

# 10<sup>TH</sup> MATHS QUADRATIC GRAPH SOLUTION

## QUADRATIC GRAPH EM NEW (2024 - 2025 )

**Example: 3.51** Discuss the nature of solutions of the following quadratic equations.

(i)  $x^2 + x - 12 = 0$  (ii)  $x^2 - 8x + 16 = 0$  (iii)  $x^2 + 2x + 5 = 0$

**Solution:**

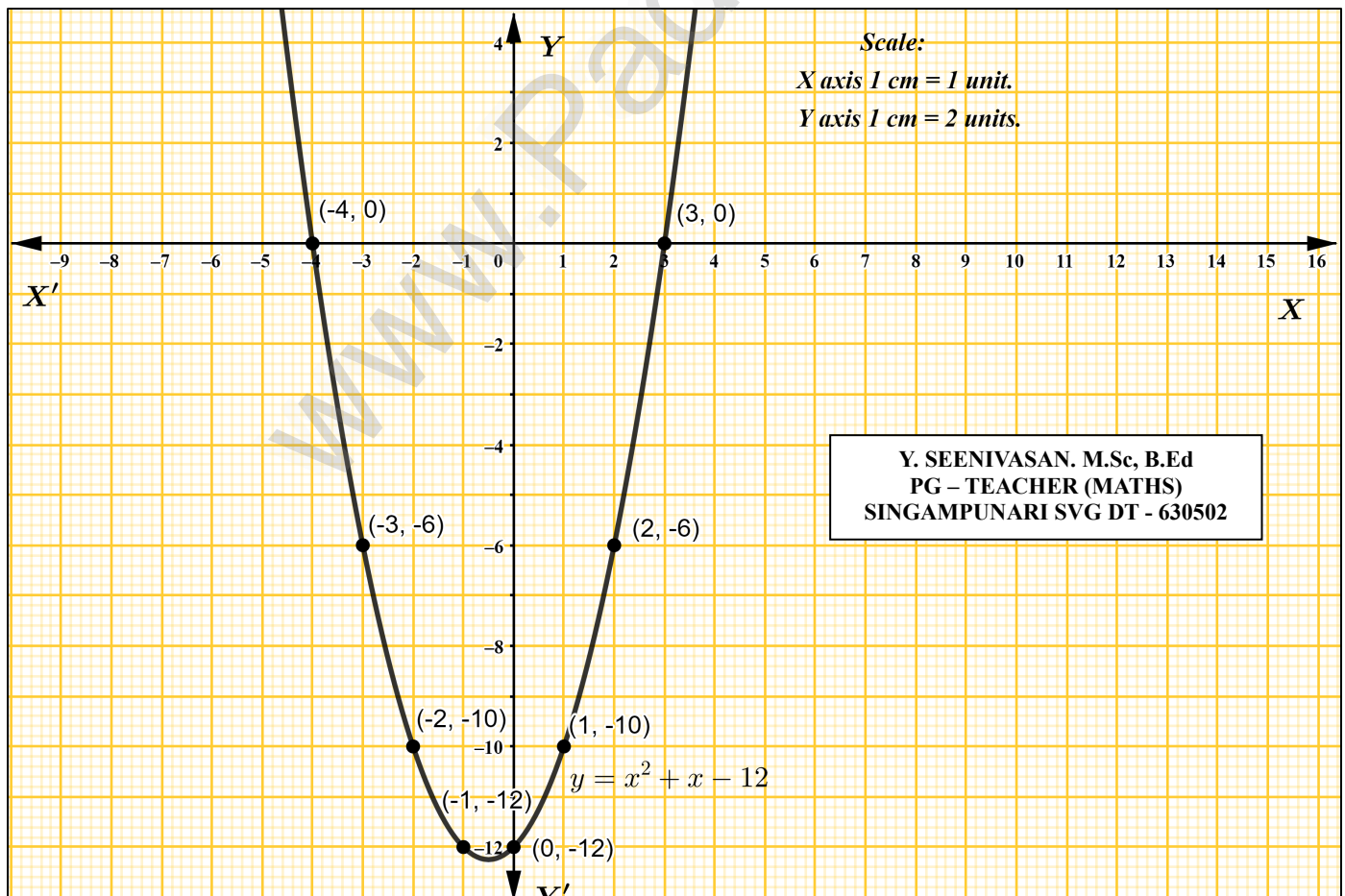
(i)  $y = x^2 + x - 12 \Rightarrow ax^2 + bx + c = 0$

$\frac{-b}{2a} = \frac{-1}{2} = -0.5$  (between -1 to 0 take left 3 point right 3 point)

|       |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| x     | -4  | -3  | -2  | -1  | 0   | 1   | 2   | 3   |
| $x^2$ | 16  | 9   | 4   | 1   | 0   | 1   | 4   | 9   |
| + x   | -4  | -3  | -2  | -1  | 0   | 1   | 2   | 3   |
| - 12  | -12 | -12 | -12 | -12 | -12 | -12 | -12 | -12 |
| y     | 0   | -6  | -10 | -12 | -12 | -10 | -6  | 0   |

Plot the points : (-4, 0), (-3, -6), (-2, -10), (-1, -12), (0, -12), (1, -10), (2, -6), (-4, 0), (3, 0).

∴ The Quadratic Equation  $x^2 + x - 12 = 0$  has **Real and Unequal Roots**.



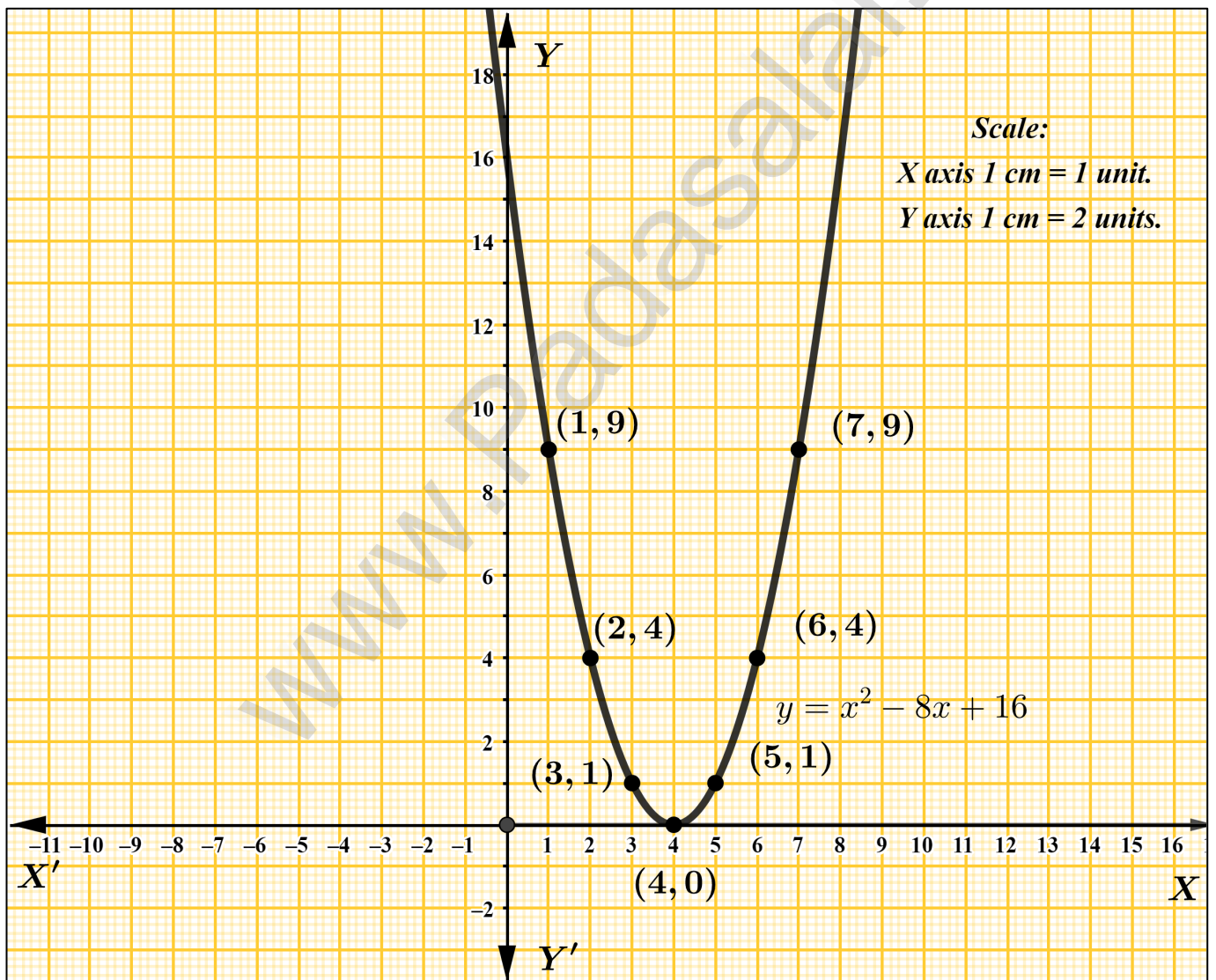
$$(ii) y = x^2 - 8x + 16 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-(-8)}{2} = 4 \text{ (between 4 Left 3 Point and Right 3 point)}$$

|       |    |     |     |     |     |     |     |
|-------|----|-----|-----|-----|-----|-----|-----|
| x     | 1  | 2   | 3   | 4   | 5   | 6   | 7   |
| $x^2$ | 1  | 4   | 9   | 16  | 25  | 36  | 49  |
| $-8x$ | -8 | -16 | -24 | -32 | -40 | -48 | -56 |
| +16   | 16 | 16  | 16  | 16  | 16  | 16  | 16  |
| y     | 9  | 4   | 1   | 0   | 1   | 4   | 9   |

Plot the points : (1, 9), (2, 4), (3, 1), (4, 0), (5, 1), (6, 4), (7, 9).

∴ The Quadratic Equation  $x^2 - 8x + 16 = 0$  has Real and Equal Roots.



