 - 34 = 4x$
$\Rightarrow 252 = 4x$
$\Rightarrow x = \frac{252}{4} = 63$
Therefore, the speed of the first motorcyclist is 63 km/h.

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

Check :

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

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

The distance between the motorcyclists after 2 hours $= 300 - \left(126 + 140\right) =$ 34 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 $= \frac{4}{5}\left(\frac{5}{6}x\right) = \frac{2}{3}x$

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

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

$\Rightarrow 15x = 150 \times 6$ (by cross multiplication)

$\Rightarrow 15x = 900$

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

Therefore, the first number is 60.

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

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

Q22

Answer :

Let the first part be x.

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

$\therefore 5\%\ of\ x = 10\%\ of\ \left(4500 - x\right)$

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

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

$\Rightarrow 5x = 45000 - 10x$ (by cancellation of same denominators from both the sides) $\Rightarrow 5x + 10x = 45000 \Rightarrow 15x = 45000 \Rightarrow x = \frac{45000}{15} = 3000$ Therefore, the first part is 3000. Second part $= \left(4500 - x\right) = \left(4500 - 3000\right) = 1500$

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).

$4x + 5 = 3\left(x + 5\right)$

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

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

$\Rightarrow x = 10$

Present age of Rakhi = 10 years

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

Q24

Answer :

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

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

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

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

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

$\Rightarrow 3x-3=135$

$\Rightarrow 3x=135+3$

$\Rightarrow 3x=138$

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

$\therefore$ Age of Monu's father $=46$ years

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

Age of Monu $=\left(x-29\right)=46-29=17$ 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 $=10\left(x\right)=10\times 6=60$ 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 $\left(\frac{1}{2}\right)x$.

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

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.

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

$\Rightarrow \frac{72+3x+4x}{8} = x$ (multiplying the L.H.S. by 8, which is the L.C.M. of 1, 8 and 2)

$\Rightarrow 72 + 7x = 8x$ (by cross multiplication) $\Rightarrow 72 = 8x - 7x \Rightarrow 72 = x \Rightarrow x = 72$Total number of deer in the herd $= 72$

********** END **********