

Mathematics

Quadratic Equations

Exercise- 4.1

Check whether the following

(vi) $x^2 + 3x + 1 = (x - 2)^2$

The given equation is

$$x^2 + 3x + 1 = (x - 2)^2$$

$$x^2 - 3x + 1 = x^2 + 4x + 4$$

$$\Rightarrow 7x - 3 = 0$$

It is not of the form $ax^2 + bx + c = 0$ $a \neq 0$

Therefore, the given equation is not a quadratic equation

(vii) $(x + 2)^2 = 2x(x^2 - 1)$

The given equation is

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

$$x^3 - 6x^2 - 12x - 8 = 2x^3 + 2x$$

$$\Rightarrow x^3 - 6x^2 - 14x - 8 = 0$$

It is not of the form $ax^2 + bx + c = 0$ $a \neq 0$

Therefore, the given equation is not a quadratic equation

(viii) $x^3 - 4x^2 - x + 1 = (x - 2)^3$

The given equation is

$$x^3 - 4x^2 - x + 1 = (x - 2)^3$$

$$x^3 - 4x^2 - x + 1 = x^3 - 8 - 6x^2 + 12x$$

$$\Rightarrow 2x^2 - 13x - 9 = 0$$

It is of the form $ax^2 + bx + c = 0$ $a \neq 0$

Therefore, the given equation is a quadratic equation

ADDITIONAL EXAMPLES

Finding the roots of the equations:

1. $x(x - 3) = 0$

Soln:- The given eqn is $x(x - 3) = 0$

$$x = 0, x - 3 = 0$$

$$\therefore x = 0, x = +3$$

2. $a(a + 5) = 0$

Soln:- The given eqn is $a(a + 5) = 0$

$$a = 0; a + 5 = 0$$

$$a = 0; a = -5$$

3. $(y + 6)(y + 9) = 0$

Soln:- The given eqn is

$$(y + 6)(y + 9) = 0$$

$$(y + 6) = 0 \Rightarrow y = -6$$

$$(y + 9) = 0 \Rightarrow y = -9$$

4. $(5z - 2)(7z + 3) = 0$

Soln:- The given eqn is

$$(5z - 2)(7z + 3) = 0$$

$$(5z - 2) = 0 \Rightarrow z = +\frac{2}{5}$$

$$(7z + 3) = 0 \Rightarrow z = -\frac{3}{7}$$

Solve the following:-

1. Solve the quadratic equation

$$a^2 - 3a + 2 = 0$$

Soln:- The given eqn is $a^2 - 3a + 2 = 0$

$$a(a - 2) - 1(a - 2) = 0$$

$$\Rightarrow (a - 2)(a - 1) = 0$$

$$(a - 2) = 0 \Rightarrow a = 2$$

$$(a - 1) = 0 \Rightarrow a = 1$$

2. Solve the quadratic equation $m^2 - m = 6$

Soln:- The given eqn is $m^2 - m = 6$

$$m^2 - m - 6 = 0$$

$$m^2 - 3m + 2m - 6 = 0$$

$$m(m - 3) + 2(m - 3) = 0$$

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

$$(m - 3) = 0 \Rightarrow m = +3$$

$$(m + 2) = 0 \Rightarrow m = -2$$

3. Solve the quadratic equation $2x^2 - 3x + 1 = 0$

Soln:- The given eqn is $2x^2 - 3x + 1 = 0$

$$2x^2 - 2x - 1x + 1 = 0$$

$$2x(x - 1) - 1(x - 1) = 0$$

$$\Rightarrow (x - 1)(2x - 1) = 0$$

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

$$(2x - 1) = 0 \Rightarrow x = +\frac{1}{2}$$

4. Solve the quadratic equation $4k(3k - 1) = 5$

Soln:- The given eqn is $4k(3k - 1) = 5$

$$12k^2 - 4k - 5 = 0$$

$$12k^2 - 10k + 6k - 5 = 0$$

$$2k(6k - 5) + 1(6k - 5) = 0$$

$$(6k - 5)(2k + 1) = 0$$

$$(6k - 5) = 0 \Rightarrow k = +\frac{5}{6}$$

$$(2k + 1) = 0 \Rightarrow k = -\frac{1}{2}$$

Check whether the following equation is a quadratic equation:

(i) $x(x + 1) + 8 = (x + 2)(x - 2)$

Soln:- $x(x + 1) + 8 = (x + 2)(x - 2)$

$$\text{Consider } x(x + 1) + 8 = x^2 + x + 8$$

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

$$x^2 + x + 8 = x^2 - 4$$

$$x + 8 = -4$$

$$x = -8 - 4 = -12$$

$$\Rightarrow x + 12 = 0$$

The above eqn is not of the form

$$ax^2 + bx + c = 0 \text{ Hence, the given}$$

eqn is not a quadratic eqn.

(Contd.....)