8-1

1. Plan

Objectives
1 To simplify expressions with zero and negative exponents
2 To evaluate exponential expressions

Examples
1 Simplifying a Power
2 Simplifying an Exponential Expression
3 Evaluating an Exponential Expression
4 Real-World Problem Solving

Professional Development

Math Background

The word "exponent" is derived from Latin words meaning "out of place." Since an exponent is written smaller, above the base line, and to the right, it is truly out of place!

More Math Background: p. 428C

Lesson Planning and Resources

See p. 428E for a list of the resources that support this lesson.

PowerPoint

Bell Ringer Practice

Check Skills You'll Need
For intervention, direct students to:

Exponents
Lesson 1-2: Example 4
Extra Skills and Word Problem Practice, Ch. 1

Multiplying and Dividing
Lesson 2-3: Example 7
Extra Skills and Word Problem Practice, Ch. 2

Zero and Negative Exponents

What You'll Learn
- To simplify expressions with zero and negative exponents
- To evaluate exponential expressions

. . . And Why
To find the size of a population, as in Example 4

Check Skills You'll Need

GO for Help Lessons 1-2 and 2-3

Simplify each expression.

1. 2^3 8
2. $\frac{1}{4^2}$ $\frac{1}{16}$
3. $4^2 \div 2^2$ 4
4. $(-3)^3$ −27
5. -3^3 −27
6. $6^2 \div 12$ 3

Evaluate each expression for $a = 2$, $b = -1$, and $c = 0.5$.

7. $\frac{a}{2a}$ $\frac{1}{2}$
8. $\frac{bc}{c}$ −1
9. $\frac{ab}{bc}$ 4

1 Zero and Negative Exponents

Activity: Exponents

1. a. Copy the table below. Replace each blank with the value of the power in simplest form.

2^x	5^x	10^x	
$2^4 =$ ■	$5^4 =$ ■	$10^4 =$ ■	16, 625, 10,000
$2^3 =$ ■	$5^3 =$ ■	$10^3 =$ ■	8, 125, 1000
$2^2 =$ ■	$5^2 =$ ■	$10^2 =$ ■	4, 25, 100

b. Look at the values that you used to replace the blanks. What pattern do you see as you go down each column? See left.

1b. In the first column, each term is $\frac{1}{2}$ the previous term. In the second column, each term is $\frac{1}{5}$ the previous term. In the third column, each term is $\frac{1}{10}$ the previous term.

2. Copy the table below. Use the pattern you described in Question 1 to complete the table.

2^x	5^x	10^x	
$2^1 =$ ■	$5^1 =$ ■	$10^1 =$ ■	2, 5, 10
$2^0 =$ ■	$5^0 =$ ■	$10^0 =$ ■	1, 1, 1
$2^{-1} =$ ■	$5^{-1} =$ ■	$10^{-1} =$ ■	$\frac{1}{2}$, $\frac{1}{5}$, $\frac{1}{10}$
$2^{-2} =$ ■	$5^{-2} =$ ■	$10^{-2} =$ ■	$\frac{1}{4}$, $\frac{1}{25}$, $\frac{1}{100}$

3. Critical Thinking What pattern do you notice in the row with 0 as an exponent? The values are all 1.

4. Copy and complete each expression.
a. $2^{-1} = \frac{1}{2^{\blacksquare}}$ 1 **b.** $2^{-2} = \frac{1}{2^{\blacksquare}}$ 2 **c.** $2^{-3} = \frac{1}{2^{\blacksquare}}$ 3

Differentiated Instruction Solutions for All Learners

Special Needs L1
Some students may have writing difficulties that make it hard to copy a lot of data in a short amount of time. Let these students just write their replacements for the blanks, or work with a partner.
learning style: verbal

Below Level L2
In Example 4, suggest that students make a table to help keep track of what w represents in different situations.
learning style: visual

Consider 3^3, 3^2, and 3^1. Decreasing the exponent by one is the same as dividing by 3. Continuing the pattern, 3^0 equals 1 and 3^{-1} equals $\frac{1}{3}$.

