
CHECKPOINT 1 - FLUENCY AND STRUCTURE

Chapter 1 Cumulative Problem Set

Solving and Rewriting Linear Equations

Name _____

Date _____

Show organized algebraic work. Check solutions in the original equation when practical. Use a separate sheet only when the space provided is not sufficient.

1. Solve $x - 7.35 = -12.8$.

2. Solve $-3.6p = 16.2$.

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

4. Solve $\frac{5}{8} - m = -\frac{7}{12}$.

CHECKPOINT 1 - FLUENCY AND STRUCTURE**CONTINUED**

5. Solve $4(3x - 5) - 7 = 5(x + 2) - 2$.

6. Solve $\frac{3}{4}(8y - 12) + 5 = 2(y + 7)$.

7. Solve $0.6(5z - 4) - 1.2 = 1.8z + 4.8$.

8. Solve $\frac{2}{3}(3w + 9) - \frac{1}{2}(w - 4) = 15$.

CHECKPOINT 2 - VARIABLES ON BOTH SIDES

For Problems 9-12, solve and classify each equation as having one solution, no solution, or infinitely many solutions. Show the final statement that supports your classification.

9. $7(2a - 3) = 5a + 24$

10. $4(3b + 2) - 5b = 7b + 8$

11. $6(2c - 5) + 4 = 12c - 19$

12. $\frac{3}{4}(8d - 4) = 2(d + 6)$

CHECKPOINT 2 - VARIABLES ON BOTH SIDES**CONTINUED**

13. Consider $k(2x - 3) + 4 = 6x + 1$.

- (a) Find the value of k for which the equation has no solution.
- (b) Determine whether any value of k produces infinitely many solutions.
- (c) Describe all values of k for which the equation has exactly one solution.

14. Write an equation that meets all three conditions: it has variables on both sides, includes a distributive step, and has the unique solution $x = -3$. Solve your equation to verify it.

15. Classify each equation without completing a full step-by-step solution. Give the structural evidence you used.

(a) $2(3x + 1) = 6x + 5$ (b) $4(x - 2) + 7 = 4x - 1$ (c) $5x - 9 = 2x + 6$

16. A number machine multiplies an input n by 3, subtracts 12, divides by 3, and then subtracts the original input. Predict the output. Use algebra to prove that the output is the same for every input.

CHECKPOINT 3 - FORMULAS AND MODELING

Isolate the requested variable. State any restriction needed to keep a denominator nonzero.

17. Solve $4x - 3y = 18$ for y .

18. Solve $P = 2L + 2W$ for L .

19. The area of a trapezoid is $A = \frac{1}{2}h(b_1 + b_2)$. Solve for b_2 .

20. The surface area of a cylinder is $S = 2\pi r^2 + 2\pi rh$. Solve for h .

CHECKPOINT 3 - FORMULAS AND MODELING**CONTINUED**

Define a variable, write an equation, solve, and interpret the result.

- 21.** A car travels 196 miles in 3.5 hours at a constant speed. Use $d = rt$ to find the rate.
- 22.** Studio A charges an \$18 registration fee plus \$6 per visit. Studio B charges a \$42 registration fee plus \$3 per visit. After how many visits will the total costs be equal? What will that cost be?
- 23.** A triangle has side lengths $(x + 4)$ centimeters, $(2x - 1)$ centimeters, and $(3x + 2)$ centimeters. Its perimeter is 77 centimeters. Find all three side lengths, then verify that they can form a triangle.
- 24.** Sixty-two percent of a rectangular parcel's length is waterfront. The remaining 76 feet is not waterfront. Find the total length of the parcel.

CHECKPOINT 4 - REASONING AND SYNTHESIS

25. A rectangular prism measures 6 units by 4 units by h units. The numerical value of its surface area equals the numerical value of its volume. Find h .

26. A student solves $4(2x - 3) = 5x + 6$ as shown:

$$8x - 3 = 5x + 6 \Rightarrow 3x = 9 \Rightarrow x = 3.$$

Identify the first error, correct the solution, and verify it in the original equation.

27. Solve $\frac{3}{4}(8x - 12) = 2x + 9$ in two different ways: first by distributing, and then by clearing the fraction before distributing. Compare the two approaches.

28. A student claims that $2(x - 5) = 3x + 1$ is equivalent to $2x = 3x + 6$. Decide whether the claim is correct. If it is not, identify a valid equivalent equation and explain the error.

CHECKPOINT 4 - REASONING AND SYNTHESIS**CONTINUED**

29. Choose k so that $x = 6$ is a solution of

$$k(x - 4) + 3 = 2x - 5.$$

After finding k , determine whether $x = 6$ is the unique solution. Explain the result.

30. Use the same left side, $3(x - 2)$, to create:

- (a) an equation with no solution;
- (b) an equation with infinitely many solutions.

Justify both classifications.

31. Consider $(n - 2)x + 6 = 4x + n + 1$, where n is an integer.

- (a) Find the value of n that makes the equation have no solution.
- (b) Determine whether any value of n makes the equation true for all real x .
- (c) Classify the equation for every other value of n .

32. For the equation

$$a(x - b) = ax - c,$$

determine the relationship among a , b , and c that produces infinitely many solutions. What relationship produces no solution? Explain why this equation can never have exactly one solution.
