Quadratic Equations

Exercise - 4.1

Q1. i) $(x+1)^2 = 2(x-3)$.

→ $x^2 + 1 + 2x = 2x - 6$.

→ $x^2 + 1 + 2x - 2x + 1 = 0$.

→ $x^2 + 7 = 0$.

Highest power of x is 2, so the given equation is quadractic.

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

→ $x^2 - 2x = -6 + 2x$.

→ $x^2 - 4x + 6 = 0$.

Highest power of $x = 2$, so given equation is quadratic.

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

→ $x^2 - 2x + x - 2 = x^2 - x + 3x - 3$.

→ $x^2 - x - 2 = x^2 + 2x - 3$.

→ $3x - 1 = 0$.

Highest power of $x = 2$.

equation is quadratic.

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

→ $2x^2 - 6x + x - 3 = x^2 + 5x$.

→ $x^2 - 10x - 3 = 0$.

Highest power $x = 2$.

∴ quadractic.

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

→ $2x^2 - 6x - x + 3 = x^2 + 3x - x - 5$.

→ $x^2 - 11x + 8 = 0$.

Highest power of $x = 2$.

∴ quadractic.

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

→ $x^2 + 3x + 1 = x^2 + 4 - 4x$.

→ $7x - 3 = 0$.

Highest power of $x = 1$.

∴ not ~~quadraction~~ quadratic.

Q2) i) breadth of rectangular plot = x m.

length = $(2x+1)$ m.

Area of rectangular plot = $l \times b$.

→ $528 = (2x+1)x$.

→ $528 = 2x^2 + x$.

→ $2x^2 + x - 528 = 0$.

Q2. ii) Let 2 consecutive Integers be x & $x+1$.

$x(x+1) = 306$.

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

which is required quadratic equation.

iii) Let the present age of Roshan = x years.

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

After 3 years, Rohan's age = $(x+3)$ years.

After 3 years, Rohan's Mother's age = $(x+26+3)$ years.

$(x+3)(x+26) = 360$.

$\Rightarrow x^2 + 29x + 3x + 87 - 360 = 0$.

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

iv) Let speed of train = x km/h.

Total dist. to be covered = 480 km.

$$\text{Time} = \frac{\text{distance}}{\text{speed}} = \frac{480}{x}.$$

Decreased Speed of train = $(x-8)$ km/h.

$$\text{Time} = \frac{480}{x-8}.$$

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

$\Rightarrow 480\left[\frac{1}{x-8} - \frac{1}{x}\right] = 3$. $\Rightarrow 480\left[\frac{x - x + 8}{x(x-8)}\right] = 3$.

$\Rightarrow 480 \times 8 = 3x(x-8)$. $\Rightarrow 3840 = 3x^2 - 24x = 3x^2 - 24x - 3840 = 0$.

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

— ● — Completed.