Practice 2-1 Properties of Numbers

Simplify each expression using mental math.

1. \(4 \cdot 13 \cdot 25\)  
2. \(700 + 127 + 300\)  
3. \(68 + 85 + 32\)

4. \(2 \cdot 3 \cdot 4 \cdot 5\)  
5. \(-14 + 71 + 29 + (-86)\)  
6. \(125 \cdot 9 \cdot 8\)

7. \(20 \cdot 7 \cdot 5\)  
8. \(217 + 545 - 17\)  
9. \(39 + 27 + 11\)

10. \(4 \cdot 12 \cdot 250\)  
11. \(19 + 0 + (-9)\)  
12. \(-6 \cdot 1 \cdot 30\)

Write the letter of the property shown.

13. \(14mn = (14m)n\)  
a. commutative property of addition  
b. associative property of addition  
c. commutative property of multiplication  
d. associative property of multiplication  
e. additive identity  
f. multiplicative identity

14. \(19 + 11 = 11 + 19\)  
15. \(k \cdot 1 = k\)

16. \((x + y) + z = x + (y + z)\)

17. \(65t = t(65)\)

18. \(p = 0 + p\)

19. \(n = 1 \cdot n\)

20. \((x + p) + (r + t) = (r + t) + (x + p)\)

21. \((h + 0) + 4 = h + 4\)

22. \(x + yz = x + zy\)

Evaluate each expression using mental math.

23. \((yz), \text{for } x = 8, y = -9, z = 5\)

24. \((q + r + s), \text{for } q = 46, r = 19, s = 54\)

25. \((a(b)(-c)), \text{for } a = 7, b = -2, c = 15\)
Practice 2-2  The Distributive Property

Write an expression using parentheses for each model. Then multiply.

1. \[ 3(4x + 2) \]
2. \[ (5y + 3)(2y - 1) \]

Multiply each expression.

3. \[ 6(h - 4) \]
4. \[ (p + 3)5 \]
5. \[ -3(x + 8) \]
6. \[ (4 - y)(-9) \]
7. \[ 2(7n - 11) \]
8. \[ -10(-a + 5) \]

Use the distributive property to simplify.

9. \[ 98 \cdot 7 \]
10. \[ 9 \cdot 28 \]
11. \[ 78 \cdot 8 \]
12. \[ 7(2,009) \]
13. \[ 899 \cdot 5 \]
14. \[ 30 \cdot 105 \]
15. \[ 8 \cdot 5 - 12 \cdot 5 \]
16. \[ 7 \cdot 10 + 7(-3) \]
17. \[ -4(3) + (-4)(6) \]
18. \[ 6(8) + 6(-2) \]

Solve using mental math.

19. A shipping container holds 144 boxes. How many boxes can be shipped in 4 containers?

Practice 2-3  Simplifying Variable Expressions

Simplify each expression.

1. \[ 16 + 7y - 8 \]
2. \[ 18m - 7 + 12m \]
3. \[ 5(3x) - 7(2x) \]
4. \[ 2x - 9y + 7x + 20y \]
5. \[ 3(9k - 4) - 4(5n - 3) \]
6. \[ 6g - h - 6(g - h) \]
7. \[ -2(5a + 2b) + 14a - 9b \]
8. \[ -7a + 3(a - c) + 5c \]
9. \[ -2(-5q + (-72)(-q) \]

Name the coefficients, any like terms, and any constants.

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<th>Coefficients</th>
<th>Like Terms</th>
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Write an expression for each model. Simplify the expression.

15. \[ \text{expression} \]
16. \[ \text{expression} \]

Justify each step.

17. \[ 5(n + 4) + 9n = (5n + 20) + 9n \]
   \[ = 5n + (20 + 9n) \]
   \[ = 5n + (9n + 20) \]
   \[ = (5n + 9n) + 20 \]
   \[ = (5 + 9)n + 20 \]
   \[ = 14n + 20 \]
**Practice 2-5 Solving Equations by Adding or Subtracting**

Use mental math to solve each equation.

1. $-52 = -52 + k$
2. $837 = p + 37$
3. $x - 155 = 15$
4. $180 = 80 + n$
5. $2,000 + y = 9,500$
6. $81 = x - 19$
7. $111 + f = 100$
8. $w - 6 = -16$

Solve each equation.

9. $m - 17 = -8$
10. $k - 55 = 67$
11. $-44 + n = 36$
12. $-36 = p - 91$
13. $x - 255 = 671$
14. $19 = c - (-12)$
15. $x + 14 = 21$
16. $31 = p + 17$
17. $-19 = k + 9$
18. $87 + y = 19$
19. $36 + n = 75$
20. $-176 = h + (-219)$
21. $41 + k = 7$
22. $1,523 + c = 2,766$
23. $-88 + z = 0$
24. $-33 + (-7) = 29 + m$
25. $t + (-2) = -66$
26. $-390 + x = 11 - 67$

27. The combined enrollment in the three grades at Jefferson Middle School is 977. There are 356 students in the seventh grade and 365 in the eighth grade. Write and solve an equation to find how many students are in the ninth grade.

Equation 

Solution
Solve each equation.

1. \( \frac{x}{-3} = -5 \)
2. \( -3 = \frac{n}{y} \)
3. \( \frac{x}{12} = 0 \)
4. \( -6 = \frac{m}{2} \)
5. \( \frac{y}{4} = -12 \)
6. \( \frac{x}{30} = 6 \)
7. \( \frac{1}{9}z = 0 \)
8. \( -\frac{m}{35} = 1 \)
9. \( -3x = 18 \)
10. \( -56 = 8y \)
11. \( 8p = -8 \)
12. \( -4s = -32 \)
13. \( 14h = 42 \)
14. \( -175 = 25g \)
15. \( -42 = 6m \)
16. \( -2x = 34 \)
17. \( \frac{t}{-9} = -11 \)
18. \( 216 = 9w \)
19. \( -17v = -17 \)
20. \( -161 = 23t \)
21. \( 56h = 3,136 \)
22. \( 20 = \frac{t}{-25} \)
23. \( 4,200 = 30x \)
24. \( \frac{y}{-21} = -21 \)
25. \( \frac{m}{3} = 21 \)
26. \( 4,000 = \frac{x}{-40} \)

27. A bamboo tree grew 3 in. per day. Write and solve an equation to find how many days \( d \) it took the tree to grow 144 in.

Equation: ___________________________ Solution: ___________________________

28. Carl drove 561 miles. His car averages 33 miles per gallon of gas. Write and solve an equation to find how much gas \( g \) Carl’s car used.

Equation: ___________________________ Solution: ___________________________

For what values of \( y \) is each equation true?

29. \(-5|y| = -25\)
30. \(\frac{1}{2}y = 28\)
31. \(9|y| = 27\)