CHAPTER 1

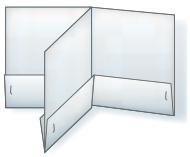
Study Guide and Review

Download Vocabulary Review from algebra2.com

FOLDABLES Study Organizer

GET READY to Study

Be sure the following Key Concepts are noted in your Foldable.



Key Concepts

Expressions and Formulas (Lesson 1-1)

- Use the order of operations and the properties of equality to solve equations.

Properties of Real Numbers (Lesson 1-2)

- Real numbers can be classified as rational (Q) or irrational (I). Rational numbers can be classified as natural numbers (N), whole numbers (W), integers (Z), and/or quotients of these.

Solving Equations (Lesson 1-3 and 1-4)

- Verbal expressions can be translated into algebraic expressions.
- The absolute value of a number is the number of units it is from 0 on a number line.
- For any real numbers a and b, where $b \geq 0$, if $|a| = b$, then $a = b$ or $-a = b$.

Solving Inequalities (Lessons 1-5 and 1-6)

- Adding or subtracting the same number from each side of an inequality does not change the truth of the inequality.
- When you multiply or divide each side of an inequality by a negative number, the direction of the inequality symbol must be *reversed*.
- The graph of an *and* compound inequality is the intersection of the solution sets of the two inequalities. The graph of an *or* compound inequality is the union of the solution sets of the two inequalities.
- An *and* compound inequality can be expressed in two different ways. For example, $-2 \leq x \leq 3$ is equivalent to $x \geq -2$ and $x \leq 3$.
- For all real numbers a and b, where $b > 0$, the following statements are true.
  1. If $|a| < b$ then $-b < a < b$.
  2. If $|a| > b$ then $a > b$ or $a < -b$.

Key Vocabulary

absolute value (p. 27)
algebraic expression (p. 6)
coefficient (p. 7)
counterexample (p. 17)
empty set (p. 28)
equation (p. 18)
formula (p. 8)
intersection (p. 41)
irrational numbers (p. 11)
like terms (p. 7)
monomial (p. 6)
polynomial (p. 7)
rational numbers (p. 11)
real numbers (p. 11)
solution (p. 19)
trinomial (p. 7)
union (p. 42)

Vocabulary Check

Choose the term from the list above that best completes each statement.

1. The _____ contains no elements.
2. A polynomial with exactly three terms is called a _____.
3. The set of _____ includes terminating and repeating decimals but does not include π.
4. _____ can be combined by adding or subtracting their coefficients.
5. The _____ of a number is never negative.
6. The set of _____ contains the rational and the irrational numbers.
7. The _____ of the term $-6xy$ is -6.
8. A(n) _____ to an equation is a value that makes the equation true.
9. A(n) _____ is a statement that two expressions have the same value.
10. $\sqrt{2}$ belongs to the set of _____ but $\frac{1}{2}$ does not.

Lesson-by-Lesson Review

1–1 Expressions and Formulas (pp. 6–10)

Evaluate each expression.

11. $10 + 16 \div 4 + 8$

12. $[21 - (9 - 2)] \div 2$

13. $\frac{1}{2}(5^2 + 3)$

14. $\frac{14(8 - 15)}{2}$

Evaluate each expression if $a = 12$, $b = 0.5$, $c = -3$, and $d = \frac{1}{3}$.

15. $6b - 5c$

16. $c^3 + ad$

17. $\frac{9c + ab}{c}$

18. $a[b^2(b + a)]$

19. DISTANCE The formula to evaluate distance is $d = r \times t$, where d is distance, r is rate, and t is time. How far can Tosha drive in 4 hours if she is driving at 65 miles per hour?

Example 1 Evaluate $(10 - 2) \div 2^2$.

$(10 - 2) \div 2^2 = 8 \div 2^2$ First subtract 2 from 10.

$= 8 \div 4$ Then square 2.

$= 2$ Finally, divide 8 by 4.

Example 2 Evaluate $\frac{y^3}{3ab + 2}$ if $y = 4$, $a = -2$, and $b = -5$.

$\frac{y^3}{3ab + 2} = \frac{4^3}{3(-2)(-5) + 2}$ $y = 4$, $a = -2$, and $b = -5$

$= \frac{64}{3(10) + 2}$ Evaluate the numerator and denominator separately.

$= \frac{64}{32}$ or 2 Simplify.

1–2 Properties of Real Numbers (pp. 11–17)

Name the sets of numbers to which each value belongs.

20. $-\sqrt{9}$

21. $1.\overline{6}$

22. $\sqrt{18}$

Simplify each expression.

23. $2m + 7n - 6m - 5n$

24. $-5(a - 4b) + 4b$

25. $2(5x + 4y) - 3(x + 8y)$

CLOTHING **For Exercises 26 and 27, use the following information.**
A department store sells shirts for $12.50 each. Dalila buys 2, Latisha buys 3, and Pilar buys 1.

26. Illustrate the Distributive Property by writing two expressions to represent the cost of these shirts.

27. Use the Distributive Property to find how much money the store received from selling these shirts.

Example 3 Name the sets of numbers to which $\sqrt{25}$ belongs.

$\sqrt{25} = 5$ naturals (N), wholes (W), integers (Z), rationals (Q), and reals (R)

Example 4 Simplify $3(x + 2) + 4x - 3y$.

$3(x + 2) + 4x - 3y$

$= 3(x) + 3(2) + 4x - 3y$ Distributive Property

$= 3x + 6 + 4x - 3y$ Multiply.

