



NCERT Solutions For Class 10 Chapter 4 Quadratic Equations
Exercise 4.3

Q1. Find the roots of the following quadratic equations if they exist by the method of completing square.

(i) $2x^2 - 7x + 3 = 0$

(ii) $2x^2 + x - 4 = 0$

(iii) $4x^2 + 4\sqrt{3}x + 3 = 0$

(iv) $2x^2 + x + 4 = 0$

Ans. (i) $2x^2 - 7x + 3 = 0$

First we divide equation by 2 to make coefficient of x^2 equal to 1,

$$x^2 - \frac{7}{2}x + \frac{3}{2} = 0$$

We divide middle term of the equation by $2x$, we get

$$\frac{7}{2}x \times \frac{1}{2x} = \frac{7}{4}$$

We add and subtract square of $\frac{7}{4}$ from the equation

$$x^2 - \frac{7}{2}x + \frac{3}{2} = 0$$

$$x^2 - \frac{7}{2}x + \frac{3}{2} + \left(\frac{7}{4}\right)^2 - \left(\frac{7}{4}\right)^2 = 0$$

$$\Rightarrow x^2 + \left(\frac{7}{4}\right)^2 - \frac{7}{2}x + \frac{3}{2} + -\left(\frac{7}{4}\right)^2 = 0$$

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

$$\Rightarrow \left(x - \frac{7}{4}\right)^2 + \frac{24 - 49}{16} = 0$$

$$\Rightarrow \left(x - \frac{7}{4}\right)^2 = \frac{49 - 24}{16}$$

Taking Square root on both sides,

$$\Rightarrow x - \frac{7}{4} = \pm \frac{5}{4}$$

$$\Rightarrow x = \frac{5}{4} + \frac{7}{4} = \frac{12}{4} = 3 \text{ and } x = -\frac{5}{4} + \frac{7}{4} = \frac{2}{4} = \frac{1}{2}$$

$$\text{Therefore, } x = \frac{1}{2}, 3$$

$$\text{(ii) } 2x^2 + x - 4 = 0$$

Dividing equation by 2,

$$x^2 + \frac{x}{2} - 2 = 0$$

Following procedure of completing square,

$$x^2 + \frac{x}{2} - 2 + \left(\frac{1}{4}\right)^2 - \left(\frac{1}{4}\right)^2 = 0$$

$$\Rightarrow x^2 + \frac{x}{2} + \left(\frac{1}{4}\right)^2 - 2 - \frac{1}{16} = 0$$

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

$$\Rightarrow \left(x + \frac{1}{4}\right)^2 - \frac{33}{16} = 0$$

$$\Rightarrow \left(x + \frac{1}{4}\right)^2 = \frac{33}{16}$$

Taking square root on both sides,

$$\Rightarrow x + \frac{1}{4} = \pm \frac{\sqrt{33}}{4}$$

\Rightarrow

$$x = \frac{\sqrt{33}}{4} - \frac{1}{4} = \frac{\sqrt{33}-1}{4} \text{ and } x = -\frac{\sqrt{33}}{4} - \frac{1}{4} = \frac{-\sqrt{33}-1}{4}$$

$$\text{Therefore, } x = \frac{\sqrt{33}-1}{4}, \frac{-\sqrt{33}-1}{4}$$

(iii) $4x^2 + 4\sqrt{3}x + 3 = 0$

Dividing equation by 4,

$$x^2 + \sqrt{3}x + \frac{3}{4} = 0$$

Following the procedure of completing square,

$$\Rightarrow x^2 + \sqrt{3}x + \frac{3}{4} + \left(\frac{\sqrt{3}}{2}\right)^2 - \left(\frac{\sqrt{3}}{2}\right)^2 = 0$$

$$\Rightarrow x^2 + \left(\frac{\sqrt{3}}{2}\right)^2 + \sqrt{3}x + \frac{3}{4} - \frac{3}{4} = 0$$

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

$$\Rightarrow \left(x + \frac{\sqrt{3}}{2}\right)^2 = 0$$

$$\Rightarrow \left(x + \frac{\sqrt{3}}{2}\right)\left(x + \frac{\sqrt{3}}{2}\right) = 0$$

Taking square root on both sides,

$$\Rightarrow x + \frac{\sqrt{3}}{2} = 0, x + \frac{\sqrt{3}}{2} = 0$$

$$\Rightarrow x = -\frac{\sqrt{3}}{2}, -\frac{\sqrt{3}}{2}$$

$$\text{(iv)} \quad 2x^2 + x + 4 = 0$$

Dividing equation by 2,

$$x^2 + \frac{x}{2} + 2 = 0$$

Following the procedure of completing square,

$$\Rightarrow x^2 + \frac{x}{2} + 2 + \left(\frac{1}{4}\right)^2 - \left(\frac{1}{4}\right)^2 = 0$$

$$\Rightarrow x^2 + \left(\frac{1}{4}\right)^2 + \frac{x}{2} + 2 - \left(\frac{1}{4}\right)^2 = 0$$

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

$$\Rightarrow \left(x + \frac{1}{4}\right)^2 + 2 - \frac{1}{16} = 0$$

$$\Rightarrow \left(x + \frac{1}{4}\right)^2 = \frac{1}{16} - 2 = \frac{1-32}{16}$$

Taking square root on both sides

Right hand side does not exist because square root of negative number does not exist.

Therefore, there is no solution for quadratic equation

$$2x^2 + x + 4 = 0$$

***** END *****