

# Solving Linear Equations & Inequalities

1)

Solve algebraically the inequality

$$11 - 2(1 + 3x) < 39$$

3

$$11 - 2(1 + 3x) < 39$$

$$11 - 2 - 6x < 39 \quad \checkmark$$

$$9 - 6x < 39$$

$$\begin{array}{r} -9 \\ -6x < 30 \end{array} \quad \checkmark$$

$$\begin{array}{r} \div (-6) \\ x > -5 \end{array} \quad \checkmark$$

2)

Solve the equation

$$\frac{2x}{3} - \frac{5}{6} = 2x.$$

Give your answer in its simplest form.

3

$$\begin{aligned} \frac{2x}{3} - \frac{5}{6} &= 2x \\ \times 6 \quad \times 6 \quad \times 6 \\ 4x - 5 &= 12x \quad \checkmark \\ -4x \quad -4x \\ -5 &= 8x \quad \checkmark \\ \div 8 \quad \div 8 \\ x &= -\frac{5}{8} \quad \checkmark \end{aligned}$$

$$\begin{aligned} \frac{2x}{3} \times 6 \\ = \frac{2x}{3} \text{ of } 6 \\ = 6 \div 3 \times 2x \\ = 4x \end{aligned}$$

2)

Solve the equation

$$\frac{2x}{3} - \frac{5}{6} = 2x.$$

Give your answer in its simplest form.

3

$$\frac{2x}{3} - \frac{5}{6} = 2x$$

$$\frac{4x}{6} - \frac{5}{6} = 2x$$

$$\frac{4x-5}{6} = 2x$$

$\times 6$                    $\times 6$

$$4x - 5 = 12x \quad \checkmark$$

$$\begin{array}{r} -4x \\ 4x - 5 = 12x \\ -4x \quad -4x \\ \hline -5 = 8x \quad \checkmark \end{array}$$

$$\div 8 \quad \div 8$$

$$x = -\frac{5}{8} \quad \checkmark$$

3)

Solve, algebraically, the inequality

$$19 + x > 15 + 3(x - 2).$$

3

$$19 + x > 15 + 3(x - 2)$$

$$19 + x > 15 + 3x - 6 \quad \checkmark$$

$$19 + x > 9 + 3x$$

$$\begin{array}{r} -9 \\ -9 \end{array}$$

$$10 + x > 3x$$

$$\begin{array}{r} -x \\ -x \end{array}$$
$$10 > 2x \quad \checkmark$$

$$\begin{array}{r} \div 2 \\ \div 2 \end{array}$$

$$5 > x$$

OR

$$x < 5 \quad \checkmark$$

4)

Solve the inequality

$$\frac{x}{4} - \frac{1}{2} < 5.$$

$$\frac{x}{4} - \frac{1}{2} < 5$$

$\times 4$        $\times 4$        $\times 4$

$$x - 2 < 20$$

$+ 2$        $+ 2$

$$x < 22$$

2

5)

Solve the equation

$$3x + 1 = \frac{x - 5}{2}$$

3

$$\begin{array}{c} 3x + 1 = \frac{x - 5}{2} \\ \times 2 \quad \times 2 \quad \quad \times 2 \end{array}$$

$$\begin{array}{c} 6x + 2 = x - 5 \quad \checkmark \\ -x \quad \quad -x \end{array}$$

$$\begin{array}{c} 5x + 2 = -5 \\ -2 \quad \quad -2 \end{array}$$

$$\begin{array}{c} 5x = -7 \quad \checkmark \end{array}$$

$$\begin{array}{c} \div 5 \quad \quad \div 5 \end{array}$$

$$x = -\frac{7}{5} \quad \checkmark$$

6)

Solve the inequality

$$4x - 5 \leq 7x - 20.$$

3

$$4x - 5 \leq 7x - 20$$

+20 +20

$$4x + 15 \leq 7x$$

-4x -4x

✓

$$15 \leq 3x$$

÷3 ÷3

✓

$$5 \leq x$$

OR

$$x \geq 5$$

✓

7)

Solve **algebraically** the equation

$$2x - \frac{(3x-1)}{4} = 4.$$

$$\begin{array}{ccc} 2x - \frac{(3x-1)}{4} = 4 \\ \times 4 \quad \quad \times 4 \quad \quad \times 4 \end{array}$$

$$8x - (3x-1) = 16 \quad \checkmark$$

$$8x - 3x + 1 = 16$$

$$5x + 1 = 16$$

$$\begin{array}{ccc} -1 & & -1 \\ 5x & = & 15 \quad \checkmark \end{array}$$

$$\begin{array}{ccc} \div 5 & & \div 5 \\ x & = & 3 \quad \checkmark \end{array}$$

3

8)

Solve the equation

$$\frac{2}{x} + 1 = 6.$$

3

$$\frac{2}{x} + 1 = 6$$

$$\times x \quad \times x \quad \times x$$

$$2 + x = 6x \quad \checkmark$$

$$-x \quad -x$$

$$2 = 5x \quad \checkmark$$

$$\div 5 \quad \div 5$$

$$x = \frac{2}{5} \quad \checkmark$$