$= 7x - 3y + 6$ Simplify.

Mixed Problem Solving
For mixed problem-solving practice, see page 926.

1–3 Solving Equations (pp. 18–26)

Solve each equation. Check your solution.

28. $x - 6 = -20$

29. $-\frac{2}{3}a = 14$

30. $7 + 5n = -58$

31. $3w + 14 = 7w + 2$

32. $\frac{n}{4} + \frac{n}{3} = \frac{1}{2}$

33. $5y + 4 = 2(y - 4)$

34. MONEY If Tabitha has 98 cents and you know she has 2 quarters, 1 dime, and 3 pennies, how many nickels does she have?

Solve each equation or formula for the specified variable.

35. $Ax + By = C$ for x

36. $\frac{a - 4b^2}{2c} = d$ for a

37. $A = p + prt$ for p

38. $d = b^2 - 4ac$ for c

39. GEOMETRY Alex wants to find the radius of the circular base of a cone. He knows the height of the cone is 8 inches and the volume of the cone is 18.84 cubic inches. Use the formula for volume of a cone, $V = \frac{1}{3}\pi r^2 h$, to find the radius.

Example 5 Solve $4(a + 5) - 2(a + 6) = 3$.

$4(a + 5) - 2(a + 6) = 3$	Original equation
$4a + 20 - 2a - 12 = 3$	Distributive Property
$4a - 2a + 20 - 12 = 3$	Commutative Property
$2a + 8 = 3$	Distributive and Substitution Properties
$2a = -5$	Subtraction Property
$a = -2.5$	Division Property

Example 6 Solve $A = \frac{h(a + b)}{2}$ for b.

$2A = h(a + b)$	Multiply each side by 2.
$\frac{2A}{h} = a + b$	Divide each side by h.
$\frac{2A}{h} - a = b$	Subtract a from each side.

1–4 Solving Absolute Value Equations (pp. 27–31)

Solve each equation. Check your solution.

40. $|x + 11| = 42$

41. $3|x + 6| = 36$

42. $|4x - 5| = -25$

43. $|x + 7| = 3x - 5$

44. $|y - 5| - 2 = 10$

45. $4|3x + 4| = 4x + 8$

46. BIKING Paloma's training goal is to ride four miles on her bicycle in 15 minutes. If her actual time is always within plus or minus 3 minutes of her preferred time, how long are her shortest and longest rides?

Example 7 Solve $|2x + 9| = 11$.

Case 1: $a = b$	**Case 2:** $a = -b$
$2x + 9 = 11$	$2x + 9 = -11$
$2x = 2$	$2x = -20$
$x = 1$	$x = -10$

The solutions are 1 and -10.

Study Guide and Review

1–5 Solving Inequalities (pp. 33–39)

Solve each inequality. Describe the solution set using set builder notation. Then graph the solution set on a number line.

47. $-7w > 28$

48. $3x + 4 \geq 19$

49. $\frac{n}{12} + 5 \leq 7$

50. $3(6 - 5a) < 12a - 36$

51. $2 - 3z \geq 7(8 - 2z) + 12$

52. $8(2x - 1) > 11x - 17$

53. PIZZA A group has \$75 to order 6 large pizzas each with the same amount of toppings. Each pizza costs \$9 plus \$1.25 per topping. Write and solve an inequality to determine how many toppings the group can order on each pizza.

Example 8 **Solve $5 - 4a > 8$. Graph the solution set on a number line.**

$5 - 4a > 8$ Original inequality

$-4a > 3$ Subtract 5 from each side.

$a < -\frac{3}{4}$ Divide each side by -4, reversing the inequality symbol.

The solution set is $\left\{a \mid a < -\frac{3}{4}\right\}$.

The graph of the solution set is shown below.

1–6 Solving Compound and Absolute Value Inequalities (pp. 41–48)

Solve each inequality. Graph the solution set on a number line.

54. $4x + 3 < 11$ or $2x - 1 > 9$

55. $-1 < 3a + 2 < 14$

56. $-1 < 3(d - 2) \leq 9$

57. $5y - 4 > 16$ or $3y + 2 < 1$

58. $|x| + 1 > 12$

59. $|2y - 9| \leq 27$

60. $|5n - 8| > -4$

61. $|3b + 11| > 1$

62. FENCING Don is building a fence around a rectangular plot and wants the perimeter to be between 17 and 20 yards. The width of the plot is 5 yards. Write and solve a compound inequality to describe the range of possible measures for the length of the fence.

Example 9 **Solve each inequality. Graph the solution set on a number line.**

a. $-19 < 4d - 7 \leq 13$

$-19 < 4d - 7 \leq 13$ Original inequality

$-12 < 4d \leq 20$ Add 7 to each part.

$-3 < d \leq 5$ Divide each part by 4.

The solution set is $\{d \mid -3 < d \leq 5\}$.

b. $|2x + 4| \geq 12$

$|2x + 4| \geq 12$ is equivalent to $2x + 4 \geq 12$ or $2x + 4 \leq -12$.

$2x + 4 \geq 12$ or $2x + 4 \leq -12$

$2x \geq 8$ $\quad$ $2x \leq -16$ Subtract.

$x \geq 4$ $\quad$ $x \leq -8$ Divide.

The solution set is $\{x \mid x \geq 4 \text{ or } x \leq -8\}$.