



Quadratic Equations Ex 8.8 Q12

Answer :

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

Increased speed of the aero plane = $(x + 250)$ km/hr

Time taken by the aero plane under usual speed to cover 1250 km = $\frac{1250}{x}$ hr

Time taken by the aero plane under increased speed to cover 1250 km = $\frac{1250}{(x + 250)}$ hr

Therefore,

$$\frac{1250}{x} - \frac{1250}{(x + 250)} = \frac{50}{60}$$

$$\frac{\{1250(x + 250) - 1250x\}}{x(x + 250)} = \frac{5}{6}$$

$$\frac{1250x + 312500 - 1250x}{x^2 + 250x} = \frac{5}{6}$$

$$\frac{1250x + 312500 - 1250x}{x^2 + 250x} = \frac{5}{6}$$

$$1875000 = 5x^2 + 1250x$$

$$5x^2 + 1250x - 1875000 = 0$$

$$5(x^2 + 250x - 375000) = 0$$

$$x^2 + 250x - 375000 = 0$$

$$x^2 - 500x + 750x - 375000 = 0$$

$$x(x - 500) + 750(x - 500) = 0$$

$$(x - 500)(x + 750) = 0$$

So, either

$$(x - 500) = 0$$

$$x = 500$$

Or

$$(x + 750) = 0$$

$$x = -750$$

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

Hence, the usual speed of train is $x = 500$ km/hr

Quadratic Equations Ex 8.8 Q13

Answer :

Let the original speed of the plane be x km/hr.

Increased speed of the plane = $(x + 100)$ km/hr.

Total Distance = 1500 km.

We know that, **Time** = $\frac{\text{Distance}}{\text{Speed}}$

Time taken to reach the destination at original speed = $t_1 = \frac{1500}{x}$ hr

Time taken to reach the destination at increasing speed = $t_2 = \frac{1500}{x+100}$ hr

According to the question,

$$\begin{aligned}t_1 - t_2 &= 30 \text{ min} \\ \Rightarrow \frac{1500}{x} - \frac{1500}{x+100} &= \frac{30}{60} \\ \Rightarrow \frac{1500(x+100) - 1500x}{x(x+100)} &= \frac{1}{2} \\ \Rightarrow \frac{1500x + 150000 - 1500x}{x^2 + 100x} &= \frac{1}{2} \\ \Rightarrow \frac{150000}{x^2 + 100x} &= \frac{1}{2} \\ \Rightarrow 300000 &= x^2 + 100x \\ \Rightarrow x^2 + 100x - 300000 &= 0 \\ \Rightarrow x^2 + 600x - 500x - 300000 &= 0 \\ \Rightarrow x(x + 600) - 500(x + 600) &= 0 \\ \Rightarrow (x - 500)(x + 600) &= 0 \\ \Rightarrow x - 500 = 0 \text{ or } x + 600 &= 0 \\ \Rightarrow x = 500 \text{ or } x = -600\end{aligned}$$

Since, speed cannot be negative.

Thus, the original speed/hour of the plane is 500 km/hr.

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