Q:- Solve the following inequality: $x^2 + x > 12$.

Acceptable Solution:

$$x^2 + x > 12$$

$$x^2 + x - 12 > 0$$

$$x^2 + 4x - 3x - 12 > 0$$

$$(x+4)(x-3) > 0$$

$\Rightarrow$ Either both are positive or both are negative.

So, $x+4 > 0$ & $x-3 > 0$

$x > -4$ & $x > 3$

$\therefore x > 3$

OR, $x+4 < 0$ & $x-3 < 0$

$x < -4$ & $x < 3$

$\therefore x < -4$

Thus,

Soln := $\{x \in \mathbb{R} : x < -4 \text{ or } x > 3\}$

$= (-\infty, -4) \cup (3, \infty)$.

Non-acceptable solution:

$$x^2 + x > 12$$

$$x^2 + x > 12 - x$$

$$x(x+1) > 12$$

$\therefore x > 12$, $x+1 > 12$

$x > 11$

$$x^2 + x - 12 > 0$$

$$x^2 + x - 3^2 - 3 > 0$$

$$(x-3)^2 + 3 > 0 + 3$$

$$(x-3)^2 > 3$$

$$x - 3 > 3^2 = 9$$

$$x > 12$$

$$(x+4)(x-3) > 0$$

$x > 3$ $\quad$ $x < -4$

$= (3, -4)$