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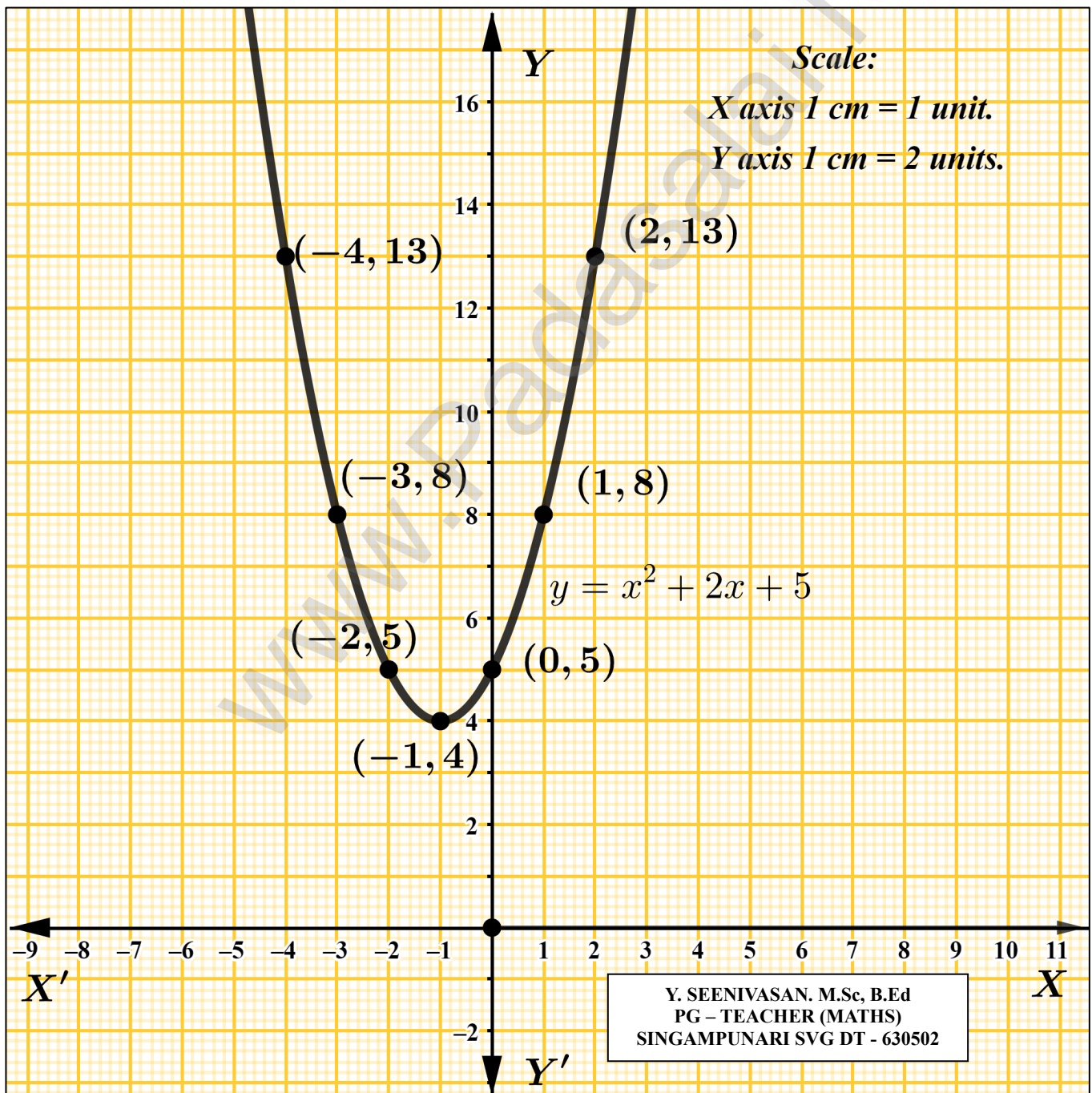
$$(iii) \quad y = x^2 + 2x + 5 = 0 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-2}{2} = -1 \text{ (between -1 Left 3 Point and Right 3 point)}$$

|       |    |    |    |    |   |   |    |
|-------|----|----|----|----|---|---|----|
| x     | -4 | -3 | -2 | -1 | 0 | 1 | 2  |
| $x^2$ | 16 | 9  | 4  | 1  | 0 | 1 | 4  |
| +2x   | -8 | -6 | -4 | -2 | 0 | 2 | 4  |
| +5    | 5  | 5  | 5  | 5  | 5 | 5 | 5  |
| y     | 13 | 8  | 5  | 4  | 5 | 8 | 13 |

Plot the points : (-4, 13), (-3, 8), (-2, 5), (-1, 4), (0, 5), (1, 8), (2, 13).

∴ The Quadratic Equation  $x^2 - 8x + 16 = 0$  has No Real Roots.



**Example: 3.52** Draw the graph of  $y = 2x^2$  and hence solve  $2x^2 - x - 6 = 0$ .

**Solution:**

Given,  $y = 2x^2 \Rightarrow ax^2 + bx + c = 0$

$\frac{-b}{2a} = \frac{0}{2} = 0$  (between 0 Left 3 Point and Right 3 point)

|            |    |    |    |   |   |   |    |
|------------|----|----|----|---|---|---|----|
| x          | -3 | -2 | -1 | 0 | 1 | 2 | 3  |
| $x^2$      | 9  | 4  | 1  | 0 | 1 | 4 | 9  |
| $Y = 2x^2$ | 18 | 8  | 2  | 0 | 2 | 8 | 18 |

Plot the points : (-3, 18), (-2, 8), (-1, 2), (0,0), (1, 2), (2, 8), (3, 18)

Solve :

$$y = 2x^2$$

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

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$$y = x + 6$$

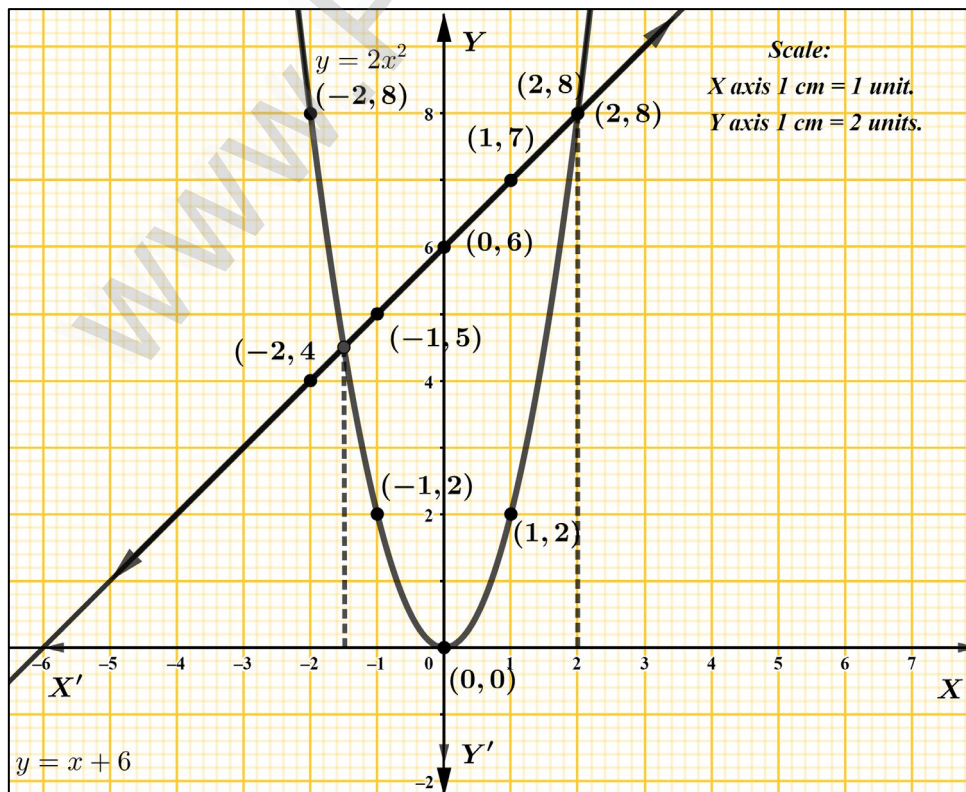

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$y = x + 6$

|             |    |    |    |   |   |   |   |
|-------------|----|----|----|---|---|---|---|
| x           | -3 | -2 | -1 | 0 | 1 | 2 | 3 |
| +6          | 6  | 6  | 6  | 6 | 6 | 6 | 6 |
| $Y = x + 6$ | 3  | 4  | 5  | 6 | 7 | 8 | 9 |

Plot the Points : (-3, 3), (-2, 4), (-1, 5), (0,6), (1, 7), (2, 8), (3, 9)

∴ The solution set of Equation  $2x^2 - x - 6 = 0$  has  $\{-1.5, 2\}$ .





**Example: 3.53** Draw the graph of  $y = x^2 + 4x + 3$  and hence solve  $x^2 + x + 1 = 0$ .

**Solution:**

$$\text{Given, } y = x^2 + 4x + 3 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-4}{2} = -2 \text{ (between -2 Left 3 Point and Right 3 point)}$$

|       |     |     |     |    |    |    |    |
|-------|-----|-----|-----|----|----|----|----|
| x     | -5  | -4  | -3  | -2 | -1 | 0  | 1  |
| $x^2$ | 25  | 16  | 9   | 4  | 1  | 0  | 1  |
| +4x   | -20 | -16 | -12 | -8 | -4 | 0  | 4  |
| +3    | +3  | +3  | +3  | +3 | +3 | +3 | +3 |
| y     | 8   | 3   | 0   | -1 | 0  | 3  | 8  |

Plot the points : (-5, 8), (-4, 3), (-3, 0), (-2, -1), (-1, 0), (0, 3), (1, 8)

Solve :

$$y = x^2 + 4x + 3$$

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

$$(-) \quad (-) \quad (-)$$

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$$y = 3x + 2$$


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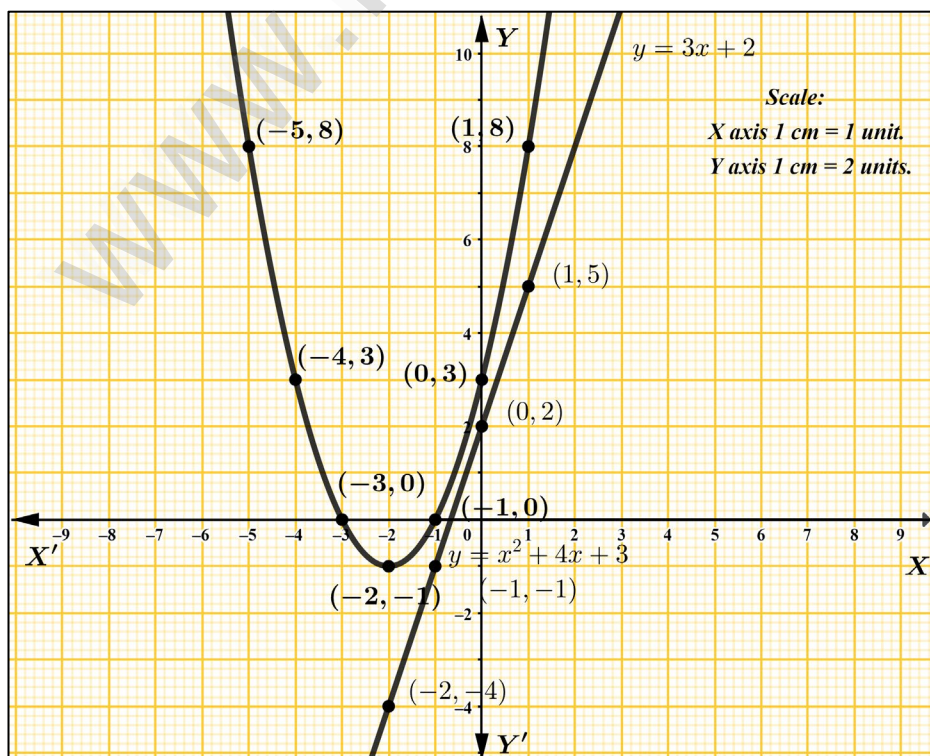
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$$y = 3x + 2$$

|    |     |    |    |    |    |    |
|----|-----|----|----|----|----|----|
| x  | -4  | -3 | -2 | -1 | 0  | 1  |
| 3x | -12 | -9 | -6 | -3 | 0  | 3  |
| +2 | +2  | +2 | +2 | +2 | +2 | +2 |
| y  | -10 | -7 | -4 | -1 | 2  | 5  |

Plot the Points : (-4, -10), (-3, -7), (-2, -4), (-1, -1), (0, 2), (1, 5).

∴ The solution set of Equation  $x^2 + x + 1 = 0$ . has **No Real Roots**.



