

Exercise 4.2

Solve and Check:

Q.1. $|x| = 9$

Sol. $x = 9$ And $-x = 9$
 $x = 9$

Hence, $x = \pm 9$

Check, $|\pm 9| = 9$ Check

Q.2. $|x - 3| = 4$

<p>Sol. $x - 3 = 4$ $x = 4 + 3$ $x = 7$</p>	<p>$-(x - 3) = 4$ $-x + 3 = 4$ $-x = 4 - 3$ $-x = 1$ $x = -1$</p>
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Hence: $x = -1, 7$

Check: $|-1 - 3| = |-4| = 4$ ✓ $|7 - 3| = |4| = 4$

Q.3. $|x + 1| = 5$

<p>Sol. $x + 1 = 5$ $x = 5 - 1$ $x = 4$</p>	<p>$-(x + 1) = 5$ $-x - 1 = 5$ $-x = 5 + 1$ $-x = 6$ $x = -6$</p>
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Hence, $x = 4, -6$

Check: $|4 + 1| = |5| = 5$ ✓ $|-6 + 1| = |-5| = 5$

Q.4. $|2x - 3| = 5$

<p>Sol. $2x - 3 = 5$</p> <p>$2x = 5 + 3$</p> <p>$2x = 8$</p> <p>$\frac{x}{2} = \frac{8}{2}$</p> <p>$x = 4$</p>		<p>$-(2x - 3) = 5$</p> <p>$-2x + 3 = 5$</p> <p>$-2x = 5 - 3$</p> <p>$\frac{-2x}{2} = \frac{2}{-2}$</p> <p>$x = -1$</p>
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S.S. = $\{4, -1\}$

Check: $|2(4) - 3| = |8 - 3| = |5| = 5 \neq |2(-1) - 3|$
 $= |-2 - 3| = |-5| = 5$

Q.5. $|3x + 4| = 9$

Sol.

<p>$3x + 4 = 9$</p> <p>$3x = 9 - 4$</p> <p>$3x = 5$</p> <p>$x = \frac{5}{3}$</p>		<p>$-(3x + 4) = 9$</p> <p>$-3x - 4 = 9$</p> <p>$-3x = 9 + 4$</p> <p>$-3x = 13$</p> <p>$x = -\frac{13}{3}$</p>
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S. S. = $\left\{\frac{5}{3}, -\frac{13}{3}\right\}$

Check: Putting $\frac{5}{3}$

$$\left|3\left(\frac{5}{3}\right) + 4\right| = |5 + 4| = |9| = 9$$

Putting $-\frac{13}{3}$

$$\left|3\left(-\frac{13}{3}\right) + 4\right| = |-13 + 4| = |-9| = 9$$

Q.6. $3(x - 2) < 2x + 1$

Sol. $3x - 6 < 2x + 1$

$$3x - 2x < 1 + 6$$

$$x < 7$$

Check: Let $x = 6$

These putting values

$$3(6 - 2) < 2(6) + 1$$

$$3(4) < 12 + 1$$

$$12 < 13$$

Which is true

Therefore, $x < 7$

Q.7. $3(x + 5) > 2(x + 2) + 8$

Sol. $3x + 15 > 2x + 4 + 8$

$$3x - 2x > 4 + 8 - 15$$

$$x > -3$$

Check: Suppose that $x = -2$

$$3(-2 + 5) > 2(-2 + 2) + 8$$

$$3(3) > 2(0) + 8$$

$$9 > 8$$

Which is true

Hence, $x > -3$

Q.8.
$$\frac{1}{2}(2-x) > \frac{1}{4}(3-x) + \frac{1}{2}$$

Sol.
$$\frac{2-x}{2} > \frac{3-x}{4} + \frac{1}{2}$$

$$1 - \frac{x}{2} > \frac{3-x}{4} + \frac{1}{2}$$

$$-\frac{x}{2} + \frac{x}{4} > \frac{3}{4} + \frac{1}{2} - 1$$

$$\frac{-2x+x}{4} > \frac{3+2-4}{4}$$

$$-\frac{x}{4} > \frac{1}{4}$$

$$-x > 1 \quad (\text{Multiplying by 4})$$

Therefore, $x < -1$

Now, Suppose that $x = -2$

• x

Putting values $x = -2$

$$\frac{1}{2}(2+2) > \frac{1}{4}(3+2) + \frac{1}{2}$$

$$\frac{4}{2} > \frac{5}{4} + \frac{1}{2}$$

$$2 > \frac{5+2}{4}$$

$$2 > \frac{7}{4} \quad (\text{Which is true})$$

Hence, $x < -1$

Q.9.
$$\frac{x-2}{4} + \frac{2}{3} < \frac{x-4}{6}$$

Sol. Multiply by L.C.M. of 4, 3, 6 by 12.

