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(Affiliated to CBSE up to +2 Level)

CLASS: X

SUB.: MATHS

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Q.1. Find the roots of the following quadratic equations by factorisation:

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

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

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

(iv) $2x^2 - x + 8 = 0$

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

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

We have: $x^2 - 3x - 10 = 0$

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

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

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

Either $x - 5 = 0 \Rightarrow x = 5$

or $x + 2 = 0 \Rightarrow x = -2$

Thus, the required roots are $x = 5$ and $x = -2$.

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

We have:

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

$\Rightarrow \sqrt{2}x^2 + 2x + 5x + 5\sqrt{2} = 0$

$\Rightarrow \sqrt{2}x^2 + (\sqrt{2}\cdot\sqrt{2})x + 5x + 5\sqrt{2} = 0$

$\Rightarrow \sqrt{2}x[x + \sqrt{2}] + 5[x + \sqrt{2}] = 0$

$\Rightarrow (x + \sqrt{2})(\sqrt{2}x + 5) = 0$

Either $x + \sqrt{2} = 0 \Rightarrow x = -\sqrt{2}$

or $\sqrt{2}x + 5 = 0 \Rightarrow x = -\frac{5}{\sqrt{2}}$

Thus, the required roots are $x = -\sqrt{2}$ and $x = -\frac{5}{\sqrt{2}}$.

Q.3. Find two numbers whose sum is 27 and product is 182.

Sol. Here, sum of the numbers is 27.

Let one of the numbers be x .

\therefore Other number = $27 - x$

According to the condition,

Product of the numbers = 182

$$\Rightarrow x(27 - x) = 182$$

$$\Rightarrow 27x - x^2 = 182$$

$$\Rightarrow -x^2 + 27x - 182 = 0$$

$$\Rightarrow x^2 - 27x + 182 = 0$$

$$\Rightarrow x^2 - 13x - 14x + 182 = 0 \quad -27 = (-13) + (-14) \text{ and}$$

$$\Rightarrow x(x - 13) - 14(x - 13) = 0 \quad (-13) \times (-14) = 182$$

$$\Rightarrow (x - 13)(x - 14) = 0$$

$$\text{Either } x - 13 = 0 \Rightarrow x = 13$$

$$\text{or } x - 14 = 0 \Rightarrow x = 14$$

Thus, the required numbers are 13 and 14.

Q.4 Find two consecutive positive integers, sum of whose squares is 365.

Q.5 The altitude of a right triangle is 7 cm less than its base. If the hypotenuse is 13 cm, find the other two sides.

Q.6. 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 Rs. 90, find the number of articles produced and the cost of each article.

Sol. Let the number of articles produced in a day = x

$$\therefore \text{Cost of production of each article} = Z(2x + 3)$$

According to the condition,

$$\text{Total cost} = 90$$

$$\Rightarrow x \times (2x + 3) = 90$$

$$\Rightarrow 2x^2 + 3x = 90$$

$$\Rightarrow 2x^2 + 3x - 90 = 0$$

$$\Rightarrow 2x^2 - 12x + 15x - 90 = 0$$

$$\Rightarrow 2x(x - 6) + 15(x - 6) = 0$$

$$\Rightarrow (x - 6)(2x + 15) = 0$$

$$\Rightarrow x - 6 = 0 \Rightarrow x = 6$$

$$\text{or } 2x + 15 = 0 \Rightarrow x = \frac{-15}{2}$$

But the number of articles cannot be negative.

$$\therefore x = \frac{-15}{2} \text{ is not required}$$

$$\Rightarrow x = 6$$

$$\therefore \text{Cost of each article} = \text{Rs } (2 \times 6 + 3) = \text{Rs. } 15$$

Thus, the required number of articles produced is 6 and the cost of each article is Rs. 15.