**Example: 3.54** Draw the graph of  $y = x^2 + x - 2$  and hence solve  $x^2 + x - 2 = 0$ .

**Solution:**

$$\text{Given, } y = x^2 + x - 2 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-1}{2} = -0.5 \text{ (between -1 to 0 Left 3 Point and Right 3 point)}$$

|       |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| x     | -4  | -3  | -2  | -1  | 0   | 1   | 2   | 3   |
| $x^2$ | 16  | 9   | 4   | 1   | 0   | 1   | 4   | 9   |
| + x   | -4  | -3  | -2  | -1  | 0   | 1   | 2   | 3   |
| - 2   | - 2 | - 2 | - 2 | - 2 | - 2 | - 2 | - 2 | - 2 |
| y     | 10  | 4   | 0   | -2  | -2  | 0   | 4   | 10  |

Plot the points :  $(-4, 10), (-3, 4), (-2, 0), (-1, -2), (0, -2), (1, 0), (2, 4), (3, 10)$

Solve :

$$y = x^2 + x - 2$$

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

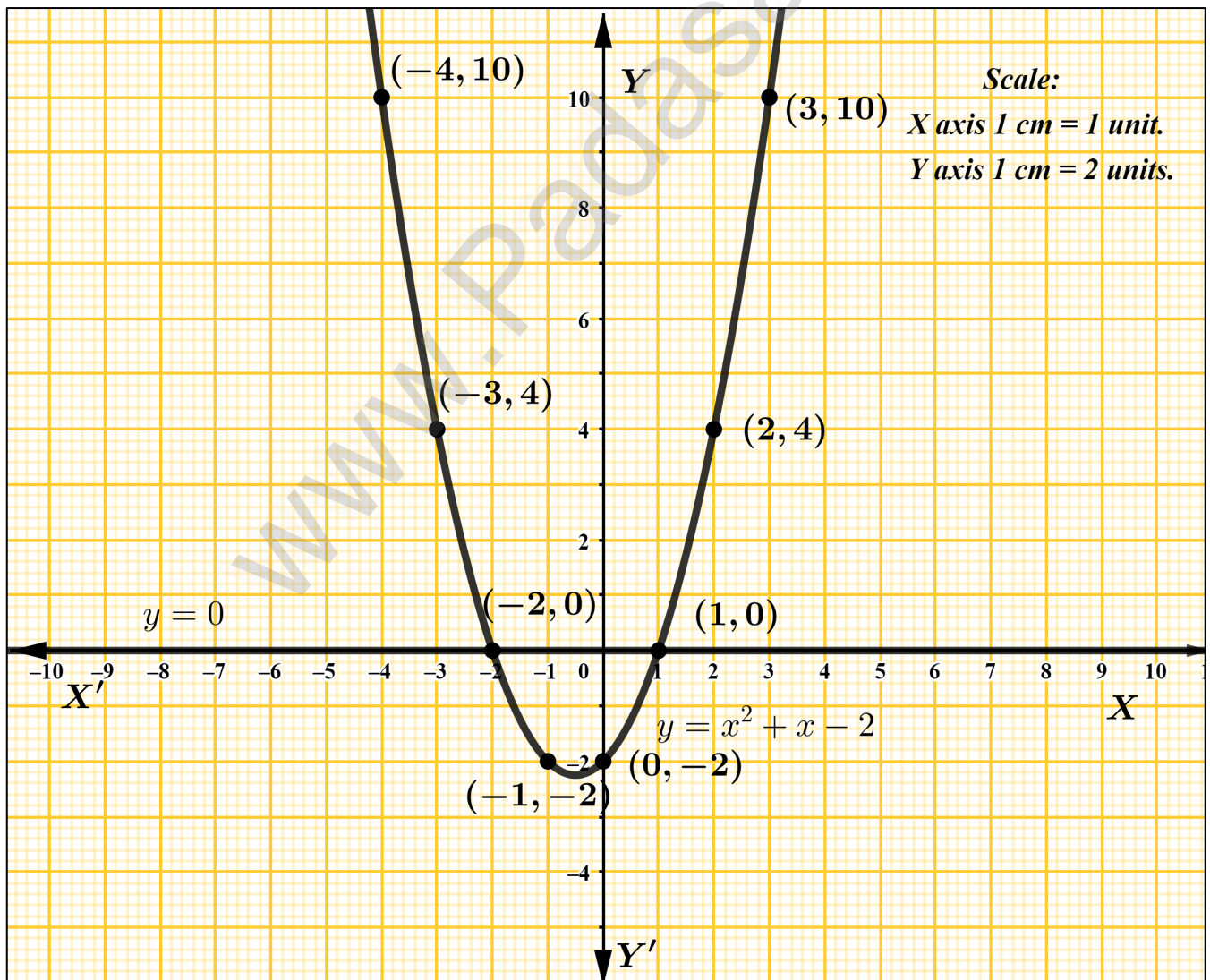
$$(-) \quad (-) \quad (+)$$

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$$y = 0$$


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**Example: 3.55:** Draw the graph of  $y = x^2 - 4x + 3$  and hence solve  $x^2 - 6x + 9 = 0$ .

**Solution:**

$$\text{Given, } y = x^2 - 4x + 3 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-(-4)}{2} = 2 \text{ (between 2 Left 3 Point and Right 3 point)}$$

|       |    |    |    |    |     |     |     |
|-------|----|----|----|----|-----|-----|-----|
| x     | -1 | 0  | 1  | 2  | 3   | 4   | 5   |
| $x^2$ | 1  | 0  | 1  | 4  | 9   | 16  | 25  |
| -4x   | 4  | 0  | -4 | -8 | -12 | -16 | -20 |
| +3    | +3 | +3 | +3 | +3 | +3  | +3  | +3  |
| y     | 8  | 3  | 0  | -1 | 0   | 3   | 8   |

Plot the points : (-1, 8), (0, 3), (1, 0), (2,-1), (3, 0), (4, 3), (5, 8)

Solve :

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

$$0 = x^2 - 6x + 9$$

$$(-) \quad (+) \quad (-)$$

$$y = 2x - 6$$

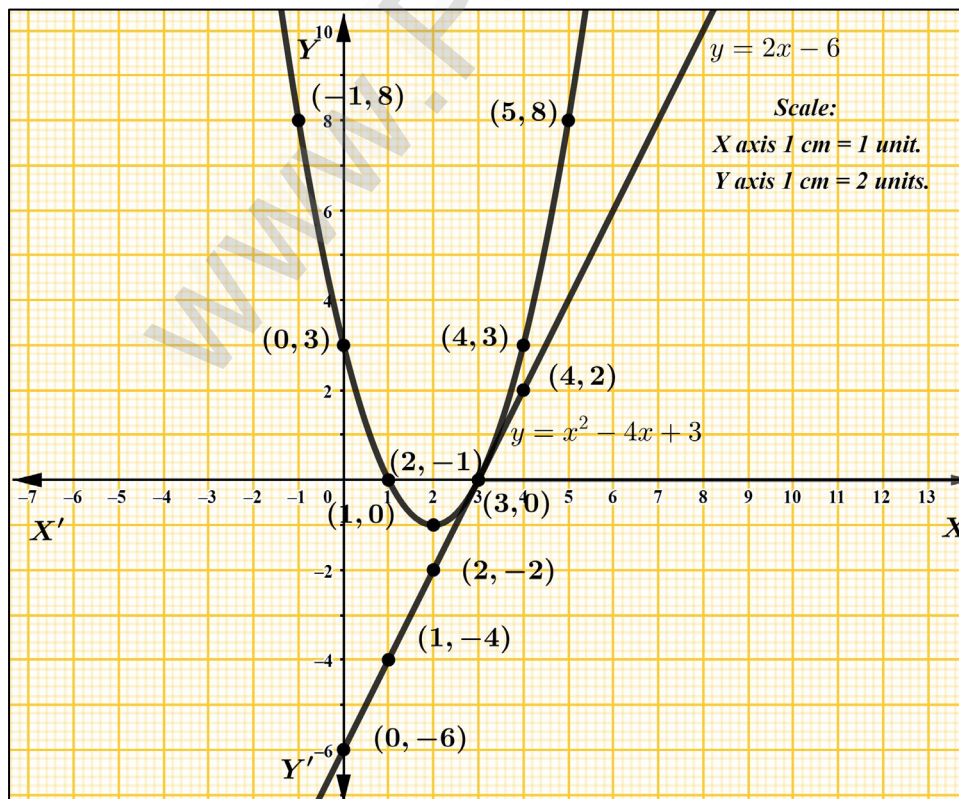
$$y = 2x - 6$$

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|    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|
| x  | -1 | 0  | 1  | 2  | 3  | 4  |
| 2x | -2 | 0  | 2  | 4  | 6  | 8  |
| -6 | -6 | -6 | -6 | -6 | -6 | -6 |
| y  | -8 | -6 | -4 | -2 | 0  | 2  |

Plot the Points : (-1, -8), (0, -6), (1, -4), (2,-2), (3, 0), (4, 2).

∴ The solution set of Equation  $x^2 - 6x + 9 = 0$  has {3} only .



**Exercise: 3.16** Graph the following quadratic equations and state the nature of solutions.

(i)  $x^2 - 9x + 20 = 0$  (ii)  $x^2 - 4x + 4 = 0$  (iii)  $x^2 + x + 7 = 0$  (iv)  $x^2 - 9 = 0$

(v)  $x^2 - 6x + 9 = 0$  (vi)  $(2x - 3)(x + 2) = 0$

**Solution:**

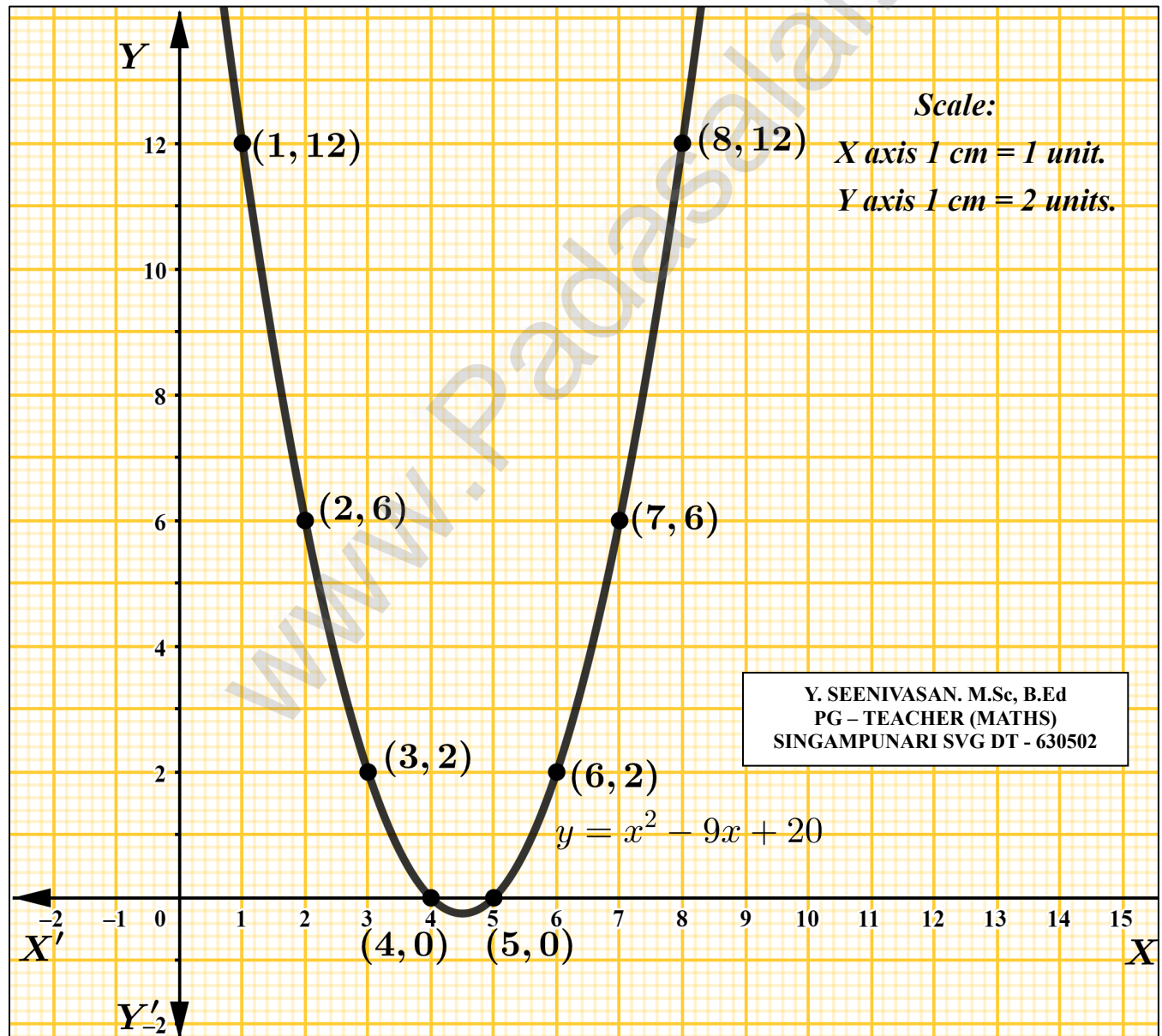
(i)  $y = x^2 - 9x + 20 \Rightarrow ax^2 + bx + c = 0$

