

# Algebra 1 – Unit 2 Study Packet

## Solving and Writing Multistep Equations

### Skill #1 – Identifying Properties to Solve Equations

1) Identify the property shown below:

$$5x = 5x$$

Reflexive Property

2) Identify the property shown below:

$$\text{If } y = 4x, \text{ then } 4x = y$$

Symmetric Property

3) Identify the property shown below:

$$\text{If } 9p = t \text{ and } t = 6s - 1 \\ \text{then } 9p = 6s - 1$$

Transitive Property

4) Which property justifies this step?

$$5(y - 9) + 4 = 24$$

Step 1:  $5(y - 9) = 20$

Subtraction Property of Equality

5) Which property justifies the work between the original and Step 1?

$$11x = 3x - 8 + 0$$

Step 1:  $11x = 3x - 8$

Additive Identity

6) Identify the property that justifies the work between Step 1 and Step 2 in solving the equation shown:

Step 1:  $7 + 4x = 23$

Step 2:  $7 + (-7) + 4x = 23 + (-7)$

Step 3:  $0 + 4x = 23 + (-7)$

Step 4:  $0 + 4x = 16$

Step 5:  $4x = 16$

Step 6:  $\frac{4x}{4} = \frac{16}{4}$

Step 7:  $1x = 4$

Step 8:  $x = 4$

Addition Property of Equality

7) Identify the property that justifies the work between Step 3 and Step 4 in solving the equation shown:

Step 1:  $15 = -(4 - x) + 7$

Step 2:  $15 - 7 = -(4 - x) + 7 - 7$

Step 3:  $8 = -(4 - x)$

Step 4:  $8 = -4 + x$

Step 5:  $8 + 4 = -4 + 4 + x$

Step 6:  $12 = 0 + x$

Step 7:  $12 = x$

Step 9:  $x = 12$

Distributive Property

Skill #1

- I can identify and apply properties of real numbers and properties of equality while solving an equation.
- Need more practice (IXL – H.4, H.1, J.7, H.3, H.2)

Skill #2 - Solve Multistep Equations

1) What is the solution to the following?

$$\begin{array}{r} 7 + 4x = -29 \\ -7 \quad -7 \\ \hline 4x = -36 \\ -7 \quad -7 \\ \hline 4x = -252 \\ \div 4 \quad \div 4 \\ \hline x = -63 \end{array}$$

- A 49
- B 38.5
- C -38.5
- D 63**

2) What is the solution to the following?

$$\begin{array}{l} -8(x - 3.375) = -2(5x - 4) - 2.5 \\ -8x + 27 = -10x + 8 - 2.5 \\ -8x + 27 = -10x + 5.5 \\ +10x \quad +10x \\ \hline 2x + 27 = 5.5 \\ -27 \quad -27 \\ \hline 2x = -21.5 \\ \div 2 \quad \div 2 \\ \hline x = -10.75 \end{array}$$

- A -1.5625
- B -10.75**
- C -8.25
- D -6.75

3) What is the solution to the following?

$$\begin{array}{l} 5h - 7 = 4(h + \frac{1}{2}) - 4 \\ 5h - 7 = 4h + 2 - 4 \\ 5h - 7 = 4h - 2 \\ +7 \quad +7 \\ \hline 5h = 4h + 5 \\ -4h \quad -4h \\ \hline h = 5 \end{array}$$

4) What is the solution to the following?

$$\begin{array}{l} -\frac{1}{2}(6x - 10) = -4 \\ -3x + 5 = -4 \\ +3 \quad +3 \\ \hline -3x = -9 \\ \div -3 \quad \div -3 \\ \hline x = 3 \end{array}$$

- Skill #2
- I can solve a multistep linear equation with one variable algebraically.
  - Need more practice (IXL - J.5, J.6, J.11)

Skill #3 - One, No, or Infinite Solutions

1) Identify all that have infinite solutions:

$$\begin{array}{l} 6x + 4 = -4 + 6x \\ -6x \quad -6x \\ \hline 4 = -4 \\ \text{no} \end{array}$$

$$\begin{array}{l} 6(-x + 2) = 12 - 6x \\ -6x + 12 = 12 - 6x \\ +6x \quad +6x \\ \hline 12 = 12 \\ \text{one} \end{array}$$

