

**Concept and Vocabulary:**

1. Terms that have the same variable factors, such as  $7x$  and  $5x$ , are called \_\_\_\_\_ terms.
2. If  $a$  and  $b$  are real numbers, the commutative property of addition states that  $a + b =$  \_\_\_\_\_.
3. If  $a$  and  $b$  are real numbers, the commutative property of multiplication states that \_\_\_\_\_  $= ba$ .
4. If  $a$ ,  $b$ , and  $c$  are real numbers, the associative property of addition states that  $(a + b) + c =$  \_\_\_\_\_.
5. If  $a$ ,  $b$ , and  $c$  are real numbers, the associative property of multiplication states that \_\_\_\_\_  $= a(bc)$ .
6. If  $a$ ,  $b$ , and  $c$  are real numbers, the distributive property states that  $a(b + c) =$  \_\_\_\_\_.
7. An algebraic expression is \_\_\_\_\_ when parentheses have been removed and like terms have been combined.

**Practice Exercises:**

In exercises 1 - 5 odd, an algebraic expression is given. Use each expression to answer the given questions.

1.  $3x + 5$ 
  - a. How many terms are there in the algebraic expression?
  - b. What is the numerical coefficient of the first term?
  - c. What is the constant term?
  - d. Does the algebraic expression contain like terms? If so, what are the like terms?

3.  $x + 2 + 5x$

- a. How many terms are there in the algebraic expression?
- b. What is the numerical coefficient of the first term?
- c. What is the constant term?
- d. Does the algebraic expression contain like terms? If so, what are the like terms?

5.  $4y + 1 + 3x$

- a. How many terms are there in the algebraic expression?
- b. What is the numerical coefficient of the first term?
- c. What is the constant term?
- d. Does the algebraic expression contain like terms? If so, what are the like terms?

In exercises 7 - 13 odd, use the commutative property of addition to write an equivalent algebraic expression.

7.  $y + 4$

11.  $4x + 5y$

9.  $5 + 3x$

13.  $5(x + 3)$

In exercises 15 - 21, use the commutative property of multiplication to write an equivalent algebraic expression.

15.  $9x$

19.  $7x + 23$

17.  $x + y6$

21.  $5(x + 3)$

In exercises 23 and 25, use an associative property to rewrite each algebraic expression. Once the grouping has been changed, simplify the resulting algebraic expression.

23.  $7 + (5 + x)$

25.  $7(4x)$

In exercises 27 - 45 odd, use a form of the distributive property to rewrite each algebraic expression without parentheses.

27.  $3(x + 5)$

37.  $2(4x - 5)$

29.  $8(2x + 3)$

39.  $\frac{1}{2}(5x - 12)$

31.  $\frac{1}{3}(12 + 6r)$

41.  $(2x + 7)4$

33.  $5(x + y)$

43.  $6(x + 3 + 2y)$

35.  $3(x - 2)$

45.  $5(3x - 2 + 4y)$

In exercises 47 - 55 and 61 - 63 odd, simplify each algebraic expression.

47.  $7x + 10x$

55.  $2x + 5 + 7x - 4$

49.  $11a - 3a$

61.  $12 + 5(3x - 2)$

51.  $3 + (x + 11)$

63.  $7(3a + 2b) + 5(4a + 2b)$

53.  $5y + 3 + 6y$

