QUADRATIC EQUATIONS

Exercise 4.1

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

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

$\Rightarrow x^2 + 1 + 6 = 0$

$\Rightarrow x^2 + 7 = 0$

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

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

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

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

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

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

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

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

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

$\Rightarrow -3x + 1 = 0$

$\Rightarrow 3x - 1 = 0$

∴ The equation is not in the form of $ax^2+bx+c=0$, So the given equation is not a quadratic equation.

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

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

$\Rightarrow x^2 - 10x - 3 = 0$

∴ The equation is in the form of $ax^2 + bx + c = 0$
So the equation given is a quadratic Equation.

(v) $(2x-1)(x-3) = (x+5)(x-1)$

$\Rightarrow 2x^2 - 7x + 3 = x^2 + 4x - 5$

$\Rightarrow 2x^2 - x^2 - 7x - 4x + 3 + 5 = 0$

$\Rightarrow x^2 - 11x + 8 = 0$

∴ The equation is in the form of $ax^2 + bx + c = 0$,
So the given equation is a quadratic Equation.

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

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

$\Rightarrow 3x + 4x + 1 + 4 = 0$

$\Rightarrow 7x + 5 = 0$

∴ The equation is not in the form of $ax^2 + bx + c = 0$,
So the given Equation is not a quadratic Equation.

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

$\Rightarrow x^3 + 8 + x^2 + 12x = 2x^3 - 2x$

$\Rightarrow x^3 - 2x^3 + x^2 + 12x + 2x + 8 = 0$

$\Rightarrow -x^3 + x^2 + 14x + 8$

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

$\Rightarrow x^3+8+x^2+12x = 2x^3-2x$

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

∴ The Equation is not in the form of $ax^2+bx+c=0$ So, the given Equation is not a quadratic equation.

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

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

$\Rightarrow -4x^2+6x^2-x-12x+1+8=0$

$\Rightarrow$ ~~$2x^3+11x+0$~~

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

∴ The Equation is not in the form of $ax^2+bx+c=0$, so the given Equation is not a quadratic Equation.

(2(i)) Let, breadth of the rectangular plot $= x$ m

then, the length of the rectangular plot $= (2x+1)$ m

A/Q

$(2x+1)\times x = 528$

$\Rightarrow 2x^2+x = 528$

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

∴ The given values of length and breadth satisfies the ~~quadratic~~ equation, $2x^2+x-528=0$, is the required equation.

(ii) Let the first integer number be x and the consecutive no. of it be $x+1$.

A/q

$$x(x+1) = 306$$
$$\Rightarrow x^2 + x = 306$$
$$\Rightarrow x^2 + x - 306 = 0$$

∴ The two integers x and $x+1$ satisfies the quadratic equation, $x^2 + x - 306 = 0$ is the required quadratic equation.

(iii) Let the age of Rohan be x years
Rohan's mother age $= x + 26$.

After 3 years

Rohan's age $= (x+3)$ years
Rohan's mother age $= x + 26 + 3$ years
$= x + 29$ years.

A/q

$$(x+3)(x+29) = 360$$
$$\Rightarrow x^2 + 29x + 3x + 87 = 360$$
$$\Rightarrow x^2 + 32x + 87 - 360 = 0$$
$$\Rightarrow x^2 + 32x - 273 = 0$$

∴ The age of Rohan and his mother satisfies the quadratic Equation So $x^2 + 32x - 273 = 0$ is the required Equation.

(iv) Let the speed of the train = x km/hr.

Time taken travel 480 km = $\frac{480}{x \text{ km/hr}}$

Time taken to travel 480 km = $\frac{480}{(x+3) \text{ km/r}}$.

A/q

$$(x-8)\left(\frac{480}{x+3}\right) = 480$$

$$\Rightarrow 480 + 3x - \frac{3840}{x} - 24 = 480.$$

$$\Rightarrow \frac{3x - 3840}{x} = 24$$

$$\Rightarrow 3x^2 - 8x - 1280 = 0.$$

∴ The speed of train satisfies the quadratic equation, $3x^2 - 8x - 1280 = 0$, is the required quadratic Equation.