

Quadratic equations

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10th Maths - Chapter 4

This is problem 2.2 from Exercise 4.2

1. A cottage industry produces a certain number of toys in a day. The cost of production of each toy was found to be 55 minus the number of toys produced in a day. On a particular day, the total cost of production was Rs 750. We would like to find out the number of toys produced on that day.

Solution:

Let the number of toys produced on that be x

therefore, the cost of production (in rupees) of each toy that day = $55 - x$

so, the total cost of production that day: $x(55 - x) = 750$

$$\implies -x^2 + 55x - 750 = 0$$

Hence the equation is $x^2 - 55x + 750 = 0$

Roots of a quadratic equation can be determined by the formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (1)$$

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

$$x = \frac{55 \pm \sqrt{-55^2 - 4 \times 1 \times 750}}{2 \times 1} \quad (3)$$

$$x = \frac{55 + \sqrt{3025 - 3000}}{2} \quad (4)$$

$$x = \frac{55 + \sqrt{25}}{2} \quad (5)$$

$$(6)$$

1st condition

$$x = \frac{55 + 5}{2} \quad (7)$$

$$x = \frac{60}{2} \quad (8)$$

$$x = 30 \quad (9)$$

$$(10)$$

2nd condition

$$x = \frac{55 - 5}{2} \quad (11)$$

$$x = \frac{50}{2} \quad (12)$$

$$x = 25 \quad (13)$$

Hence the roots are $x=30$ and $x=25$