

Ex-4.1

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

$$\Rightarrow x^2 + 2x + 1 = 2x - 6$$

$$\Rightarrow x^2 + 7 = 0 \Rightarrow x^2 + 0x + 7 = 0$$

So it is in the form of $ax^2 + bx + c = 0$, so it is a quadratic equation.

2. $x^2 - 2x = (-2)(3-x)$

$$\Rightarrow x^2 - 2x = -6 + 2x$$

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

So it is in the form of $ax^2 + bx + c = 0$, so it is a quadratic equation.

iii. $(x-2)(x+1) = (x-1)(x+3)$

$$\Rightarrow x(x-2) + 1(x-2) = x(x-1) + 3(x-1)$$

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

$$\Rightarrow x^2 - x - 2 = x^2 + 2x - 3 \Rightarrow 3x - 1 = 0$$

So it is not a quadratic equation as it is not in a form $ax^2 + bx + c = 0$.

iv. $(x-3)(2x+1) = x(x+5)$

$$\Rightarrow 2x(x-3) + 1(x-3) = x^2 + 5x$$

$$\Rightarrow 2x^2 - 6x + x - 3 = x^2 + 5x$$

$$\Rightarrow 2x^2 - x^2 - 6x - 5x + x - 3 = 0 \Rightarrow x^2 - 10x - 3 = 0$$

So it is in the form of $ax^2 + bx + c = 0$.

$$V. (2x-1)(x-3) = 6(x+5)(x+1)$$

$$\rightarrow 2x^2 - 8x + x + 3 = x^2 + 5x - x - 5$$

$$\rightarrow x^2 - 11x + 8 = 0.$$

So it is a quadratic equation as it is in form of $ax^2 + bx + c = 0$.

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

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

$$\rightarrow 3x + 4x + 1 - 4 = 0$$

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

It is not in form of $ax^2 + bx + c = 0$ so it is not a quadratic equation.

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

$$\rightarrow x^3 + 8 + 6x(x+2) = 2x^3 - 2x$$

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

$$\rightarrow -x^3 + 6x^2 + 14x + 8 = 0.$$

It is not a quadratic equation as it is not in the form of $ax^2 + bx + c = 0$.

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

$$\rightarrow x^3 - 4x^2 - x + 1 = x^3 - 8 - 6x(x-2)$$

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

$$\rightarrow 2x^2 - 13x + 9 = 0.$$

It is a quadratic equation as it is in the form of $ax^2 + bx + c = 0$.

Q2. i) let the breadth = x m.

so length = $2x + 1$ m.

$$\text{area} = x(2x + 1) \text{ m}^2.$$

ATQ

$$x(2x + 1) = 528.$$

$$\Rightarrow 2x^2 + x - 528 = 0.$$

So length and breadth satisfies the equation $2x^2 + x - 528 = 0$.

ii) let the integer be x .

and next = $x + 1$

so product = $x(x + 1)$

ATQ

$$x(x + 1) = 306$$

$$\Rightarrow x^2 + x - 306 = 0.$$

iii) let age of Rohan be x year.

Age of Rohan's mother = $x + 26$ yrs.

So after 3 years

Rohan age = $x + 3$.

his mother's age = $x + 29$ yrs.

Product of their ages = $(x + 3)(x + 29)$ yrs.

ATQ

$$(x + 3)(x + 29) = 360$$

$$\Rightarrow x^2 + 3x + 29x + 87 = 360.$$

$$\Rightarrow x^2 + 32x - 273 = 0$$

iv) Speed of train = x km/h.

Total distance = 480 km.

$$\text{Time} = \frac{480}{x} \text{ hours.}$$

If the speed been 8 km/h so time taken = $\frac{480}{x-8}$ hrs.

ATD

$$\frac{480}{x-8} - \frac{480}{x} = 3.$$

$$\Rightarrow \frac{480x - 480(x-8)}{(x-8)x} = 3.$$

$$\Rightarrow 480x - 480x + 3640 = 3(x-8)x.$$

$$3640 = 3x^2 - 24x.$$

$$3x^2 - 24x - 3640 = 0.$$