Exercise 5(A)

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1. Find which of the following equations are quadratic:
(i) $(3x - 1)^2 = 5(x + 8)$
(ii) $5x^2 – 8x = -3(7 – 2x)$
(iii) $(x -4) (3x + 1) = (3x – 1) (x + 2)$
(iv) $x^2 + 5x – 5 = (x - 3)^2$
(v) $7x^3 – 2x^2 + 10 = (2x - 5)^2$
(vi) $(x - 1)^2 + (x + 2)^2 + 3(x + 1) = 0$
Solution:

(i) $(3x - 1)^2 = 5(x + 8)$
$\Rightarrow (9x^2 - 6x + 1) = 5x + 40$
$\Rightarrow 9x^2 - 11x - 39 = 0$; which is of the general form $ax^2 + bx + c = 0$.
Thus, the given equation is a quadratic equation.

(ii) $5x^2 - 8x = -3(7 - 2x)$
$\Rightarrow 5x^2 - 8x = 6x - 21$
$\Rightarrow 5x^2 - 14x + 21 = 0$; which is of the general form $ax^2 + bx + c = 0$.
Thus, the given equation is a quadratic equation.

(iii) $(x - 4) (3x + 1) = (3x - 1) (x +2)$
$\Rightarrow 3x^2 + x - 12x - 4 = 3x^2 + 6x - x - 2$
$\Rightarrow 16x + 2 = 0$; which is not of the general form $ax^2 + bx + c = 0$. And it's a linear equation.
Thus, the given equation is not a quadratic equation.

(iv) $x^2 + 5x - 5 = (x - 3)^2$
$\Rightarrow x^2 + 5x - 5 = x^2 - 6x + 9$
$\Rightarrow 11x - 14 = 0$; which is not of the general form $ax^2 + bx + c = 0$. And it's a linear equation.
Thus, the given equation is not a quadratic equation.

(v) $7x^3 - 2x^2 + 10 = (2x - 5)^2$
$\Rightarrow 7x^3 - 2x^2 + 10 = 4x^2 - 20x + 25$
$\Rightarrow 7x^3 - 6x^2 + 20x - 15 = 0$; which is not of the general form $ax^2 + bx + c = 0$. And it's a cubic equation.
Thus, the given equation is not a quadratic equation.

(vi) $(x - 1)^2 + (x + 2)^2 + 3(x +1) = 0$
$\Rightarrow x^2 - 2x + 1 + x^2 + 4x + 4 + 3x + 3 = 0$
$\Rightarrow 2x^2 + 5x + 8 = 0$; which is of the general form $ax^2 + bx + c = 0$.
Thus, the given equation is a quadratic equation.

2. (i) Is x = 5 a solution of the quadratic equation $x^2 - 2x - 15 = 0$?
Solution:

Given quadratic equation, $x^2 - 2x - 15 = 0$

We know that, for x = 5 to be a solution of the given quadratic equation it should satisfy the equation.
Now, on substituting x = 5 in the given equation, we have
L.H.S $= (5)^2 - 2(5) - 15$
$= 25 - 10 - 15$
$= 0$
= R.H.S
Therefore, x = 5 is a solution of the given quadratic equation $x^2 - 2x - 15 = 0$

(ii) Is x = -3 a solution of the quadratic equation $2x^2 - 7x + 9 = 0$?
Solution:

Given quadratic equation, $2x^2 - 7x + 9 = 0$
We know that, for x = -3 to be solution of the given quadratic equation it should satisfy the equation.
Now, on substituting x = 5 in the given equation, we have
L.H.S $= 2(-3)^2 - 7(-3) + 9$
$= 18 + 21 + 9$
$= 48$
$\neq$ R.H.S
Therefore, x = -3 is not a solution of the given quadratic equation $2x^2 - 7x + 9 = 0$.