



Quadratic Equations Ex 8.8 Q4

Answer :

Let the usual speed of train be x km/hr then

Increased speed of the train = $(x + 5)$ km/hr

Time taken by the train under usual speed to cover 150 km = $\frac{150}{x}$ hr

Time taken by the train under increased speed to cover 150 km = $\frac{150}{(x+5)}$ hr

Therefore,

$$\frac{150}{x} - \frac{150}{(x+5)} = 1$$

$$\frac{\{150(x+5) - 150x\}}{x(x+5)} = 1$$

$$\frac{150x + 750 - 150x}{x^2 + 5x} = 1$$

$$\frac{\cancel{150x} + 750 - \cancel{150x}}{x^2 + 5x} = 1$$

$$750 = x^2 + 5x$$

$$x^2 + 5x - 750 = 0$$

$$x^2 + 5x - 750 = 0$$

$$x^2 - 25x + 30x - 750 = 0$$

$$x(x - 25) + 30(x - 25) = 0$$

$$(x - 25)(x + 30) = 0$$

So, either

$$(x - 25) = 0$$

$$x = 25$$

Or

$$(x + 30) = 0$$

$$x = -30$$

But, the speed of the train can never be negative.

Hence, the usual speed of train is $x = 25$ km/hr

Quadratic Equations Ex 8.8 Q5

Answer :

Let the ongoing speed of person be x km/hr . Then,

Returning speed of the person is $= (x + 10)$ km/hr .

Time taken by the person in going direction to cover 150 km $= \frac{150}{x}$ hr

Time taken by the person in returning direction to cover 150 km $= \frac{150}{(x + 10)}$ hr

Therefore,

$$\begin{aligned}\frac{150}{x} - \frac{150}{(x + 10)} &= \frac{5}{2} \\ \frac{\{150(x + 10) - 150x\}}{x(x + 10)} &= \frac{5}{2} \\ \frac{150x + 1500 - 150x}{x^2 + 10x} &= \frac{5}{2} \\ \frac{\cancel{150x} + 1500 - \cancel{150x}}{x^2 + 10x} &= \frac{5}{2} \\ \frac{1500}{x^2 + 10x} &= \frac{5}{2} \\ 3000 &= 5x^2 + 50x \\ 5x^2 + 50x - 3000 &= 0 \\ 5x^2 + 50x - 3000 &= 0 \\ 5(x^2 + 10x - 600) &= 0 \\ x^2 + 10x - 600 &= 0 \\ x^2 - 20x + 30x - 600 &= 0 \\ x(x - 20) + 30(x - 20) &= 0 \\ (x - 20)(x + 30) &= 0\end{aligned}$$

So, either

$$\begin{aligned}(x - 20) &= 0 \\ x &= 20\end{aligned}$$

Or

$$\begin{aligned}(x + 30) &= 0 \\ x &= -30\end{aligned}$$

But, the speed of the train can never be negative.

Thus, when $x = 20$ then

$$\begin{aligned}&= (x + 10) \\ &= (20 + 10) \\ &= 30\end{aligned}$$

Hence, ongoing speed of person is $x = 20$ km/hr

and returning speed of the person is $x = 30$ km/hr respectively.

Quadratic Equations Ex 8.8 Q6

Answer :

Let the usual speed of plane be x km/hr . Then,

Increased speed of the plane = $(x + 400)$ km/hr

Time taken by the plane under usual speed to cover 1600 km = $\frac{1600}{x}$ hr

Time taken by the plane under increased speed to cover 1600 km = $\frac{1600}{(x + 400)}$ hr

Therefore,

$$\begin{aligned}\frac{1600}{x} - \frac{1600}{(x + 400)} &= \frac{40}{60} \\ \frac{\{1600(x + 400) - 1600x\}}{x(x + 400)} &= \frac{2}{3} \\ \frac{1600x + 640000 - 1600x}{x^2 + 400x} &= \frac{2}{3} \\ \frac{\cancel{1600x} + 640000 - \cancel{1600x}}{x^2 + 400x} &= \frac{2}{3}\end{aligned}$$

$$1920000 = 2x^2 + 800x$$

$$2x^2 + 800x - 1920000 = 0$$

$$2(x^2 + 400x - 960000) = 0$$

$$x^2 + 400x - 960000 = 0$$

$$x^2 - 800x + 1200x - 960000 = 0$$

$$x(x - 800) + 1200(x - 800) = 0$$

$$(x - 800)(x + 1200) = 0$$

So, either

$$(x - 800) = 0$$

$$x = 800$$

Or

$$(x + 1200) = 0$$

$$x = -1200$$

But, the speed of the plane can never be negative.

Hence, the usual speed of train is $x = 800$ km/hr

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