$$12 \frac{(x-2)}{4} + 12 \left(\frac{2}{3} \right) < 12 \frac{(x-4)}{6}$$

$$3(x-2) + 4(2) < 2(x-4)$$

$$3x - 6 + 8 < 2x - 8$$

$$3x - 2x < -8 - 8 + 6$$

$$x < -10$$

Q.10.
$$\frac{3x+4}{5} - \frac{x+1}{3} > 1 - \frac{x+5}{3}$$

Sol. Multiply by L.C.M of 5, 3 by 15.

$$15 \left(\frac{3x+4}{5} \right) - 15 \left(\frac{x+1}{3} \right) > 15 \times 1 - 15 \left(\frac{x+5}{3} \right)$$

$$3(3x+4) - 5(x+1) > 15 - 5(x+5)$$

$$9x + 12 - 5x - 5 > 15 - 5x - 25$$

$$9x - 5x + 5x > 15 - 25 - 12 + 5$$

$$9x > -17$$

$$x > -\frac{17}{9}$$

Q.11.
$$\frac{x+1}{2} - \frac{x+3}{3} > \frac{x+1}{4} + 1$$

Sol. Multiply by 12, L.C.M of 4, 3, 2.

$$12 \left(\frac{x+1}{2} \right) - 12 \left(\frac{x+3}{3} \right) > 12 \left(\frac{x+1}{4} \right) + 12 \times 1$$

$$6(x+1) - 4(x+3) > 3(x+1) + 12$$

$$6x + 6 - 4x - 12 > 3x + 3 + 12$$

$$6x - 4x - 3x > 3 + 12 - 6 + 12$$

$$-x > 21$$

Therefore, $x < -21$ N.T.S

Q.12.
$$\frac{x+3}{4} - \frac{x+2}{5} < 1 + \frac{x+5}{6}$$

Sol. Multiply by 60, L.C.M. of 4, 5, 6.

$$60\left(\frac{x+3}{4}\right) - 60\left(\frac{x+2}{5}\right) < 60 \times 1 + 60\left(\frac{x+5}{6}\right)$$

$$15(x+3) - 12(x+2) < 60 + 10(x+5)$$

$$15x + 45 - 12x - 24 < 60 + 10x + 50$$

$$15x - 12x - 10x < 60 + 50 - 45 - 24$$

$$-7x < 89$$

$$7x < -89 \text{ (Changing symbol)}$$

$$x > -\frac{89}{7}$$

$$x > -12\frac{5}{7}$$

Q.13.
$$\frac{1}{2}x \geq 1 + \frac{1}{3}x$$

Sol. Multiply by 6, L.C.M. of 2, 3.

$$6\left(\frac{1}{2}x\right) \geq 6 \times 1 + 6 \times \frac{1}{3}x$$

$$3x \geq 6 + 2x$$

$$3x - 2x \geq 6$$

$$x \geq 6$$

Q.14.
$$\frac{1}{4}(2x+3) \leq (7-4x)$$

Sol.
$$4 \times \frac{1}{4}(2x+3) \leq 4(7-4x) \text{ (Multiply by 4)}$$

$$2x + 3 \leq 28 - 16x$$

$$\left\{ \begin{array}{l} + 16x \leq 28 - 3 \end{array} \right.$$

$$18x \leq 25$$

$$\frac{18x}{18} \leq \frac{25}{18} \quad (\text{Dividing by } 18)$$

$$x \leq 1\frac{7}{18}$$

Q.15.

$$\frac{4}{3}(2x+3) \geq 10 - \frac{4x}{3}$$

Sol.

$$3 \times \frac{4}{3}(2x+3) \geq 3 \times 10 - 3 \times \frac{4x}{3} \quad (\text{Multiply by } 3)$$

$$4(2x+3) \geq 30 - 4x$$

$$8x + 12 \geq 30 - 4x$$

$$8x + 4x \geq 30 - 12$$

$$12x \geq 18$$

$$x \geq \frac{18}{12}$$

$$x \geq \frac{3}{2}$$

$$x \geq 1\frac{1}{2}$$

Q.16.

$$\frac{x-2}{4} - \frac{x-5}{6} \geq \frac{1}{3}$$

Sol.

Multiply by 12, L.C.M. of 4, 6, 3.

$$12\left(\frac{x-2}{4}\right) - 12\left(\frac{x-5}{6}\right) \geq 12 \times \frac{1}{3}$$

$$3(x-2) - 2(x-5) \geq 4$$

$$3x - 6 - 2x + 10 \geq 4$$

$$3x - 2x \geq 4 + 6 - 10$$

$$x \geq 0$$