$\frac{-b}{2a} = \frac{-(-9)}{2} = 4.5$  (between 4 to 5 take left 3 point right 3 point)

|       |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|
| x     | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   |
| $x^2$ | 1   | 4   | 9   | 16  | 25  | 36  | 49  | 64  |
| $-9x$ | -9  | -18 | -27 | -36 | -45 | -54 | -63 | -72 |
| $+20$ | +20 | +20 | +20 | +20 | +20 | +20 | +20 | +20 |
| y     | 12  | 6   | 2   | 0   | 0   | 2   | 6   | 12  |

Plot the points : (1, 12), (2, 6), (3, 2), (4, 0), (5, 0), (6, 2), (7, 6), (8, 12).

∴ The Quadratic Equation  $x^2 - 9x + 20 = 0$  has Real and Unequal Roots.





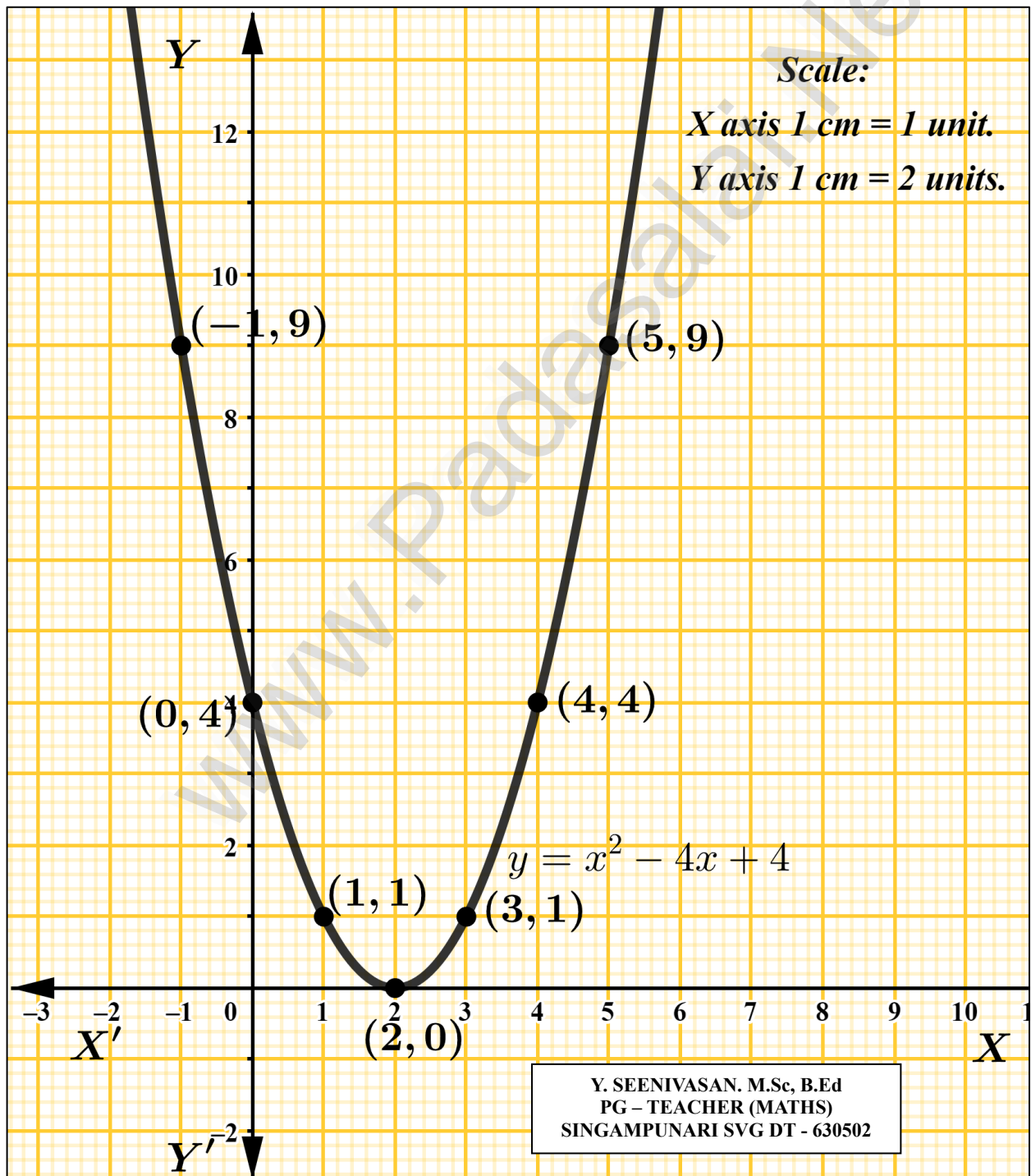
$$(ii) y = x^2 - 4x + 4 = 0 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-(-4)}{2} = 2 \text{ (between 2 take left 3 point right 3 point)}$$

|       |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|
| x     | -1   | 0    | 1    | 2    | 3    | 4    | 5    |
| $x^2$ | 1    | 0    | 1    | 4    | 9    | 16   | 25   |
| $-4x$ | 4    | 0    | -4   | -8   | -12  | -16  | -20  |
| $+4$  | $+4$ | $+4$ | $+4$ | $+4$ | $+4$ | $+4$ | $+4$ |
| y     | 9    | 4    | 1    | 0    | 1    | 4    | 9    |

Plot the points : (-1, 9), (0, 4), (1, 1), (2, 0), (3, 1), (4, 4), (5, 9).

∴ The Quadratic Equation  $x^2 - 4x + 4 = 0$  has **Real and Equal Roots**.



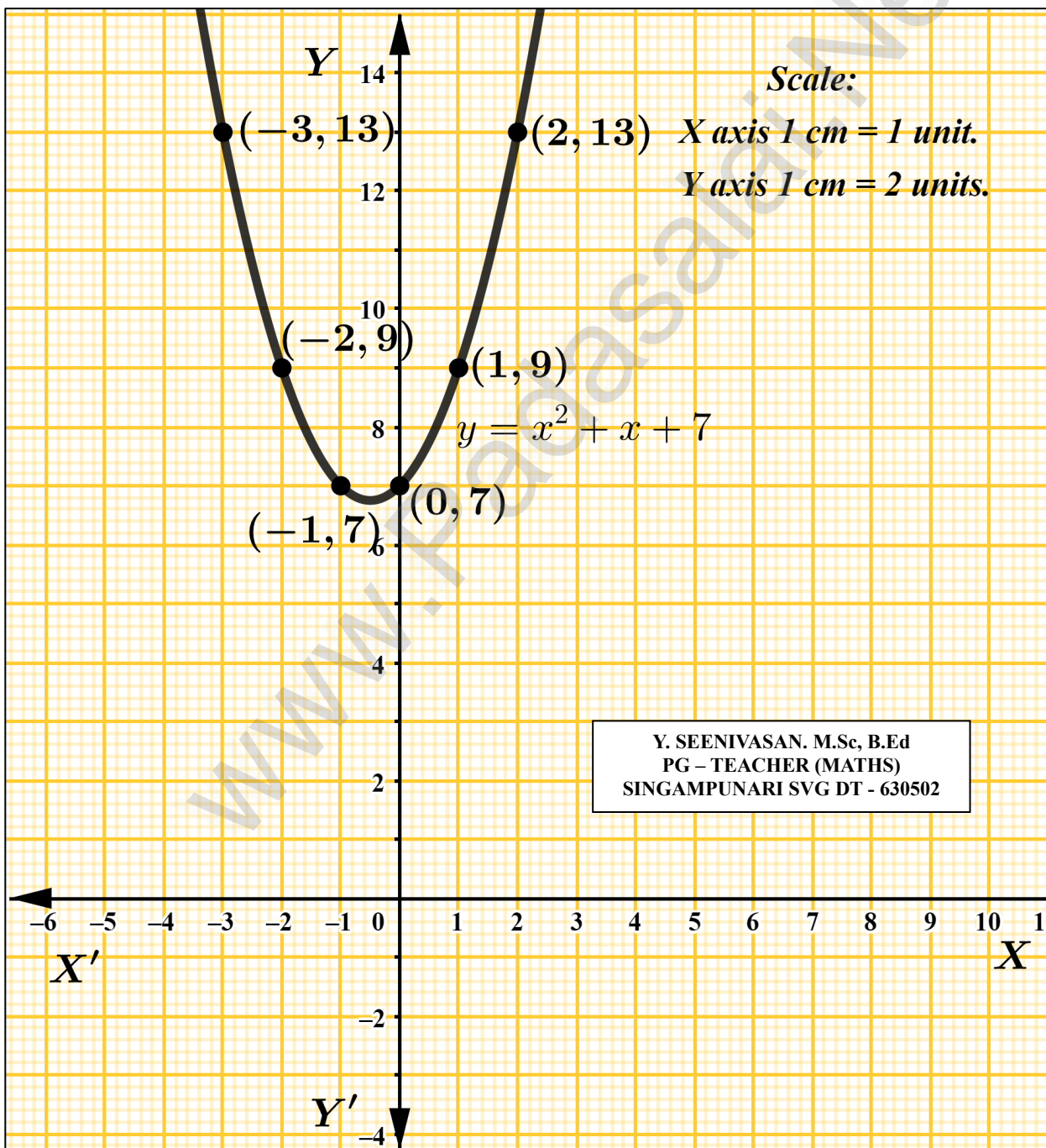
$$(iii) y = x^2 + x + 7 = 0 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-1}{2} = -0.5 \text{ (between -1 to 0 take left 3 point right 3 point)}$$

|       |    |    |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|----|----|
| x     | -4 | -3 | -2 | -1 | 0  | 1  | 2  | 3  |
| $x^2$ | 16 | 9  | 4  | 1  | 0  | 1  | 4  | 9  |
| +x    | -4 | -3 | -2 | -1 | 0  | 1  | 2  | 3  |
| +7    | +7 | +7 | +7 | +7 | +7 | +7 | +7 | +7 |
| y     | 19 | 13 | 9  | 7  | 7  | 9  | 13 | 19 |

Plot the points : (-4, 19), (-3, 13), (-2, 9), (-1, 7), (0, 7), (1, 9), (2, 13), (3, 19).

