CBSE Class–10 Mathematics
NCERT solution
Chapter - 4
Quadratic Equations - Exercise 4.2

1. Find the roots of the following Quadratic Equations by factorization.

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

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

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

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

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

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

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

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

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

$\Rightarrow x = 5, -2$

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

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

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

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

$\Rightarrow x = \dfrac{3}{2}, -2$

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

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

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

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

$\Rightarrow x = \dfrac{-5}{\sqrt{2}}, -\sqrt{2}$

$\Rightarrow x = \dfrac{-5}{\sqrt{2}} \times \dfrac{\sqrt{2}}{\sqrt{2}}, -\sqrt{2}$

$\Rightarrow x = \dfrac{-5\sqrt{2}}{2}, -\sqrt{2}$

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

$\Rightarrow \dfrac{16x^2 - 8x + 1}{8} = 0$

$\Rightarrow 16x^2 - 8x + 1 = 0$

$\Rightarrow 16x^2 - 4x - 4x + 1 = 0$

$\Rightarrow 4x(4x - 1) - 1(4x - 1) = 0$

$\Rightarrow (4x - 1)(4x - 1) = 0$

$\Rightarrow x = \dfrac{1}{4}, \dfrac{1}{4}$

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

$\Rightarrow 100x^2 - 10x - 10x + 1 = 0$

$\Rightarrow 10x(10x - 1) - 1(10x - 1) = 0$

$\Rightarrow (10x - 1)(10x - 1) = 0$

$\Rightarrow x = \dfrac{1}{10}, \dfrac{1}{10}$

2. Solve the following problems given:

(i) $x^2 - 45x + 324 = 0$

(ii) $x^2 - 55x + 750 = 0$

Ans. (i) $x^2 - 45x + 324 = 0$

$\Rightarrow x^2 - 36x - 9x + 324 = 0$

$\Rightarrow x(x - 36) - 9(x - 36) = 0$

$\Rightarrow (x - 9)(x - 36) = 0$

$\Rightarrow x = 9, 36$

(ii) $x^2 - 55x + 750 = 0$

$\Rightarrow x^2 - 25x - 30x + 750 = 0$

$\Rightarrow x(x - 25) - 30(x - 25) = 0$

$\Rightarrow (x - 30)(x - 25) = 0$

$\Rightarrow x = 30, 25$

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

Ans. Let first number be x and let second number be $(27 - x)$

According to given condition, the product of two numbers is 182.

Therefore,

$x(27 - x) = 182$

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

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

$\Rightarrow x^2 - 14x - 13x + 182 = 0$

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

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

$\Rightarrow x = 14, 13$

Therefore, the first number is equal to 14 or 13

And, second number is = 27 – x = 27 – 14 = 13 or Second number = 27 – 13 = 14

Therefore, two numbers are 13 and 14.

---

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

Ans. Let first number be x and let second number be $(x + 1)$

According to given condition,

$$x^2 + (x + 1)^2 = 365$$

$$\{(a+b)^2 = a^2 + b^2 + 2ab\}$$

$\Rightarrow x^2 + x^2 + 1 + 2x = 365$

$\Rightarrow 2x^2 + 2x - 364 = 0$

Dividing equation by 2

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

$\Rightarrow x^2 + 14x - 13x - 182 = 0$

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

⇒ (x + 14) (x − 13) = 0

⇒x = 13, −14

Therefore, first number = 13 {We discard -14 because it is negative number)

Second number = x + 1 = 13 + 1 = 14

Therefore, two consecutive positive integers are 13 and 14 whose sum of squares is equal to 365.

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

Ans. Let base of triangle be x cm and let altitude of triangle be (x − 7) cm

It is given that hypotenuse of triangle is 13 cm

According to Pythagoras Theorem,

$$(13)^2 = x^2 + (x - 7)^2 \qquad\qquad \text{[Since, } (a+b)^2 = a^2 + b^2 + 2ab]$$

$$\Rightarrow 169 = x^2 + x^2 + 49 - 14x$$

$$\Rightarrow 169 = 2x^2 - 14x + 49$$

$$\Rightarrow 2x^2 - 14x - 120 = 0$$

Dividing equation by 2

$$\Rightarrow x^2 - 7x - 60 = 0$$

$$\Rightarrow x^2 - 12x + 5x - 60 = 0$$

⇒x (x − 12) + 5 (x − 12) = 0

⇒(x − 12) (x + 5) = 0

⇒x = −5, 12

We discard x = −5 because length of side of triangle cannot be negative.

Therefore, base of triangle = 12 cm

Altitude of triangle = (x − 7) = 12 – 7 = 5 cm

---

6. A cottage industry produces a certain number of pottery articles in a day. It was observed on a particular day that 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.

Ans. Let cost of production of each article be Rs x

We are given total cost of production on that particular day = Rs 90

Therefore, total number of articles produced that day = 90/x

According to the given conditions,

$$x = 2\left(\frac{90}{x}\right) + 3$$

$$\Rightarrow x = \frac{180}{x} + 3$$

$$\Rightarrow x = \frac{180 + 3x}{x}$$

$$\Rightarrow x^2 = 180 + 3x$$

$$\Rightarrow x^2 - 3x - 180 = 0$$

$$\Rightarrow x^2 - 15x + 12x - 180 = 0$$

$$\Rightarrow x(x - 15) + 12(x - 15) = 0$$

$$\Rightarrow (x - 15)(x + 12) = 0 \Rightarrow x = 15, -12$$

Cost cannot be in negative, therefore, we discard *x* = −12

Therefore, *x* = *Rs* 15 which is the cost of production of each article.

Number of articles produced on that particular day = $\dfrac{90}{15}$ = 6