

$$a^3 + b^3 = (a+b)(a^2 - ab + b^2)$$

$$(a+b)(a-b) = a^2 - b^2$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$ax^2 + bx + c = 0$$

$$4a^2x^2 + 4abx + 4ac = 0$$

$$4a^2x^2 + 4abx = -4ac$$

$$4a^2x^2 + 4abx + b^2 = b^2 - 4ac$$

$$(2ax + b)^2 = b^2 - 4ac$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



# CLASS - 10

## MATHEMATICS

### Chapter - 4

### QUADRATIC EQUATIONS

#### Part - 2

#### Exercise - 4.1

Shubham Tiwari

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$$(2ax + b)^2 = b^2 - 4ac$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$



## EXERCISE - 4.1

1. Check whether the following are quadratic equations :

$$a \neq 0$$

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

Solu.

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

$$\cancel{x^2 = 0}$$

$$ax^2 + bx + c = 0$$

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

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

$$\underline{x^2 + 7 = 0}$$

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

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


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

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

It is a quadratic eq.



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

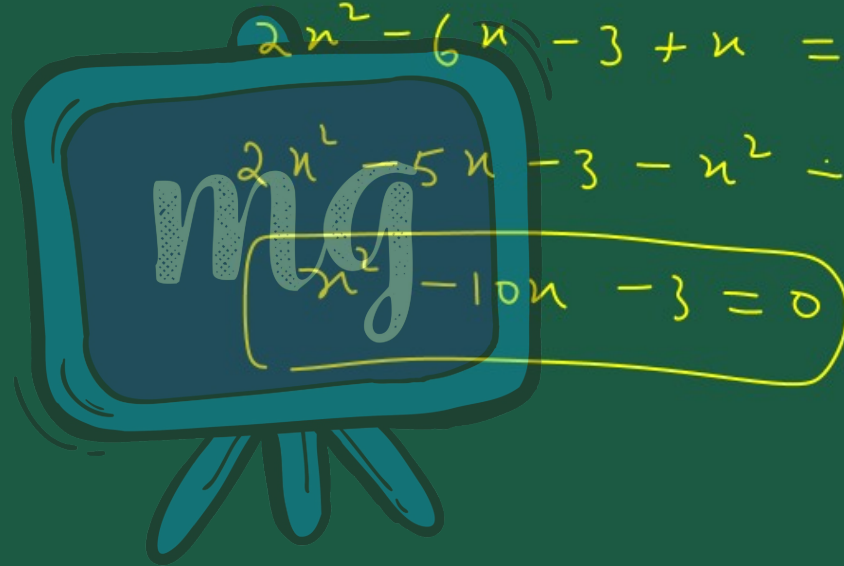

$$\begin{aligned} \cancel{x} - 2x + x - 2 &= \cancel{x} - x + 3x - 3 \\ -x - 2 &= 2x - 3 \\ 0 &= 2x - 3 + x + 2 \\ 0 &= 3x - 1 \\ &= \cancel{0x^2 + 3x - 1} \end{aligned}$$

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

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

$$2x^2 - 5x - 3 - x^2 - 5x = 0$$

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



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

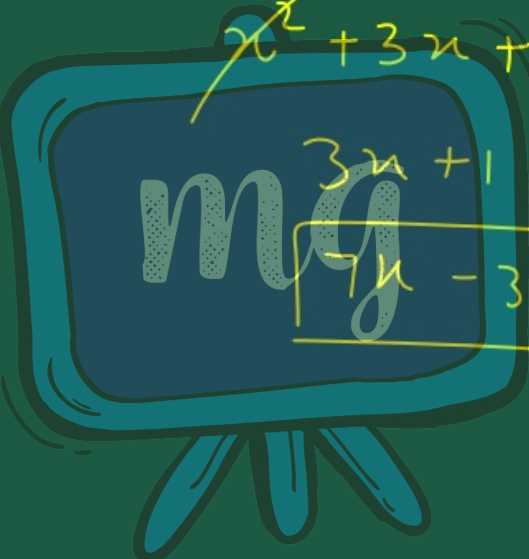
$$2x^2 - 6x - x + 3 = x^2 + 5x - x - 5$$

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

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

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

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



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

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

$7x - 3 = 0$

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

$$x^3 + 8 + 3(x)(2)(x+2)$$

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

$$x^3 + 8 + 6x^2 + 12x - 2x^3 + 2x = 0$$

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

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

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

$$\cancel{x^3} - 4x^2 - x + 1 = \cancel{x^3} - 8 - 6x^2 + 12x$$

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

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

2. Represent the following situations in the form of quadratic equations :

- (i) The area of a rectangular plot is 528 m<sup>2</sup>. The length of the plot (in metres) is one more than twice its breadth. We need to find the length and breadth of the plot.

$$A = 528$$
$$l = 2b + 1$$
$$A = l \times b$$
$$528 = (2b + 1) \times b$$

$$528 = (2b+1)(b)$$

$$0 = 2b^2 + b - 528$$



mg

(ii) The product of two consecutive positive integers is 306. We need to find the integers.



Soln

Let the no be.

$x$  and  $x+1$

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

$$x^2 + x - 306 = 0$$

(iii) Rohan's mother is 26 years older than him. The product of their ages (in years) 3 years from now will be 360. We would like to find Rohan's present age.

$R$   
 $x$   
 $(x+3)$

$R_m$   
 $x+26$   
 $x+26+3$   
 $x+29$

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

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

$$x^2 + 29x + 3x + 87 = 360$$

$$x^2 + 32x + 87 - 360 = 0$$

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

(iv) A train travels a distance of 480 km at a uniform speed. If the speed had been 8 km/h less, then it would have taken 3 hours more to cover the same distance. We need to find the speed of the train.

Uniform speed =  $x$   
 time taken  
 at  $x$  speed =  $t$

$$x \times t = 480$$

$$(x - 8)(t + 3) = 480$$

$$\cancel{x}t - 8t + 3x - 24 = \cancel{480}$$

$$-8t + 3x - 24 = 0$$

$$-8t + 3x - 24 = 0 \quad \left\{ \begin{array}{l} xt = 480 \\ \textcircled{t} = \frac{480}{x} \end{array} \right.$$

$$-8 \times \left( \frac{480}{x} \right) + 3x - 24 = 0$$

$$-8 \times 480 + 3x^2 - 24x = 0$$

$$3[-8 \times 160 + x^2 - 8x] = 0$$

$$x^2 - 8x - 1280 = 0$$