∴ The Quadratic Equation  $x^2 + x + 7 = 0$  has No Real Roots.



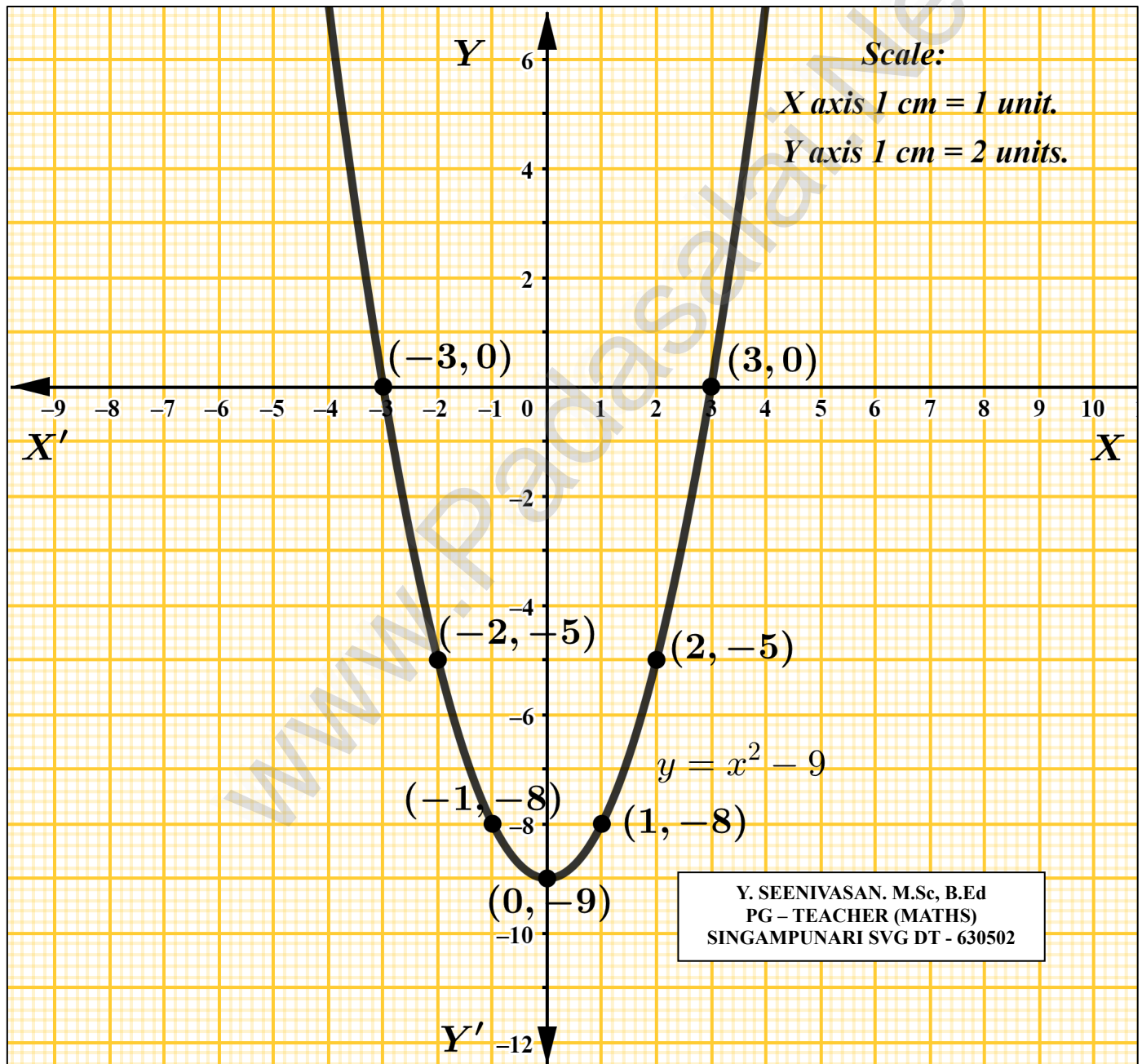
$$(iv) y = x^2 - 9 = 0 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{0}{2} = 0 \text{ (between 0 take left 3 point right 3 point)}$$

|       |    |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|----|
| x     | -3 | -2 | -1 | 0  | 1  | 2  | 3  |
| $x^2$ | 9  | 4  | 1  | 0  | 1  | 4  | 9  |
| -9    | -9 | -9 | -9 | -9 | -9 | -9 | -9 |
| y     | 0  | -5 | -8 | -9 | -8 | -5 | 0  |

Plot the points : (-3, 0), (-2, -5), (-1, -8), (0, -9), (1, -8), (2, -5), (3, 0).

∴ The Quadratic Equation  $x^2 - 9 = 0$  has Real and Unequal Roots.



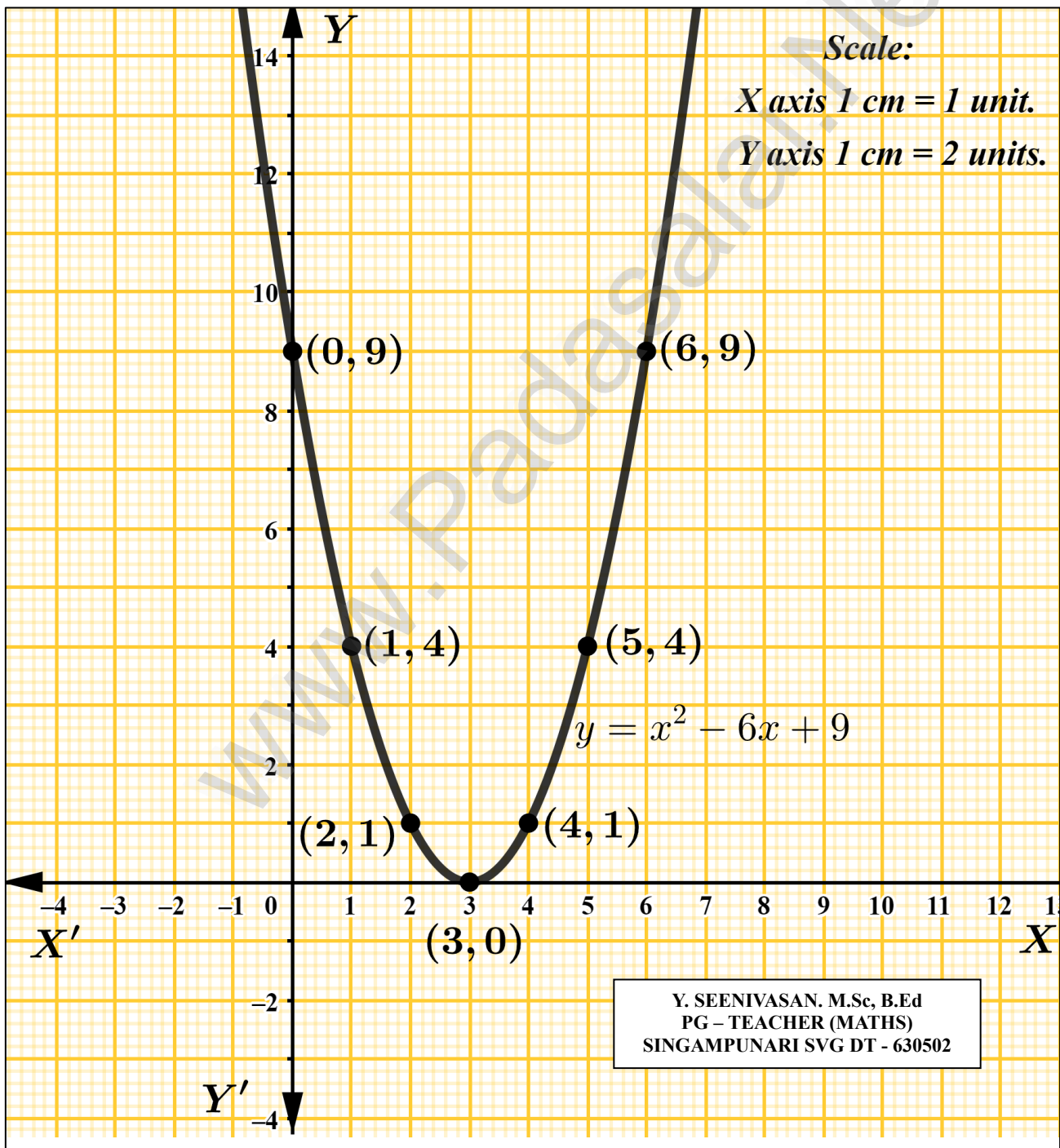
$$(v) y = x^2 - 6x + 9 = 0 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-(-6)}{2} = 3 \text{ (between 3 take left 3 point right 3 point)}$$

|       |      |      |      |      |      |      |      |
|-------|------|------|------|------|------|------|------|
| x     | 0    | 1    | 2    | 3    | 4    | 5    | 6    |
| $x^2$ | 0    | 1    | 4    | 9    | 16   | 25   | 36   |
| $-6x$ | 0    | -6   | -12  | -18  | -24  | -30  | -36  |
| $+9$  | $+9$ | $+9$ | $+9$ | $+9$ | $+9$ | $+9$ | $+9$ |
| y     | 9    | 4    | 1    | 0    | 1    | 4    | 9    |

Plot the points : (0, 9), (1, 4), (2, 1), (3, 0), (4, 1), (5, 4), (6, 9).

∴ The Quadratic Equation  $x^2 - 6x + 9 = 0$  has Real and Equal Roots.





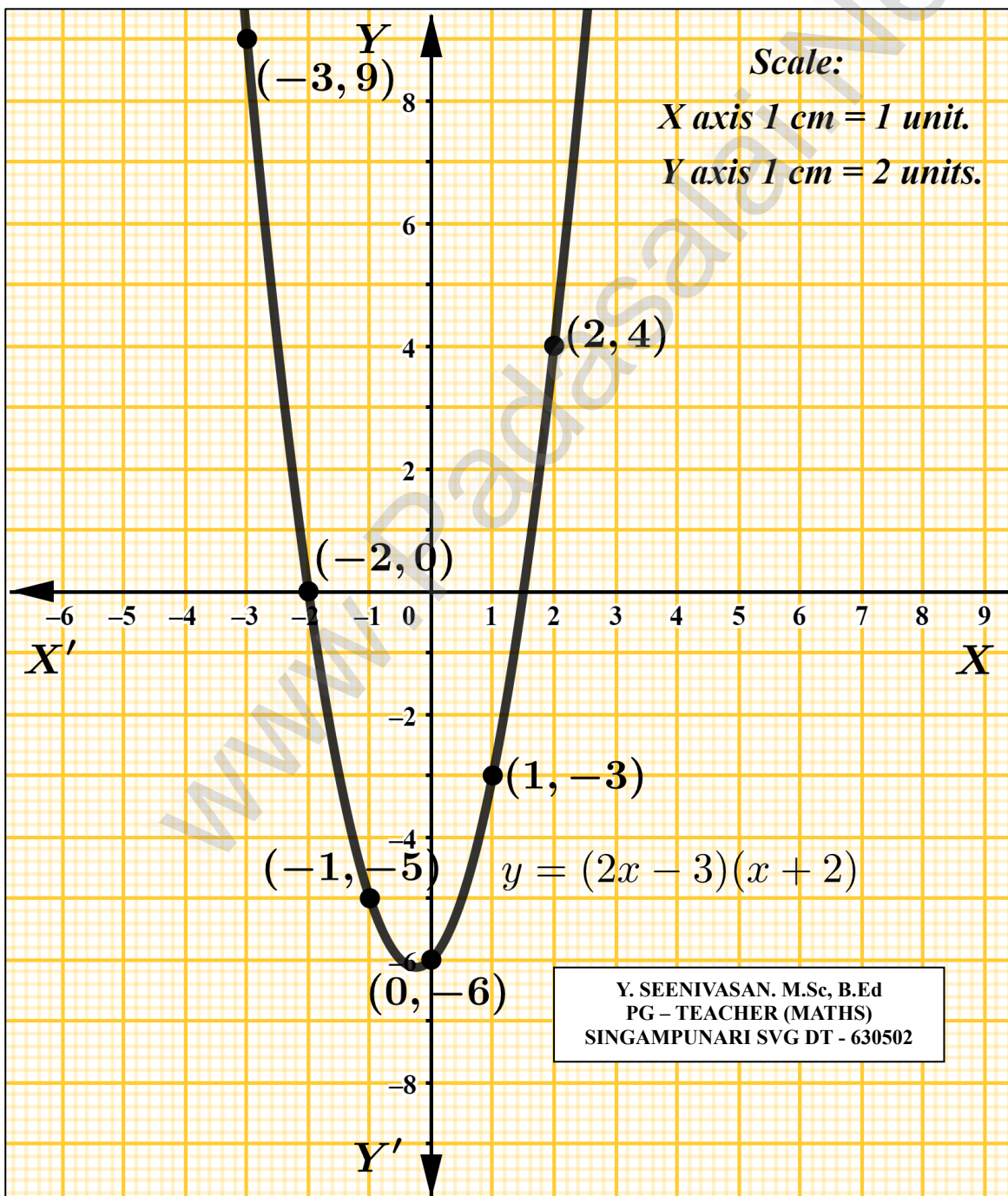
$$(vi) y = (2x - 3)(x + 2) = 2x^2 + 4x - 3x - 6 = 2x^2 + x - 6 = 0 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-1}{2 \times 2} = \frac{-1}{4} = -0.25 \text{ (between -1 to 0 take left 3 point right 3 point).}$$