2) Identify all that have no solutions:

$$\begin{array}{l} 4x = 5 + 4x \\ -4x \quad -4x \\ \hline 0 = 5 \\ \text{no} \end{array}$$

$$\begin{array}{l} 4x + 3 = -11 - 3x \\ +3x \quad +3x \\ \hline 7x + 3 = -11 \\ -3 \quad -3 \\ \hline 7x = -14 \\ \div 7 \quad \div 7 \\ \hline x = -2 \\ \text{one} \end{array}$$

$$\begin{array}{l} -7x = 14 + 7x \\ -7x \quad -7x \\ \hline -14x = 14 \\ \div -14 \quad \div -14 \\ \hline x = -1 \\ \text{one} \end{array}$$

$$\begin{array}{l} -7x - 5 = -5 + -7x \\ +7x \quad +7x \\ \hline -5 = -5 \\ \text{one} \end{array}$$

$$\begin{array}{l} 5(x + 1) = 1 + 5x \\ 5x + 5 = 1 + 5x \\ -5x \quad -5x \\ \hline 5 = 1 \\ \text{no} \end{array}$$

$$\begin{array}{l} 3(4 + 2x) = 2(2 + 3x) \\ 12 + 6x = 4 + 6x \\ -6x \quad -6x \\ \hline 12 = 4 \\ \text{no} \end{array}$$

3) Match the solution description to the equation:

No Solution	One Solution	Infinite Solutions
$5x + 9 = 9x + 5$ $-5x \quad -5x$ $9 = 4x + 5$ $-5 \quad -5$ $4x = 4$ $\div 4 \quad \div 4$ $x = 1$ <b>one</b>	$6(x + 2) = 6x + 12$ $6x + 12 = 6x + 12$ <b>same/equal</b>	$2(x + 3) = 2x + 3$ $2x + 6 = 2x + 3$ $-2x \quad -2x$ $6 = 3$ <b>not equal</b>

- Skill #3
- I can determine whether a linear equation with one variable has one, an infinite, or no solutions.
  - Need more practice (IXL - J.8, J.9)

Skill #4 - Literal Equations

1) What is the solution for  $r$  in the following equation?

$$6 = 5t - r$$

A  $r = 5t + 6$

B  $r = -5t + 6$

C  $r = 5t - 6$

D  $r = -5t - 6$

$$\begin{array}{r|l} 6 = 5t - r & \\ -5t & -5t \\ \hline 6 - 5t = -r & \\ -1 & -1 \\ \hline -6 + 5t = r & \end{array}$$

2) The formula for the area of a triangle is

$$\frac{2}{1} \cdot A = \frac{1}{2} bh \cdot \frac{2}{1}$$

$$\frac{2A}{b} = \frac{bh}{b}$$

$$\boxed{\frac{2A}{b} = h}$$

Solve this equation for  $h$ :

3) The volume of a cylinder formula is used to find the number of cubic units that a cylindrical container will hold. Solve for  $r$  in the following equation:

$$\begin{array}{r|l} V = \pi r^2 h & \\ \pi h & \pi h \\ \hline \sqrt{\frac{V}{\pi h}} = \sqrt{r^2} & \\ \sqrt{\frac{V}{\pi h}} = r & \end{array}$$

4) Solve for  $b$  in the following equation:

$$K = \frac{3\pi y(B + b)}{3\pi y}$$

A  $b = \frac{3\pi y}{K} - B$

B  $b = \frac{K - 3\pi y}{B}$

C  $b = \frac{K}{3\pi y} - B$

D  $b = \frac{K - B}{3\pi y}$

$$\frac{K}{3\pi y} = \frac{B + b}{-B}$$

Skill #4  I can solve a literal equation for a specified variable.  
 Need more practice (IXL - I.8)

Skill #5 - Writing and Solving Practical Problems

1) When Mary makes a collect call to her friend Linda in Portugal, the phone company charges \$15 dollars to connect overseas and \$1.50 for each minute she talks. How many minutes did Mary and Linda talk if her final bill was \$52.50?

$$\begin{array}{r|l} 1.50m + 15 = 52.50 & \\ -15 & -15 \\ \hline 1.5m = 37.5 & \\ \div 1.5 & \div 1.5 \\ \hline m = 25 & \end{array}$$

2) Which equation describes a tuxedo rental company that charges a fee of \$50.25 for every tuxedo it rents, plus \$20.15 for each day that the customer keeps it, if the final bill is \$191.30?

A  $20.15d + 191.30 = 50.25$

C  $50.25 + 20.15d = 191.30$

B  $20.15 + 50.25d = 191.30$

D  $191.30d + 20.15 = 50.25$

3) June wants to go on a helicopter tour over the Great Smoky Mountains. The cost of the tour is \$45.00 with a cost of \$10.00 for every hour that you are in the sky. If June pays \$62.00 for her tour, how many hours was she in the air?

$$\begin{array}{r} 10h + 45 = 62 \\ -45 \quad -45 \\ \hline 10h = 17 \\ \frac{10}{10} \quad \frac{10}{10} \\ \hline h = 1.7 \end{array}$$

Skill #4

- I can write an equation from a given situation and I can solve the same equation for the given variable.
- Need more practice (IXL - J.10)