Ncert Solutions Chapter 4 Quadratic Equations Exercise 4.3 Question 8

Question 8. A train travels 360 km at a uniform speed. If, the speed had been 5 km/hr more, it would have taken 1 hour less for the same journey. Find the speed of the train.

Solution:

Let the speed of the train $= x\ km/hr$

If, speed had been 5km/hr more, train would have taken 1 hour less.

So, according to this condition, we have

$$\frac{360}{x} = \frac{360}{x+5} + 1$$

$$\Rightarrow 360\left(\frac{1}{x} - \frac{1}{x+5}\right) = 1$$

$$\Rightarrow 360\left(\frac{x+5-x}{x(x+5)}\right) = 1$$

$$\Rightarrow 360 \times 5 = x^2 + 5x$$

$$\Rightarrow x^2 + 5x - 1800 = 0$$

Comparing equation $x^2 + 5x - 1800 = 0$ *with* general equation $ax^2 + bx + c = 0,$ *we get* $a = 1,\ b = 5$ *and* $c = -1800$

Applying quadratic formula $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ *to solve equation, we get*

$$x = \frac{-5 \pm \sqrt{5^2 - 4(1)(-1800)}}{2}$$

$$\Rightarrow x = \frac{-5 \pm \sqrt{25 + 7200}}{2} = \frac{-5 \pm \sqrt{7225}}{2}$$

$$\Rightarrow x = \frac{-5 \pm 85}{2}$$

$$\Rightarrow x = \frac{-5+85}{2}, \frac{-5-85}{2}$$

$$\Rightarrow x = 40, -45$$

Speed of train cannot be in negative. Therefore, we discard $x = -45$

Therefore, speed of train = $40\ km/hr$

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