|        |     |     |     |     |     |     |     |     |
|--------|-----|-----|-----|-----|-----|-----|-----|-----|
| x      | -4  | -3  | -2  | -1  | 0   | 1   | 2   | 3   |
| $2x^2$ | 32  | 18  | 8   | 2   | 0   | 2   | 8   | 18  |
| + x    | -4  | -3  | -2  | -1  | 0   | 1   | 2   | 3   |
| - 6    | - 6 | - 6 | - 6 | - 6 | - 6 | - 6 | - 6 | - 6 |
| y      | 22  | 9   | 0   | -5  | -6  | -3  | 4   | 15  |

Plot the points : (-4, 22), (-3, 9), (-2, 0), (-1, -5), (0, -6), (1, -3), (2, 4), (3, 15).

∴ The Quadratic Equation  $(2x - 3)(x + 2) = 0$  has Real and Unequal Roots.



Exercise: 3.16) 2) Draw the graph of  $y = x^2 - 4$  and hence solve  $x^2 - x - 12 = 0$ .

**Solution:**

$$\text{Given, } y = x^2 - 4 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{0}{2} = 0 \text{ (between 0 Left 3 Point and Right 4 point)}$$

|       |    |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|----|
| x     | -3 | -2 | -1 | 0  | 1  | 2  | 3  |
| $x^2$ | 9  | 4  | 1  | 0  | 1  | 4  | 9  |
| -4    | -4 | -4 | -4 | -4 | -4 | -4 | -4 |
| y     | 5  | 0  | -3 | -4 | -3 | 0  | 5  |

Plot the points : (-3, 5), (-2, 0), (-1, -3), (0, -4), (1, -3), (2, 0), (3, 5)

Solve :

$$y = x^2 - 4$$

$$0 = x^2 - x - 12$$

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$$y = x + 8$$

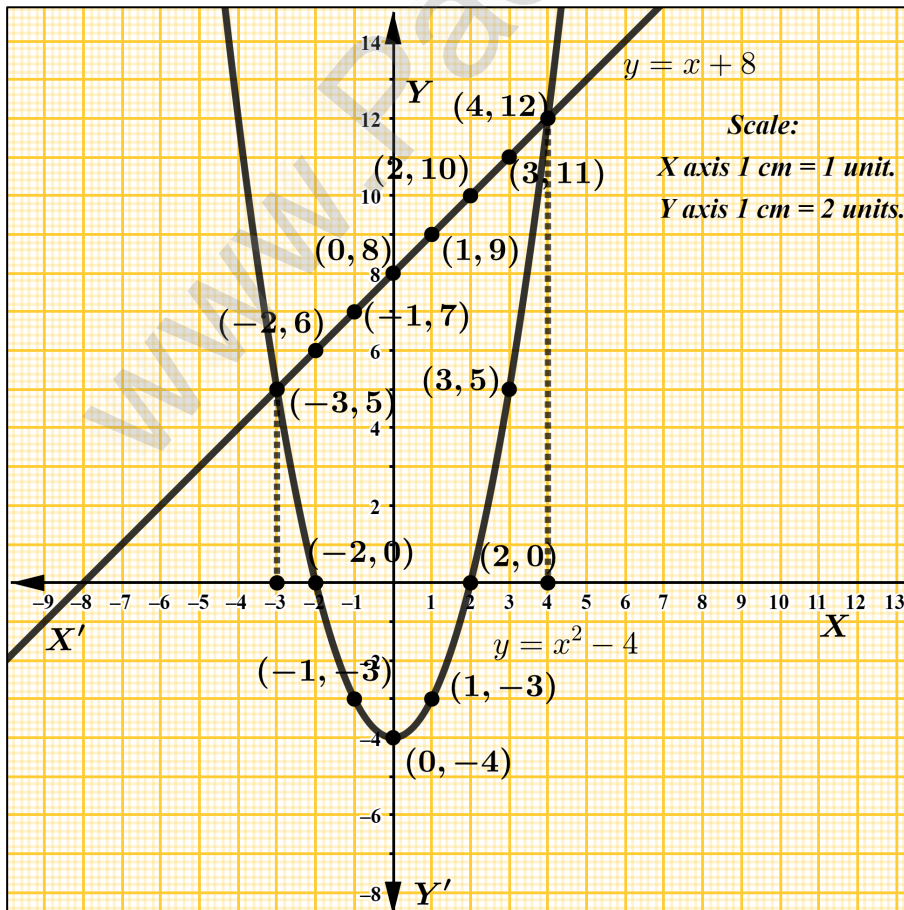

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$$y = x + 8$$

|   |    |    |    |   |   |    |    |    |
|---|----|----|----|---|---|----|----|----|
| x | -3 | -2 | -1 | 0 | 1 | 2  | 3  | 4  |
| 8 | 8  | 8  | 8  | 8 | 8 | 8  | 8  | 8  |
| Y | 5  | 6  | 7  | 8 | 9 | 10 | 11 | 12 |

Plot the Points : (-3, 5), (-2, 6), (-1, 7), (0, 8), (1, 9), (2, 10), (3, 11).

∴ The solution set of Equation  $x^2 - x - 12 = 0$  has  $\{-3, 4\}$ .



**Exercise: 3.16) 3)** Draw the graph of  $y = x^2 + x$  and hence solve  $x^2 + 1 = 0$ .

**Solution:**

$$\text{Given, } y = x^2 + x \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-1}{2} = -0.5 \text{ (between -1 to 0 Left 3 Point and Right 3 point)}$$

|       |    |    |    |    |   |   |   |    |
|-------|----|----|----|----|---|---|---|----|
| x     | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3  |
| $x^2$ | 16 | 9  | 4  | 1  | 0 | 1 | 4 | 9  |
| + x   | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3  |
| y     | 12 | 6  | 2  | 0  | 0 | 2 | 6 | 12 |

Plot the points : (-4, 12), (-3, 6), (-2, 2), (-1,0), (0, 0), (1, 2), (2, 6), (3, 12).

Solve :

$$y = x^2 + x$$

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

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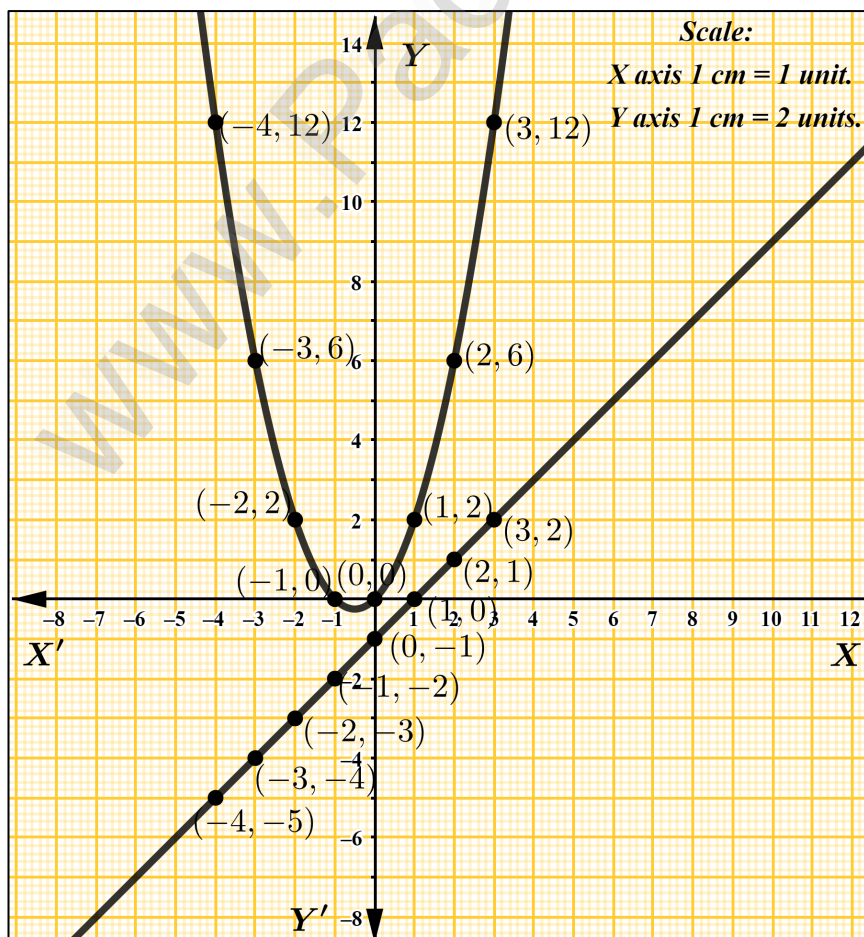

$$y = x - 1$$

$$y = x - 1$$

|    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|
| x  | -4 | -3 | -2 | -1 | 0  | 1  | 2  | 3  |
| -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 | -1 |
| Y  | -5 | -4 | -3 | -2 | -1 | 0  | 1  | 2  |

Plot the Points : (-4, -5), (-3, -4), (-2, -3), (-1,-2), (0, -1), (1, 0), (2,1), (3, 2).

∴ The solution set of Equation  $x^2 + 1 = 0$  has No Real roots.



**Exercise: 3.16) 4)** Draw the graph of  $y = x^2 + 3x + 2$  and hence solve  $x^2 + 2x + 1 = 0$ .

**Solution:**

$$\text{Given, } y = x^2 + 3x + 2 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-3}{2} = -1.5 \text{ (between -2 to -1 Left 3 Point and Right 3 point)}$$

|       |     |     |    |    |    |    |    |    |
|-------|-----|-----|----|----|----|----|----|----|
| x     | -5  | -4  | -3 | -2 | -1 | 0  | 1  | 2  |
| $x^2$ | 25  | 16  | 9  | 4  | 1  | 0  | 1  | 4  |
| +3x   | -15 | -12 | -9 | -6 | -3 | 0  | 3  | 6  |
| +2    | +2  | +2  | +2 | +2 | +2 | +2 | +2 | +2 |
| y     | 12  | 6   | 2  | 0  | 0  | 2  | 6  | 12 |

Plot the points :  $(-5, 12), (-4, 6), (-3, 2), (-2, 0), (-1, 0), (0, 2), (1, 6), (2, 12)$ .

