

QUADRATIC EQUATIONS

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10th Maths - Chapter 4

This is Problem-2.4 from Exercise 4.1

1. A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. We need to find the speed of the train.

Solution: :

Let speed of train be = x Time taken by train to cover 480 km = $\frac{480}{x}$

Required quadratic equation is :

$$(x - 8)\left(\frac{480}{x} + 3\right) = 480 \quad (1)$$

$$480 + 3x - \frac{3840}{x} - 24 = 480 \quad (2)$$

$$3x^2 - 24x - 3840 = 0 \quad (3)$$

$$x^2 - 8x - 1280 = 0 \quad (4)$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (5)$$

$$x = \frac{8 \pm \sqrt{(-8)^2 - (4)(1)(-1280)}}{(2)(1)} \quad (6)$$

$$x = \frac{8 \pm \sqrt{64 + 5120}}{2} \quad (7)$$

$$x = \frac{8 \pm 72}{2} \quad (8)$$

$$x_1 = \frac{80}{2} \quad (9)$$

$$x_2 = \frac{-64}{2} \quad (10)$$

$$x_1 = 40 \quad (11)$$

$$x_2 = -32 \quad (12)$$

$$(13)$$

Since speed cannot be negative, speed = 40 km/h