Key Concepts

Property **Zero as an Exponent**

For every nonzero number a, $a^0 = 1$.

Examples $5^0 = 1$ $(-2)^0 = 1$ $(1.02)^0 = 1$ $\left(\frac{1}{3}\right)^0 = 1$

Property **Negative Exponent**

For every nonzero number a and integer n, $a^{-n} = \frac{1}{a^n}$.

Examples $6^{-4} = \frac{1}{6^4}$ $(-8)^{-1} = \frac{1}{(-8)^1}$

Why can't you use 0 as a base? By the first property, $3^0 = 1, 2^0 = 1$, and $1^0 = 1$, which implies $0^0 = 1$. However, the pattern $0^3 = 0, 0^2 = 0$, and $0^1 = 0$ implies $0^0 = 0$. Since both 1 and 0 cannot be the answer, 0^0 is undefined. In the second property, using 0 as a base results in division by zero, which you know is undefined.

1 EXAMPLE Simplifying a Power

Vocabulary Tip

Read 4^{-3} as "four to the negative three".

Simplify.

a. $4^{-3} = \frac{1}{4^3}$ Use the definition of negative exponent.

$= \frac{1}{64}$ Simplify.

b. $(-1.23)^0 = 1$ Use the definition of zero as an exponent.

Quick Check 1 Simplify each expression.

a. 3^{-4} $\frac{1}{81}$ **b.** $(-7)^0$ 1 **c.** $(-4)^{-3}$ $-\frac{1}{64}$ **d.** 7^{-1} $\frac{1}{7}$ **e.** -3^{-2} $-\frac{1}{9}$

An algebraic expression is in simplest form when it is written with only positive exponents. If the expression is a fraction in simplest form, the only common factor of the numerator and denominator is 1.

2 EXAMPLE Simplifying an Exponential Expression

Simplify each expression.

a. $4yx^{-3} = 4y\left(\frac{1}{x^3}\right)$ Use the definition of negative exponent.

$= \frac{4y}{x^3}$ Simplify.

b. $\frac{1}{w^{-4}} = 1 \div w^{-4}$ Rewrite using a division symbol.

$= 1 \div \frac{1}{w^4}$ Use the definition of negative exponent.

$= 1 \cdot w^4$ Multiply by the reciprocal of $\frac{1}{w^4}$, which is w^4.

$= w^4$ Identity Property of Multiplication

Quick Check 2 Simplify each expression.

a. $11m^{-5}$ $\frac{11}{m^5}$ **b.** $7s^{-4}t^2$ $\frac{7t^2}{s^4}$ **c.** $\frac{2}{a^{-3}}$ $2a^3$ **d.** $\frac{n^{-5}}{v^2}$ $\frac{1}{n^5v^2}$

2. Teach

Guided Instruction

Activity

1 EXAMPLE Teaching Tip

Assure students that in Lesson 5 you will demonstrate another reason why $a^0 = 1$.

2 EXAMPLE Auditory Learners

Some students may forget to remove the negative sign from the exponent after the factor is moved. Students may find it useful to remember the phrase "move it, lose it," meaning that when they *move* the factor with the negative exponent, they should *lose* the negative sign.

PowerPoint

Additional Examples

1 Simplify.

a. 3^{-2} $\frac{1}{9}$

b. $(-22.4)^0$ 1

2 Simplify each expression.

a. $3ab^{-2}$ $\frac{3a}{b^2}$

b. $\frac{1}{x^{-3}}$ x^3

Advanced Learners L4

Have students simplify $\frac{1}{x^{-1}}$.

learning style: verbal

English Language Learners ELL

In Example 4, some students may be confused by the terms *aphid* and *insect*, which are used interchangeably. Be sure that students understand the example. Ask: *How would you find the size of the population 4 weeks after the initial population?*

learning style: verbal

3 EXAMPLE Error Prevention

When students substitute -3 for t, they may incorrectly write -3^2 and multiply as "the negative of 3 times 3." Suggest that they write parentheses around their substitutions to help avoid confusion.