Solve :

$$y = x^2 + 3x + 2$$

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

$$(-) \quad (-) \quad (-)$$

$$y = x + 1$$

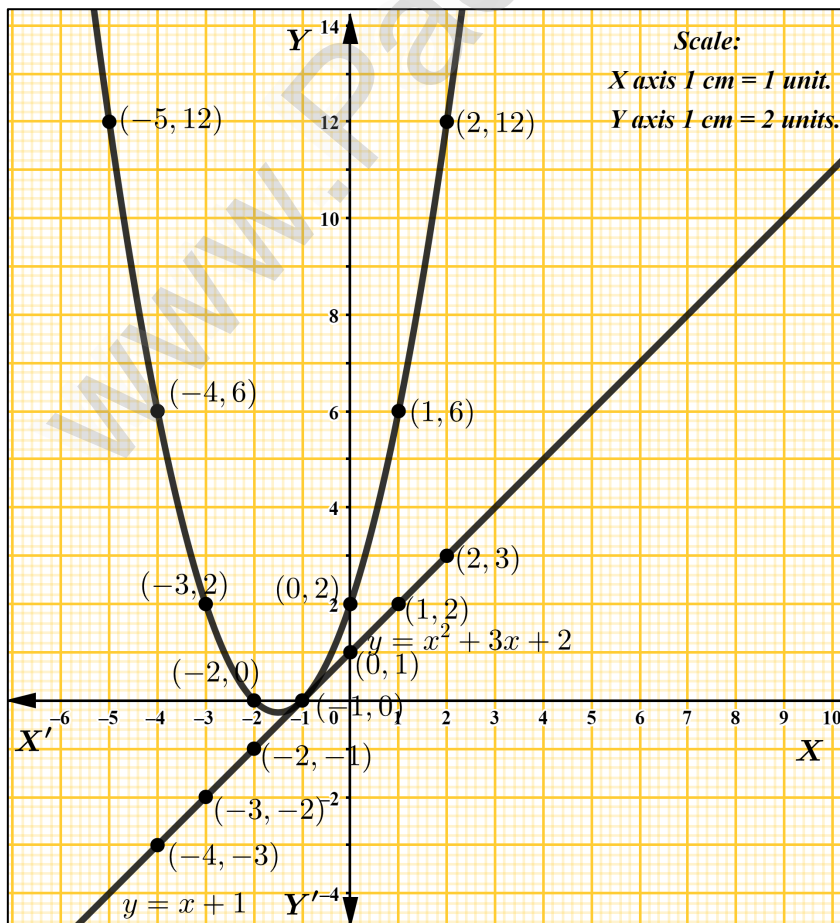
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$$y = x + 1$$

|    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|
| x  | -4 | -3 | -2 | -1 | 0  | 1  | 2  |
| +1 | +1 | +1 | +1 | +1 | +1 | +1 | +1 |
| Y  | -3 | -2 | -1 | 0  | 1  | 2  | 3  |

Plot the Points :  $(-4, -3), (-3, -2), (-2, -1), (-1, 0), (0, 1), (1, 2), (2, 3)$ .

$\therefore$  The solution set of Equation  $x^2 + 2x + 1 = 0$  has  $\{-1\}$ .





**Exercise: 3.16) 5)** Draw the graph of  $y = x^2 + 3x - 4$  and hence solve  $x^2 + 3x - 4 = 0$ .

**Solution:**

$$\text{Given, } y = x^2 + 3x - 4 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-3}{2} = -1.5 \text{ (between -2 to -1 Left 3 Point and Right 3 point)}$$

|       |     |     |    |    |    |    |    |    |
|-------|-----|-----|----|----|----|----|----|----|
| x     | -5  | -4  | -3 | -2 | -1 | 0  | 1  | 2  |
| $x^2$ | 25  | 16  | 9  | 4  | 1  | 0  | 1  | 4  |
| +3x   | -15 | -12 | -9 | -6 | -3 | 0  | 3  | 6  |
| -4    | -4  | -4  | -4 | -4 | -4 | -4 | -4 | -4 |
| y     | 6   | 0   | -4 | -6 | -6 | -4 | 0  | 6  |

Plot the points :  $(-5, 6), (-4, 0), (-3, -4), (-2, -6), (-1, -6), (0, -4), (1, 0), (2, 6)$ .

Solve :

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

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

$$(-) \quad (-) \quad (+)$$

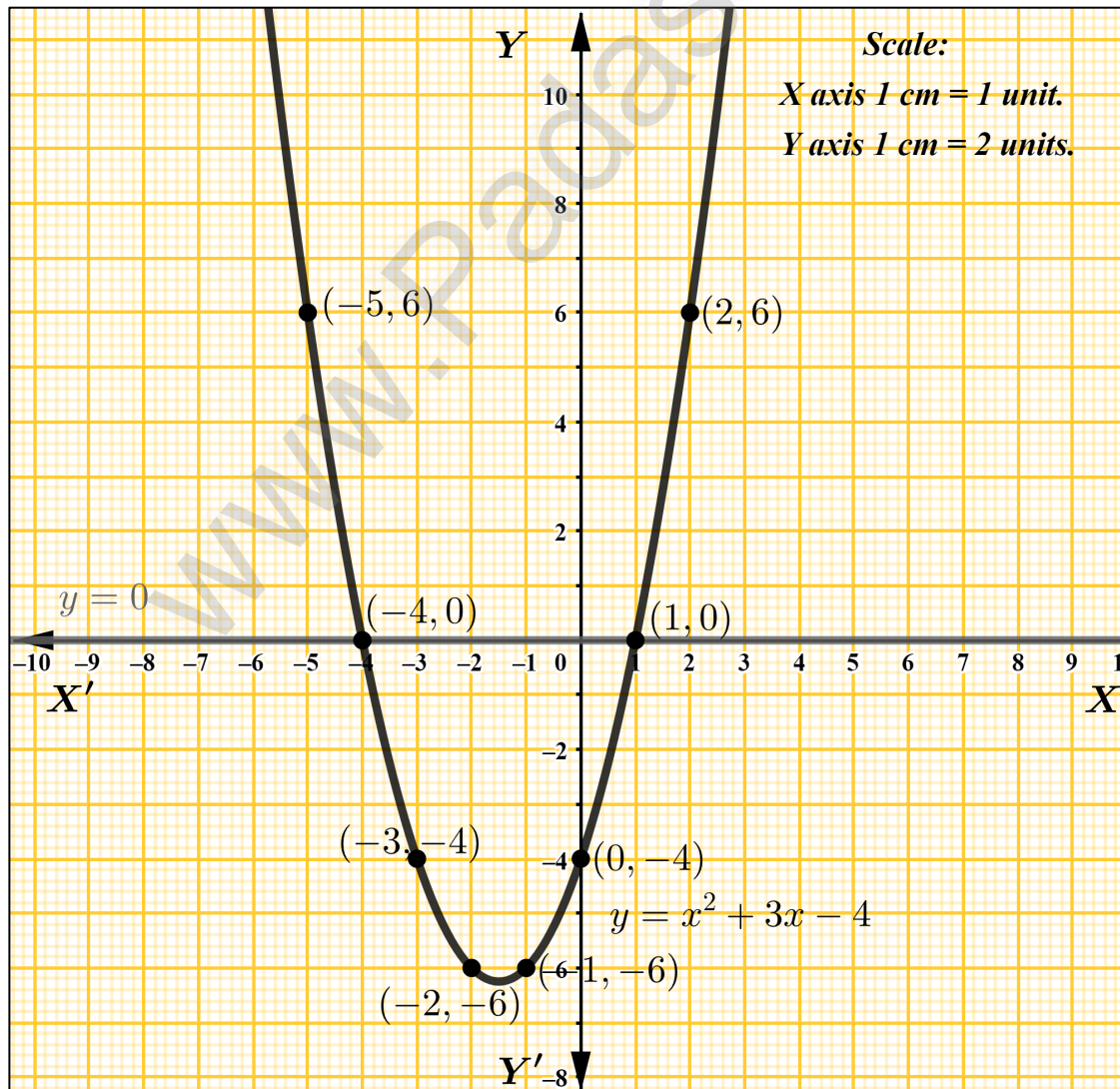
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$$y = 0$$


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$\therefore$  The solution set of Equation  $x^2 + 3x - 4 = 0$  has  $\{-4, 1\}$ .



**Exercise: 3.16) 6)** Draw the graph of  $y = x^2 - 5x - 6$  and hence solve  $x^2 - 5x - 14 = 0$ .

**Solution:**

$$\text{Given, } y = x^2 - 5x - 6 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-(-5)}{2} = 2.5 \text{ (between 2 to 3 Left 4 Point and Right 4 point)}$$

|       |    |    |    |     |     |     |     |     |     |     |
|-------|----|----|----|-----|-----|-----|-----|-----|-----|-----|
| x     | -2 | -1 | 0  | 1   | 2   | 3   | 4   | 5   | 6   | 7   |
| $x^2$ | 4  | 1  | 0  | 1   | 4   | 9   | 16  | 25  | 36  | 49  |
| $-5x$ | 10 | 5  | 0  | -5  | -10 | -15 | -20 | -25 | -30 | -35 |
| $-6$  | -6 | -6 | -6 | -6  | -6  | -6  | -6  | -6  | -6  | -6  |
| y     | 8  | 0  | -6 | -10 | -12 | -12 | -10 | -6  | 0   | 8   |

