

EXERCISE 4.3

1. Find the roots of the quadratic equations by using the quadratic formula in each of the following:

- (i) $2x^2 - 3x - 5 = 0$
- (ii) $5x^2 + 13x + 8 = 0$
- (iii) $-3x^2 + 5x + 12 = 0$
- (iv) $-x^2 + 7x - 10 = 0$
- (v) $x^2 + 2\sqrt{2}x - 6 = 0$
- (vi) $x^2 - 3\sqrt{5}x + 10 = 0$
- (vii) $(\frac{1}{2})x^2 - \sqrt{11}x + 1 = 0$

Solution:

The quadratic formula for finding the roots of quadratic equation $ax^2 + bx + c = 0$, $a \neq 0$ is given by,

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

(i) $2x^2 - 3x - 5 = 0$

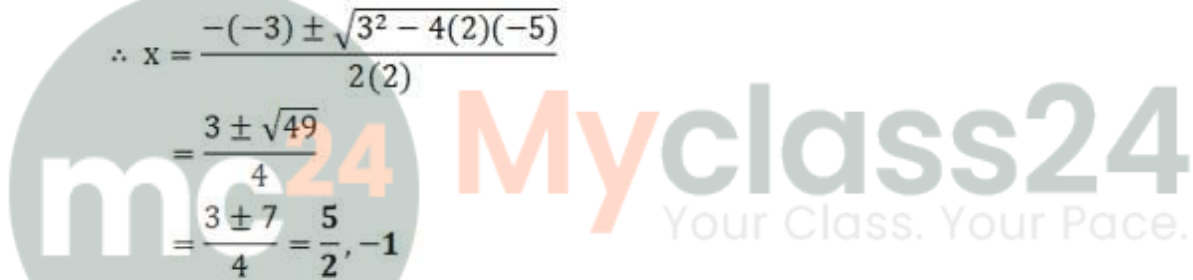
$$\begin{aligned} \therefore x &= \frac{-(-3) \pm \sqrt{3^2 - 4(2)(-5)}}{2(2)} \\ &= \frac{3 \pm \sqrt{49}}{4} \\ &= \frac{3 \pm 7}{4} = \frac{5}{2}, -1 \end{aligned}$$

(ii) $5x^2 + 13x + 8 = 0$

$$\begin{aligned} \therefore x &= \frac{-13 \pm \sqrt{(-13)^2 - 4(5)(8)}}{2(5)} \\ &= \frac{-13 \pm \sqrt{9}}{10} \\ &= \frac{-13 \pm 3}{10} = -1, -\frac{8}{5} \end{aligned}$$

(iii) $-3x^2 + 5x + 12 = 0$

$$\begin{aligned} \therefore x &= \frac{-5 \pm \sqrt{5^2 - 4(-3)(12)}}{2(-3)} \\ &= \frac{-5 \pm \sqrt{169}}{-6} \\ &= \frac{5 \pm 13}{6} = 3, -\frac{4}{3} \end{aligned}$$



(iv) $-x^2 + 7x - 10 = 0$

$$\begin{aligned} \therefore x &= \frac{-7 \pm \sqrt{(-7)^2 - 4(-1)(-10)}}{2(-1)} \\ &= \frac{-7 \pm \sqrt{9}}{-2} \\ &= \frac{7 \pm 3}{2} = 5, 2 \end{aligned}$$

(v) $x^2 + 2\sqrt{2}x - 6 = 0$

$$\begin{aligned} \therefore x &= \frac{-2\sqrt{2} \pm \sqrt{(2\sqrt{2})^2 - 4(1)(-6)}}{2(1)} \\ &= \frac{-2\sqrt{2} \pm \sqrt{32}}{2} \\ &= \frac{-2\sqrt{2} \pm 4\sqrt{2}}{2} = \sqrt{2}, -3\sqrt{2} \end{aligned}$$

(vi) $x^2 - 3\sqrt{5}x + 10 = 0$

$$\begin{aligned} \therefore x &= \frac{-(-3\sqrt{5}) \pm \sqrt{(-3\sqrt{5})^2 - 4(1)(10)}}{2(1)} \\ &= \frac{3\sqrt{5} \pm \sqrt{5}}{2} = 2\sqrt{5}, \sqrt{5} \end{aligned}$$

(vii) $(\frac{1}{2})x^2 - \sqrt{11}x + 1 = 0$

$$\begin{aligned} \therefore x &= \frac{-(-\sqrt{11}) \pm \sqrt{(-\sqrt{11})^2 - 4(\frac{1}{2})(1)}}{2(\frac{1}{2})} \\ &= \frac{\sqrt{11} \pm \sqrt{9}}{1} \\ &= \sqrt{11} \pm 3 = 3 + \sqrt{11}, -3 + \sqrt{11} \end{aligned}$$