Instructions: Answer all questions on a separate piece of paper. **SHOW ALL SUPPORTING WORK.** Do your own work, although learning through cooperation with classmates is encouraged. This assignment will be due the first day of school, do not wait to the last minute. This assignment is to help prepare you for Advanced Geometry by helping you recall key, foundational topics.

Each problem has a topic resource name which you can use to look up the topic covered. To use the Khan Academy link you must first be a registered user at khanacademy.org (this is free).

**Students:** Show all work in detailed steps for credit (on separate paper)

Find the value of the variable.

1. \[12 + 3b = 2 + 5b\]

2. \[5x + (180 - x) = 300\]

3. \[2(4d + 4) = d + 1\]

4. \[(3g - 4) + (4g + 10) = 90\]

5. \[3^2 + 4^2 = x^2\]

6. \[x^2 + 5^2 = 10^2\]

7. \[x^2 + \left(7\sqrt{3}\right)^2 = (2x)^2\]

**Topic Resource:** [Linear Equations, Solving Equations](#)

Solve each system of equations

8. \[y = 3x\]

9. \[5x + y = 24\]

10. \[y = 3x + 8\]

11. \[x = y\]

12. \[3x + y = 19\]

13. \[2x - 5y = -10\]
\[ 2y = 3x - 1 \]
\[ 2y = x + 21 \]

Topic Resource: **Solving System of Linear Equations**

**Find the product or quotient.**

12. \( \left( \frac{-4}{5} \right) \left( \frac{-1}{5} \right) \)

13. \( \left( \frac{-5}{6} \right) \div \left( \frac{-1}{2} \right) \)

Topic Resource: **Multiplying Fractions, Dividing Fractions**

**Simplify the following fractions.**

14. \( \frac{5bc}{10b^2} \)

15. \( \frac{9x - 6y}{3} \)

16. \( \frac{5a + 5b}{a^2 - b^2} \)

17. \( \frac{3x^2 - 6x - 24}{3x^2 + 2x - 8} \)

Topic Resource: **Simplifying Rational Expressions**

**Give the dimensions of each matrix and tell whether the matrices can be multiplied. If so, find the product.**

18. \[
\begin{bmatrix}
2 & 7 \\
-4 &
\end{bmatrix}
\begin{bmatrix}
1 & 0 & 6 & 4
\end{bmatrix}
\]

19. \[
\begin{bmatrix}
6 & 2 & 0 \\
1 & 0 & 8 \\
4 & -2 & 5
\end{bmatrix}
\begin{bmatrix}
2 & 0 \\
1 & -3 \\
0 & 4
\end{bmatrix}
\]

Topic Resource: **Multiplying Matrices**

**Simplify each expression. If the expression does not represent a real number, say so.**
20. \( \sqrt{300} \)
21. \( \sqrt{17^2} \)
22. \( (2\sqrt{3})^2 \)
23. \( \sqrt[3]{-64} \)
24. \( \sqrt[4]{81} \)
25. \( \sqrt[3]{-0.008} \)
26. \( \sqrt{\frac{5}{3}} \)

Topic Resource: Simplifying Radicals

Tell whether the given lines are parallel, perpendicular, or neither.

27. \( x - 2y = 1 \)
28. \( 2x = 4y + 3 \)
29. \( 2x + y = 1 \)
30. \( x + 2y = 3 \)
31. \( 2x + 3y = 6 \)
32. \( 3x - 2y = 4 \)

Topic Resource: Equations of Parallel and Perpendicular Lines

Find an equation for the line described.

30. Passing through the points (-2, 3) and (-2, 6)
31. Through \( P(-2, 1) \) and parallel to the line containing (1, 4) and (2, 3)
32. Through \( P(-2, 1) \) and perpendicular to the line containing (2, 3) and (1, -2).

Topic Resource: Equations of Parallel and Perpendicular Lines

Evaluate each expression for the given values of the variables.

33. Length of a hypotenuse of a right triangle: \( \sqrt{a^2 + b^2} \) when \( a = 15 \) and \( b = 20 \).
34. Perimeter of a parallelogram: \(2x + 2y\) when \(x = \frac{5}{3}\) and \(y = \frac{3}{2}\).

**Topic Resource:** [Evaluating Expressions](#)

**Solve each variable for the indicated variable.**

35. \(ax + by = c\) for \(x\)

36. \(C = \pi d\) for \(d\)

37. \(a^2 + b^2 = \left(a\sqrt{2}\right)^2\) for \(b\)

**Topic Resource:** [Solving for a Variable](#)

**Show the steps and state the mathematical properties used in simplifying the expression.**

38. \(12(x - 3) - 6(5x - 1)\)

39. \(\left(\frac{1}{5} + y + \frac{2}{5} - y\right)(2x + y + 8x)\)

**Topic Resource:** [Multiplying Polynomials; Algebraic Properties](#)

**Solve the proportion.**

40. \(\frac{x}{8} = \frac{3}{4}\)

41. \(\frac{x}{28} = \frac{x - 1}{50}\)

42. \(\frac{9}{5} = \frac{w + 21}{w + 5}\)

**Topic Resource:** [Solving Proportions](#)

**Graph the linear equation.**

43. \(y = x + 7\)
44. \( x + y = 11 \)

45. \( 4x + 5y = 20 \)

**Topic Resource:** [Graphing Linear Equations](#)

The points are the vertices of a figure in the coordinate plane. Plot the points and find the perimeter and/or area of the figure.

46. \((-1, -1), (4, -1), (4, 2), (-1, 2)\); perimeter and area

47. \((0, 0), (2, 2), (-5, 1)\); perimeter only

**Topic Resource:** [Area & Perimeter](#)

**Find \( B \) such that \( X \) is the midpoint between \( A \) and \( B \).**

48. \( A(9, -4), X(2, 2) \)

**Topic Resource:** [Midpoint, Distance Formula](#)

49. Your final average in algebra class is 75% of your semester average plus 25% of your final exam. If your semester average is 90 points and your final average is 92, what is your final exam grade?

**Topic Resource:** [Averages](#)

50.

\[ a) \text{ Find the following products.} \]

\[ 3(-3) = \quad 3(-2) = \quad 3(-1) = \]

\[ -3 + 3 = \quad -2 + 2 = \quad -1 + 1 = \]

\[ 3(-3 + 3) = \quad 3(-2 + 2) = \quad 3(-1 + 1) = \]

\[ b) \text{ Use your observations from part } a) \text{ to prove that } a(-b) = -(ab) \]

Your proof should include the properties of the Additive Inverse Identity and the distributive property.

**Topic Resource:** [Algebraic Properties](#)