Got It? 4. The shipping cost for an order at an online store is $\frac{1}{10}$ the cost of the items you order. What is an expression for the total cost of a given order? What are the total costs for orders of \$43, \$79, \$95, and \$103?

Lesson Check

Do you know HOW?

What is the simplified form of each expression?

1. 5^2
2. 2^3
3. $\left(\frac{3}{4}\right)^2$

Evaluate each expression for $x = 3$ and $y = 4$.

4. $x^2 + 2(x + y)$
5. $(xy)^3$
6. $4x^2 - 3xy$

Do you UNDERSTAND? MATHEMATICAL PRACTICES

7. **Vocabulary** Identify the exponent and the base in 4^3.
8. **Error Analysis** A student simplifies an expression as shown below. Find the error and simplify the expression correctly.

$$23 - 8 \cdot 2 + 3^2 = 23 - 8 \cdot 2 + 9$$
$$= 15 \cdot 2 + 9$$
$$= 30 + 9$$
$$= 39 \quad \text{✗}$$

Practice and Problem-Solving Exercises MATHEMATICAL PRACTICES

A Practice

Simplify each expression. See Problems 1 and 2.

9. 3^5
10. 4^3
11. 2^4
12. 10^8
13. $\left(\frac{2}{3}\right)^3$
14. $\left(\frac{1}{2}\right)^4$
15. $(0.4)^6$
16. 7^4
17. $20 - 2 \cdot 3^2$
18. $6 + 4 \div 2 + 3$
19. $(6^2 - 3^3) \div 2$
20. $5 \cdot 2^2 \div 2 + 8$
21. $80 - (4 - 1)^3$
22. $52 + 8^2 - 3(4 - 2)^3$
23. $\frac{6^4 \div 3^2}{9}$
24. $\frac{2 \cdot 7 + 4}{9 \div 3}$

Evaluate each expression for $s = 4$ and $t = 8$. See Problem 3.

25. $(s + t)^3$
26. $s^4 + t^2 + s \div 2$
27. $(st)^2 \div (st^2)$
28. $3st^2 \div (st) + 6$
29. $(t - s)^5$
30. $(2s)^2 t$
31. $2st^2 - s^2$
32. $2s^2 - t^3 \div 16$
33. $\frac{(3s)^3 t + t}{s}$

34. Write an expression for the amount of change you will get when you pay for a purchase p with a \$20 bill. Make a table to find the amounts of change you will get for purchases of \$11.59, \$17.50, \$19.00, and \$20.00. See Problem 4.
35. An object's momentum is defined as the product of its mass m and velocity v. Write an expression for the momentum of an object. Make a table to find the momentums of a vehicle with a mass of 1000 kg moving at a velocity of 15 m/s, 20 m/s, and 25 m/s.

Apply

36. Geometry The expression $\pi r^2 h$ represents the volume of a cylinder with radius r and height h.

a. What is the volume, to the nearest tenth of a cubic inch, of the juice can at the right? Use 3.14 for π.

b. Reasoning About how many cubic inches, to the nearest tenth of a cubic inch, does a fluid ounce of juice fill?

Simplify each expression.

37. $2[(8-4)^5 \div 8]$

38. $3[(4-2)^5 - 20]$

39. $10 - (2^3 + 4) \div 3 - 1$

40. $\dfrac{22 + 1^3 + (3^4 - 7^2)}{2^3}$

41. $3[42 - 2(10^2 - 9^2)]$

42. $\dfrac{2[8 + (67 - 2^6)^3]}{9}$

43. Think About a Plan The snack bar at your school has added sushi to its menu. The ingredients for one roll include sushi rice, seaweed sheets, cucumbers, cream cheese, and 3 oz of smoked salmon. One roll can be cut into 8 servings. Write an expression for the amount of salmon needed to make s servings of sushi. How much salmon is needed to make 16 servings? 24 servings? 80 servings? 100 servings?

- What operations are needed in your calculations?
- Use a table to help you organize your results. What will you use for the column headings in your table?

44. Salary You earn \$10 for each hour you work at a canoe rental shop. Write an expression for your salary for working the number of hours h. Make a table to find how much you earn for working 10 h, 20 h, 30 h, and 40 h.

Evaluate each expression for the given values of the variables.

45. $3(s-t)^2$; $s = 4, t = 1$

46. $2x - y^2$; $x = 7, y = 3.5$

47. $3m^2 - n$; $m = 2, n = 6$

48. $(2a + 2b)^2$; $a = 3, b = 4$

49. $2p^2 + (2q)^2$; $p = 4, q = 3$

50. $(4c - d + 0.2)^2 - 10c$; $c = 3.1, d = 4.6$

51. $\dfrac{3g + 6}{h}$; $g = 5, h = 7$

52. $\dfrac{2w + 3v}{v^2}$; $v = 6, w = 1$

53. Writing Consider the expression $(1 + 5)^2 - (18 \div 3)$. Can you perform the operations in different orders and still get the correct answer? Explain.

54. A student wrote the expressions shown and claimed they were equal for all values of x and y.

$(x + y)^2$
$x^2 + y^2$

a. Evaluate each expression for $x = 1$ and $y = 0$.

b. Evaluate each expression for $x = 1$ and $y = 2$.

c. Open-Ended Choose another pair of values for x and y. Evaluate each expression for those values.

d. Writing Is the student's claim correct? Justify your answer.

55. Find the value of $14 + 5 \cdot 3 - 3^2$. Then change two operation signs so that the value of the expression is 8.