

Notes 5.1 – Solving Equations and Inequalities

Lesson

Word	Meaning/Notation	Example
Equation	a statement that shows two math expressions are equal	$y = mx + b$ ↑
Inverse	the opposite operation	$+ \leftrightarrow -$ $\cdot \leftrightarrow \div$
Order of Operations For Solving	Solve ↓ Add / Subtract Multiply / Divide Exponents Parenthesis / Groups	
Reciprocal	A flipped over fraction	$\frac{2}{3}$ has a reciprocal of $\frac{3}{2}$
Combine Like Terms	add terms that are alike	$2x - 3 + x + 5$ $3x + 2$

You must keep the equation balanced!

Whatever you do to one side of the equation you MUST do to the other side too.

One & Two Step Equations

$$\begin{array}{r} a) \quad x - 6 = -2 \\ \quad +6 \quad +6 \\ \hline \boxed{x = 4} \end{array}$$

$$\begin{array}{r} c) \quad \left(\frac{3}{2}\right) \frac{2}{3}x = 10 \left(\frac{3}{2}\right) \\ \hline \boxed{x = 15} \end{array}$$

$$\begin{array}{r} e) \quad 2x + 1 = 11 \\ \quad -1 \quad -1 \\ \hline 2x = 10 \\ \frac{2x}{2} = \frac{10}{2} \\ \hline \boxed{x = 5} \end{array}$$

$$\begin{array}{r} g) \quad \frac{3(x-2)}{3} = \frac{12}{3} \\ \hline x - 2 = 4 \\ \quad +2 \quad +2 \\ \hline \boxed{x = 6} \end{array} \quad \begin{array}{l} \text{divide} \\ \text{then} \\ \text{add} \end{array}$$

$$\begin{array}{r} b) \quad (4) \frac{x}{4} = 3(4) \\ \hline \boxed{x = 12} \end{array}$$

$$\begin{array}{r} d) \quad 8 - x = 12 \\ \quad -8 \quad -8 \\ \hline -x = 4 \\ \frac{-x}{-1} = \frac{4}{-1} \\ \hline \boxed{x = -4} \end{array}$$

$$\begin{array}{r} f) \quad \frac{3}{4}x - 4 = 5 \\ \quad +4 \quad +4 \\ \hline \left(\frac{4}{3}\right) \frac{3}{4}x = 9 \left(\frac{4}{3}\right) \\ \hline \boxed{x = 12} \end{array}$$

$$\begin{array}{r} h) \quad 5(x-2) = 12 \\ \quad \quad \quad +10 \quad +10 \\ \hline 5x - 10 = 12 \\ \quad \quad \quad +10 \quad +10 \\ \hline 5x = 22 \\ \frac{5x}{5} = \frac{22}{5} \\ \hline \boxed{x = \frac{22}{5}} \end{array} \quad \begin{array}{l} \text{distribute} \\ \text{first} \end{array}$$

Multi-Step Equations

$$\begin{array}{r} i) \quad (4) \frac{2x-8}{4} = 6(4) \\ \hline 2x - 8 = 24 \\ \quad +8 \quad +8 \\ \hline 2x = 32 \\ \frac{2x}{2} = \frac{32}{2} \\ \hline \boxed{x = 16} \end{array}$$

$$\begin{array}{r} j) \quad \left(\frac{4}{3}\right) \frac{3}{4}(x-6) = 12 \left(\frac{4}{3}\right) \\ \hline x - 6 = 16 \\ \hline \boxed{x = 22} \end{array}$$

Multi-Step Equations

$$k) \quad \frac{2}{3}(x-4) + 5 = 3$$

$$\quad \quad \quad -5 \quad -5$$

$$\left(\frac{3}{2}\right) \frac{2}{3}(x-4) = -2 \left(\frac{3}{2}\right)$$

$$x-4 = -3$$

$$\quad +4 \quad +4$$

$$\boxed{x=1}$$

$$l) \quad 8.9 + 1.2(3x-1) = 14.9$$

$$\quad \quad \quad -8.9 \quad \quad \quad -8.9$$

$$\frac{1.2(3x-1)}{1.2} = \frac{6}{1.2}$$

$$3x-1 = 5$$

$$\quad +1 \quad +1$$

$$\frac{3x}{3} = \frac{6}{3}$$

$$\boxed{x=2}$$

Multiple Variables

$$m) \quad 5x + 8 - 2x = 14$$

$$3x + 8 = 14$$

$$\quad -8 \quad -8$$

$$\frac{3x}{3} = \frac{6}{3}$$

$$\boxed{x=2}$$

$$n) \quad 3x - 2(4x + 3) = 42$$

$$3x - 8x - 6 = 42$$

$$-5x - 6 = 42$$

$$\quad +6 \quad +6$$

$$-5x = 48$$

$$\boxed{x = \frac{48}{-5}}$$

$$o) \quad -4x - 1(x+3) = -7$$

$$-4x - x - 3 = -7$$

$$-5x - 3 = -7$$

$$\quad +3 \quad +3$$

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

$$\boxed{x = \frac{4}{5}}$$

$$p) \quad 0.5 = 4.1x - 2(1.3x - 4)$$

$$.5 = 4.1x - 2.6x + 8$$

$$.5 = 1.5x + 8$$

$$-8 \quad \quad \quad -8$$

$$\frac{-7.5}{1.5} = \frac{1.5x}{1.5}$$

$$\boxed{x = -5}$$

* combine like terms if they are on the same side of the equation