



Quadratic Equations Ex 8.8 Q1

Answer :

Let the speed of stream be x km/hr then

Speed downstream = $(8 + x)$ km/hr .

Therefore, Speed upstream = $(8 - x)$ km/hr

Time taken by the boat to go 15 km upstream = $\frac{15}{(8-x)}$ hr

Time taken by the boat to returns 22 km downstream = $\frac{22}{(8+x)}$ hr

Now it is given that the boat returns to the same point in 5 hr.

So,

$$\frac{15}{(8-x)} + \frac{22}{(8+x)} = 5$$

$$\frac{15(8+x) + 22(8-x)}{(8-x)(8+x)} = 5$$

$$\frac{120 + 15x + 176 - 22x}{64 - x^2} = 5$$

$$\frac{296 - 7x}{64 - x^2} = 5$$

$$5x^2 - 7x + 296 - 320 = 0$$

$$5x^2 - 7x - 24 = 0$$

$$5x^2 - 15x + 8x - 24 = 0$$

$$5x(x - 3) + 8(x - 3) = 0$$

$$(x - 3)(5x + 8) = 0$$

$$x = 3, x = -\frac{8}{5}$$

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

Hence, the speed of the stream is $x = 3$ km/hr

Quadratic Equations Ex 8.8 Q2

Answer :

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

Increased speed of the train = $(x + 10)$ km/hr

Time taken by the train under usual speed to cover 360 km = $\frac{360}{x}$ hr

Time taken by the train under increased speed to cover 360 km = $\frac{360}{(x+10)}$ hr

Therefore,

$$\frac{360}{x} - \frac{360}{(x+10)} = 3$$

$$\frac{\{360(x+10) - 360x\}}{x(x+10)} = 3$$

$$\frac{360x + 3600 - 360x}{x^2 + 10x} = 3$$

$$\frac{\cancel{360x} + 3600 - \cancel{360x}}{x^2 + 10x} = 3$$

$$3600 = 3x^2 + 30x$$

$$3x^2 + 30x - 3600 = 0$$

$$3(x^2 + 10x - 1200) = 0$$

$$x^2 + 10x - 1200 = 0$$

$$x^2 - 30x + 40x - 1200 = 0$$

$$x(x - 30) + 40(x - 30) = 0$$

$$(x - 30)(x + 40) = 0$$

So, either

$$(x - 30) = 0$$

$$x = 30$$

Or

$$(x + 40) = 0$$

$$x = -40$$

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

Hence, the usual speed of train is $x = 30$ km/hr

Answer :

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

the speed of the slow train be $= (x - 10)$ km/hr

Time taken by the fast train to cover 200 km $= \frac{200}{x}$ hr

Time taken by the slow train to cover 200 km $= \frac{200}{(x - 10)}$ hr

Therefore,

$$\frac{200}{x} - \frac{200}{(x - 10)} = 1$$

$$\frac{\{200(x - 10) - 200x\}}{x(x - 10)} = 1$$

$$\frac{200x - 2000 - 200x}{x^2 - 10x} = 1$$

$$\frac{\cancel{200x} - 2000 - \cancel{200x}}{x^2 - 10x} = 1$$

$$x^2 - 10x = -2000$$

$$x^2 - 10x + 2000 = 0$$

$$x^2 - 10x + 2000 = 0$$

$$x^2 - 50x + 40x + 2000 = 0$$

$$x(x - 50) + 40(x - 50) = 0$$

$$(x - 50)(x + 40) = 0$$

So, either

$$(x - 50) = 0$$

$$x = 50$$

Or

$$(x + 40) = 0$$

$$x = -40$$

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

Thus, when $x = 50$ then

$$= (x - 10)$$

$$= (50 - 10)$$

$$= 40$$

Hence, the speed of the fast train is $x = 50$ km/hr

and the speed of the slow train is $x = 40$ km/hr respectively.

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