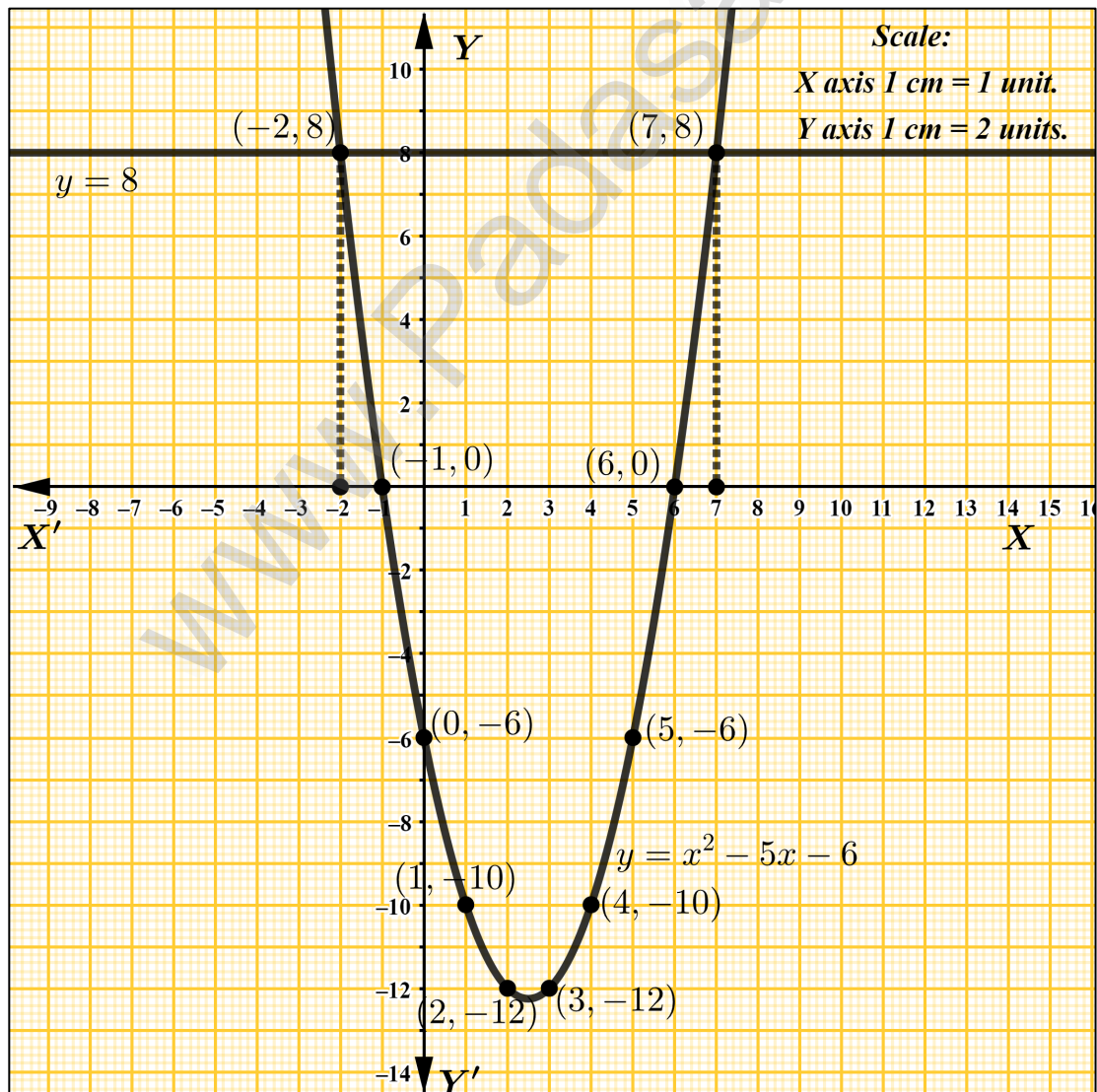
Plot the points :  $(-2, 8), (-1, 0), (0, -6), (1, -10), (2, -12), (3, -12), (4, -10), (5, -6), (6, 0), (7, 8)$ .

Solve :

$$\begin{array}{r} y = x^2 - 5x - 6 \\ 0 = x^2 - 5x - 14 \\ \quad (-) \quad (+) \quad (+) \\ \hline y = 8 \end{array}$$

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$\therefore$  The solution set of Equation  $x^2 - 5x - 14 = 0$  has  $\{-2, 7\}$ .



**Exercise: 3.16) 7)** Draw the graph of  $y = 2x^2 - 3x - 5$  and hence solve  $2x^2 - 4x - 6 = 0$ .

**Solution:**

$$\text{Given, } y = 2x^2 - 3x - 5 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-(-3)}{2 \times 2} = \frac{3}{4} = 0.75 \text{ (between 0 to 1 Left 3 Point and Right 3 point)}$$

|       |    |    |    |    |    |    |     |     |
|-------|----|----|----|----|----|----|-----|-----|
| x     | -2 | -1 | 0  | 1  | 2  | 3  | 4   | 5   |
| $x^2$ | 8  | 2  | 0  | 2  | 8  | 18 | 32  | 50  |
| $-3x$ | 6  | 3  | 0  | -3 | -6 | -9 | -12 | -15 |
| $-5$  | -5 | -5 | -5 | -5 | -5 | -5 | -5  | -5  |
| y     | 9  | 0  | -5 | -6 | -3 | 4  | 15  | 30  |

Plot the points :  $(-2, 9), (-1, 0), (0, -5), (1, -6), (2, -3), (3, 4), (4, 15), (5, 30)$ .

Solve :

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

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

(-) (+) (+)

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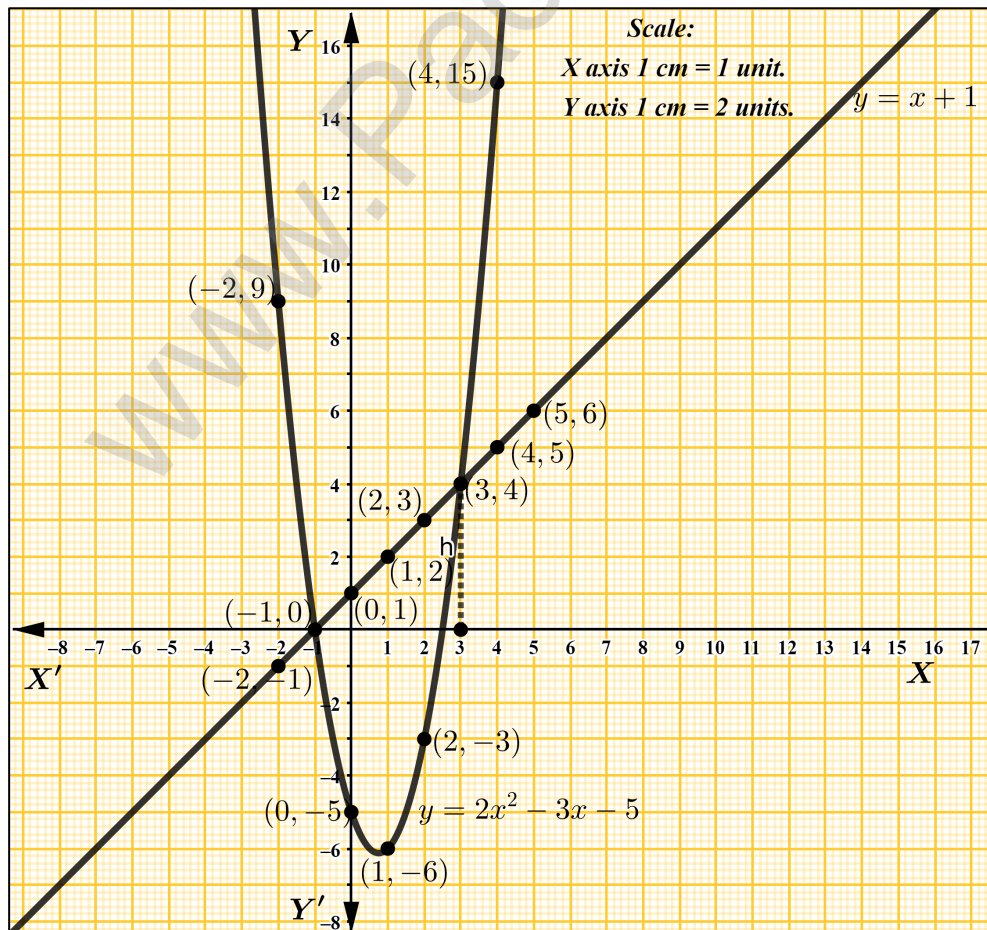
$$y = x + 1$$

$$y = x + 1$$

|    |    |    |    |    |    |    |    |    |
|----|----|----|----|----|----|----|----|----|
| x  | -2 | -1 | 0  | 1  | 2  | 3  | 4  | 5  |
| +1 | +1 | +1 | +1 | +1 | +1 | +1 | +1 | +1 |
| Y  | -1 | 0  | 1  | 2  | 3  | 4  | 5  | 6  |

Plot the Points :  $(-2, -1), (-1, 0), (0, 1), (1, 2), (2, 3), (3, 4), (4, 5), (5, 6)$ .

$\therefore$  The solution set of Equation  $2x^2 - 4x - 6 = 0$  has  $\{-1, 3\}$ .



**Exercise: 3.16) 8)** Draw the graph of  $y = (x - 1)(x + 3)$  and hence solve  $x^2 - x - 6 = 0$ .

**Solution:**

$$\text{Given, } y = (x - 1)(x + 3) = x^2 + 3x - x - 3 = x^2 + 2x - 3 \Rightarrow ax^2 + bx + c = 0$$

$$\frac{-b}{2a} = \frac{-2}{2} = -1 \text{ (between 1 Left 3 Point and Right 4 point)}$$

|       |    |    |    |    |    |    |    |
|-------|----|----|----|----|----|----|----|
| x     | -4 | -3 | -2 | -1 | 0  | 1  | 2  |
| $x^2$ | 16 | 9  | 4  | 1  | 0  | 1  | 4  |
| +2x   | -8 | -6 | -4 | -2 | 0  | 2  | 4  |
| -3    | -3 | -3 | -3 | -3 | -3 | -3 | -3 |
| y     | 5  | 0  | -3 | -4 | -3 | 0  | 5  |

Plot the points : (-4, 5), (-3, 0), (-2, -3), (-1, -4), (0, -3), (1, 0), (2, 5).

Solve :

$$y = x^2 + 2x - 3$$

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

$$(-) \quad (+) \quad (+)$$

---


$$y = 3x + 3$$


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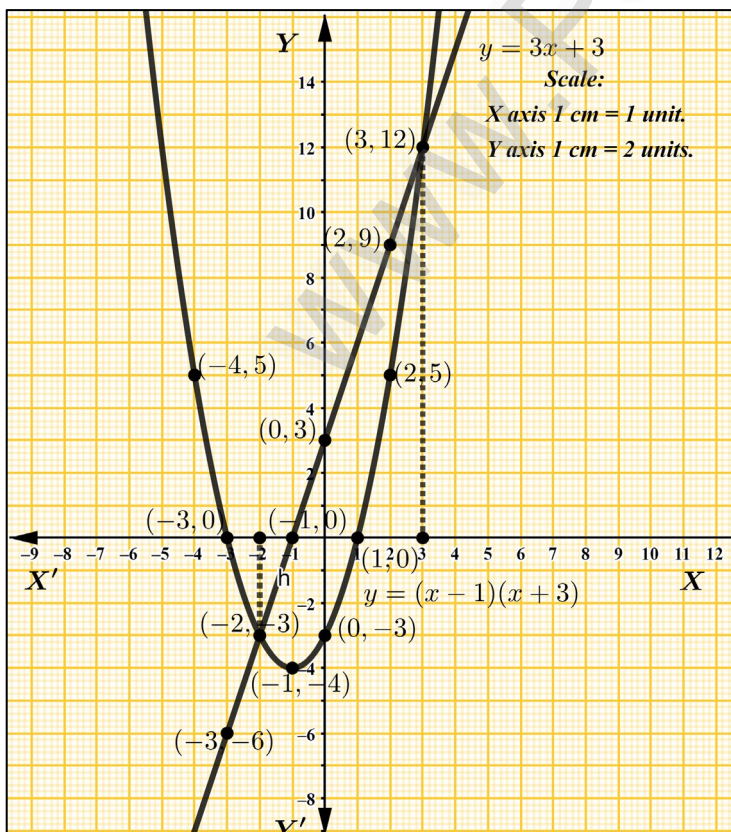
$$y = 3x + 3$$

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|    |     |    |    |    |    |    |    |    |
|----|-----|----|----|----|----|----|----|----|
| x  | -4  | -3 | -2 | -1 | 0  | 1  | 2  | 3  |
| 3x | -12 | -9 | -6 | -3 | 0  | 3  | 6  | 9  |
| +3 | +3  | +3 | +3 | +3 | +3 | +3 | +3 | +3 |
| y  | -9  | -6 | -3 | 0  | 3  | 6  | 9  | 12 |

Plot the Points : (-4, -9), (-3, -6), (-2, -3), (-1, 0), (0, 3), (1, 6), (2, 9), (3, 12).

∴ The solution set of Equation  $x^2 - x - 6 = 0$  has  $\{-2, 3\}$ .



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