

Algebra 1 • Unit 2 Worksheet

Linear Equations and Systems

Name: _____

Date: _____

Part A • Modeling with Equations

First understand the situation, then write the equation. Variables should have units.

1. A party planner orders pizzas and bottles of soda. Each pizza costs \$12, each bottle costs \$3, and the total budget is \$180.

a. Define your variables (with units). Write an equation connecting them.

b. Could 8 pizzas and 28 bottles work? Show that it does or doesn't satisfy your equation.

c. Could (15, 0) work in the equation? Could it work in the REAL situation? Explain the difference.

d. List THREE realistic solutions: (____, ____), (____, ____), (____, ____)

Part B • Equivalent Equations and Valid Moves

2. Are these two equations equivalent? Show your reasoning.

Equation A: $3(x - 4) = 2x + 1$

Equation B: $3x = 2x + 13$

3. Each of the moves below was used to solve an equation. Decide whether each move is VALID (preserves solutions) or NOT VALID. If invalid, explain why.

a. From $2x + 6 = 10$, subtract 6 from BOTH sides to get $2x = 4$. Valid Invalid

b. From $x + 5 = 12$, multiply BOTH sides by 0 to get $0 = 0$. Valid Invalid

c. From $x(x - 3) = 5x$, divide both sides by x to get $x - 3 = 5$. Valid Invalid

d. From $4(x + 2) = 20$, distribute to get $4x + 8 = 20$. Valid Invalid

Part C • Rearranging to Solve

4. The formula $F = (9/5)C + 32$ converts Celsius to Fahrenheit.

a. Solve for C in terms of F .

b. Use your formula from (a) to find C when $F = 50$.

c. Why is solving once for C (in terms of F) more efficient than plugging in and solving $F = (9/5)C + 32$ each time?

5. Solve $5x - 3(2 - x) = 4x + 14$ for x . Then check your answer by substitution.

Answer: $x = \underline{\hspace{2cm}}$

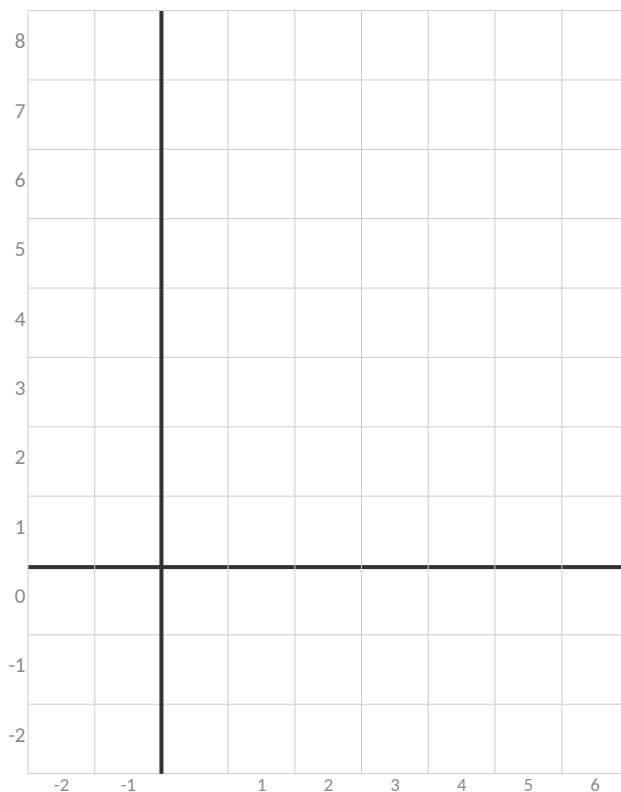
Part D • Slope, Intercepts, and Equivalent Forms

6. Consider the equation $4x + 2y = 12$.

a. Rewrite in slope-intercept form ($y = mx + b$).

b. Find the x-intercept and y-intercept WITHOUT graphing. x-int = (, 0) y-int = (0,)

c. Sketch the graph on the grid below.



7. A line has slope 3 and passes through (2, 11). Write its equation in TWO different forms (e.g., point-slope and slope-intercept). Show both forms are equivalent.

Part E • Systems — Multiple Methods

8. Solve the system using BOTH substitution AND elimination. Verify both methods give the same answer.

$$2x + y = 11$$

$$3x - 2y = 6$$

Substitution	Elimination

Solution: (____, ____)

9. Without solving, decide whether each system has ONE solution, NO solution, or INFINITELY MANY solutions. Explain how you can tell from the equations alone.

a. $y = 2x + 5$ and $y = 2x - 3$. Answer: _____ Reason:

b. $y = 4x - 1$ and $2y = 8x - 2$. Answer: _____ Reason:

c. $3x + y = 6$ and $x - y = 2$. Answer: _____ Reason:

Part F • Error Analysis and Reasoning

10. Han solved the system $x + y = 10$, $x - y = 4$ like this:

- a. Is Han correct? Yes No If no, find and fix the error.

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- b. WHY does adding two equations preserve the solution? (One key idea — articulate it.)

Adding: $2x = 14$, so $x = 7$.

Subtracting: $2y = 6$, so $y = 3$.

11. A bus rental costs \$200 plus \$0.50 per mile. A van rental costs \$50 plus \$0.80 per mile.

- a. At how many miles do they cost the same? Set up and solve a system.

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- b. For a 600-mile trip, which is cheaper, and by how much?

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- c. Sketch both cost functions on the same axes. What does the intersection point mean in context?
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12. Open exploration: Make up a system of TWO linear equations that has the solution $(4, -3)$. Show that your system works. Can you make a SECOND system with the same solution? How many systems share this solution?
