Name: _____

Date: _____ Class: Algebra 1, per: _____

Chapter 3 - Navigating Linear Equations

A. One-Step Equations

Objective: Use inverse operations and check solutions.

Directions: Show substitutions and simplification steps. Follow the order of operations, preserve units in applications, and explain all error-analysis, proof, and challenge responses.

Equality principle	**Solution types**
Perform the same operation on both sides. Check by substitution in the original equation.	true statement → infinitely many false statement → no solution x=value → one solution

1. Solve x+9=23 and check the solution.	**2.** Solve y-14=-6.
3. Solve -7m=42.	**4.** Solve n/8=-5.
5. Solve -2.5+p=7.3.	**6.** Write and solve an equation: five more than a number is 19.

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B. Two-Step Equations

Objective: Solve equations with signed, fractional, and decimal coefficients.

7. Solve $4x-7=21$.	**8.** Solve $9-3y=30$.
9. Solve $z/5+6=2$.	**10.** Solve $-2.4a+1.8=9$.
11. Solve $(3/4)x-5=7$.	**12.** A student solves $6x+4=28$ by dividing both sides by 6 first. Explain a correct path and solve.

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C. Distribution and Grouping

Objective: Solve equations requiring distribution, grouping, and denominator clearing.

13. Solve 3(x+5)=27.	**14.** Solve -4(2y-3)=28.
15. Solve 5(2m+1)-3=42.	**16.** Solve 2[3x-(x-4)]=24.
17. Solve 7-2(3p+5)=-21.	**18.** Solve (x-2)/3+(x+1)/2=7.

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D. Variables on Both Sides

Objective: Collect variable terms strategically and solve accurately.

19. Solve 5x+8=2x+29.	**20.** Solve 7-4y=3y+28.
21. Solve 6(2x-1)=4x+18.	**22.** Solve 3(2a+5)-4=5(a-2)+18.
23. Solve 0.4x+6=0.7x-3.	**24.** Solve (2/3)x+5=(1/6)x-1.

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E. Identities and Contradictions

Objective: Distinguish one solution, no solution, and infinitely many solutions.

25. Classify the equation as one solution, no solution, or infinitely many solutions: $4(x+2)=4x+8$.	**26.** Classify and justify: $3(2x-5)=6x+1$.
27. Classify and justify: $5x-7=5(x-2)+3$.	**28.** Find k so that $k(x-4)=3x-12$ has infinitely many solutions.
29. Find c so that $2(x+3)=2x+c$ has no solution.	**30.** A student concludes $x=0$ from $7x+5=7x+5$. Explain the error and give the correct solution set.

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F. Proportions and Scale Models

Objective: Solve proportions and use constant ratios in applications.

31. Solve the proportion $x/12=7/18$.	**32.** Solve $5/(y-1)=2/3$ and state the restriction.
33. Solve $(x+4)/6=(2x-1)/9$.	**34.** A map scale is 1 inch to 24 miles. Write and solve a proportion for the actual distance represented by 3.75 inches.
35. A 6-foot person casts an 8-foot shadow. A tree casts a 30-foot shadow. Use similar triangles to find the tree's height.	**36.** A recipe uses 3.5 cups of rice for 14 servings. How much rice is needed for 22 servings?

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G. Literal Equations

Objective: Rearrange formulas while tracking restrictions.

37. Solve $P=2l+2w$ for l.	**38.** Solve $A=(1/2)bh$ for h.
39. Solve $d=rt$ for t, then find t when $d=315$ miles and $r=70$ mph.	**40.** Solve $F=(9/5)C+32$ for C.
41. Solve $V=\pi r^2h$ for h.	**42.** Solve $ax+b=cx+d$ for x, assuming a is not equal to c.

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H. Linear Equation Modeling

Objective: Define a variable, build an equation, and interpret the solution.

43. The sum of three consecutive integers is 72. Find the integers.	**44.** A gym charges a $35 registration fee plus $18 per month. The total is $197. How many months were purchased?
45. The length of a rectangle is 5 more than twice its width. Its perimeter is 58. Find both dimensions.	**46.** A phone plan costs $42 plus $0.08 per text over the limit. A bill is $49.20. How many extra texts were sent?

Chapter 3 - Navigating Linear Equations

I. Reasoning, Proof, and Challenge

Objective: Analyze errors, justify equality steps, determine parameters, and compare linear models.

47. Error analysis: Solve $4-3(2x-5)=31$, then identify the sign error a student might make when distributing -3.	**48.** Prove that if $5x-2=5y-2$, then $x=y$. Name the equality properties used.
49. For what value of k does $2(kx+3)-4x=10x+6$ have infinitely many solutions? What occurs for every other k?	**50.** A tank initially contains 420 liters and drains at a constant rate of 18 liters per minute. A second tank contains 150 liters and fills at 9 liters per minute. Write and solve an equation for when the tanks contain the same amount, then verify the common amount.