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(Affiliated to CBSE up to +2 Level)

CLASS: X

SUB.: MATHS (NCERT BASED)

DATE: 09 -07-2020

Chapter 4:- Quadratic Equations

Ex 4.2

Find the roots of the following quadratic equations by factorisation:

(i) $x^2 - 3x - 10 = 0$

(ii) $2x^2 + x - 6 = 0$

(i) Given: $x^2 - 3x - 10 = 0$

$$\Rightarrow x^2 - 5x + 2x - 10 = 0$$

$$\Rightarrow x(x - 5) + 2(x - 5) = 0$$

$$\Rightarrow (x - 5)(x + 2) = 0$$

Either $x - 5 = 0$ or $x + 2 = 0$

$$\Rightarrow x = 5 \text{ or } x = -2$$

Hence, the roots are **5** and **-2**.

(ii) Given: $2x^2 + x - 6 = 0$

$$\Rightarrow 2x^2 + 4x - 3x - 6 = 0$$

$$\Rightarrow 2x(x + 2) - 3(x + 2) = 0$$

$$\Rightarrow (x + 2)(2x - 3) = 0$$

Either $x + 2 = 0$ or $2x - 3 = 0$

$$\Rightarrow x = -2 \text{ or } x = \frac{3}{2}$$

Hence, the roots are **-2** and **$\frac{3}{2}$** .

(iii) $\sqrt{2x^2 + 7x + 5}\sqrt{2} = 0$

(iv) $2x^2 - x + \frac{1}{8} = 0$

(v) $100x^2 - 20x + 1 = 0$

Do Your Self

Solve the following situations mathematically:

(i) John and Jivanti together have 45 marbles. Both of them lost 5 marbles each and the product of the number of marbles they now have is 124. We would like to find out how many marbles they had to start with.

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

Solution:

(i) Let the number of marbles John had be x

Then, the number of marbles Jivanti had = $45 - x$

The number of marbles left with John, when he lost 5 marbles = $x - 5$

The number of marbles left with Jivanti, when she lost 5 marbles = $45 - x - 5 = 40 - x$

According to question,

$$\begin{aligned} (x-5)(40-x) &= 124 \Rightarrow 40x - x^2 - 200 + 5x = 124 \\ \Rightarrow x^2 - 45x + 324 &= 0 \Rightarrow x^2 - 36x - 9x + 324 = 0 \\ \Rightarrow x(x-36) - 9(x-36) &= 0 \Rightarrow (x-9)(x-36) = 0 \\ \Rightarrow x-9 = 0 \text{ or } x-36 &= 0 \\ \Rightarrow x = 9 \text{ or } x = 36 \end{aligned}$$

Number of marbles they had to start with 9 and 36.

(ii) Let the number of toys produced in a day be x

Then, cost of production of each toy on that day = ₹ $(55 - x)$

Total cost of production on that day = $x(55 - x)$

According to question,

$$\begin{aligned} x(55-x) &= 750 \Rightarrow 55x - x^2 = 750 \\ \Rightarrow x^2 - 55x + 750 &= 0 \Rightarrow x^2 - 25x - 30x + 750 = 0 \\ \Rightarrow x(x-25) - 30(x-25) &= 0 \Rightarrow (x-30)(x-25) = 0 \\ \Rightarrow x-30 = 0 \text{ or } x-25 &= 0 \\ \Rightarrow x = 30 \text{ or } x = 25 \end{aligned}$$

Number of toys produced on that day was 25 or 30.

Do Your Self

1) Find two numbers whose sum is 27 and product is 182.

2) Find two consecutive positive integers, the sum of whose squares is 365.

3) The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

4)

A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that the cost of production of each article (in rupees) was 3 more than twice the number of articles produced on that day. If the total cost of production on that day was ₹90, find the number of articles produced and the cost of each article.