PowerPoint

Additional Examples

3 Evaluate $4x^2y^{-3}$ for $x = 3$ and $y = -2$. $-4\frac{1}{2}$

4 In the lab, the population of a certain bacteria doubles every month. The expression $3000 \cdot 2^m$ models a population of 3000 bacteria after m months of growth. Evaluate the expression for $m = 0$ and $m = -2$. Describe what the value of the expression represents in each situation.
When $m = 0$, the value of the expression is 3000. This represents the initial population of the bacteria.
When $m = -2$, the value of the expression is 750. This represents the 750 bacteria in the population 2 months before the present population of 3000 bacteria.

Resources
- Daily Notetaking Guide 8-1 L3
- Daily Notetaking Guide 8-1—Adapted Instruction L1

Closure

Ask students to explain the meaning of a zero exponent and the meaning of a negative exponent. **A nonzero base raised to a zero exponent is equal to 1. A nonzero base raised to a negative exponent is equal to the reciprocal of the base raised to the positive exponent.**
Also ask what the first step is for simplifying an exponential expression that contains negative exponents. **Use the definition of negative exponents to rewrite the expression with positive exponents only.**

2 Evaluating Exponential Expressions

When you evaluate an exponential expression, you can write the expression with positive exponents before substituting values.

3 EXAMPLE Evaluating an Exponential Expression

Evaluate $3m^2t^{-2}$ for $m = 2$ and $t = -3$.

Method 1 Write with positive exponents first.

$$3m^2t^{-2} = \frac{3m^2}{t^2}$$ Use the definition of negative exponent.

$$= \frac{3(2)^2}{(-3)^2}$$ Substitute 2 for m and -3 for t.

$$= \frac{12}{9} = 1\frac{1}{3}$$ Simplify.

Method 2 Substitute first.

$$3m^2t^{-2} = 3(2)^2(-3)^{-2}$$ Substitute 2 for m and -3 for t.

$$= \frac{3(2)^2}{(-3)^2}$$ Use the definition of negative exponent.

$$= \frac{12}{9} = 1\frac{1}{3}$$ Simplify.

Quick Check

3 Evaluate each expression for $n = -2$ and $w = 5$.

a. $n^{-3}w^0$ $-\frac{1}{8}$ b. $\frac{n^{-1}}{w^2}$ $-\frac{1}{50}$ c. $\frac{w^0}{n^4}$ $\frac{1}{16}$ d. $\frac{1}{nw^{-2}}$ $-12\frac{1}{2}$

You can also evaluate exponential expressions that model real-world situations.

Real-World Connection

During the months of June and July, green peach aphids in a field of potato plants can double in population every three days.

4 EXAMPLE Real-World Problem Solving

Population Growth A biologist is studying green peach aphids, like the one shown at the left. In the lab, the population doubles every week. The expression $1000 \cdot 2^w$ models an initial population of 1000 insects after w weeks of growth.

a. Evaluate the expression for $w = 0$. Then describe what the value of the expression represents in the situation.

$$1000 \cdot 2^w = 1000 \cdot 2^0$$ Substitute 0 for w.

$$= 1000 \cdot 1$$ Simplify.

$$= 1000$$

The value of the expression represents the initial population of insects. This makes sense because when $w = 0$, no time has passed.

b. Evaluate the expression for $w = -3$. Then describe what the value of the expression represents in the situation.

$$1000 \cdot 2^w = 1000 \cdot 2^{-3}$$ Substitute -3 for w.

$$= 1000 \cdot \frac{1}{8}$$ Simplify.

$$= 125$$

There were 125 aphids 3 weeks before the present population of 1000 insects.

Quick Check

4 A sample of bacteria triples each month. The expression $5400 \cdot 3^m$ models a population of 5400 bacteria after m months of growth. Evaluate the expression for $m = -2$ and $m = 0$. Describe what each value of the expression represents in the situation. **See margin.**

Quick Check

4. **600; 5400; for $x = -2$, the population is 600, 2 months before the population is 5400. For $x = 0$, it is the population when time is 0.**

EXERCISES

For more exercises, see *Extra Skill and Word Problem Practice.*

Practice and Problem Solving

A Practice by Example

Example 1 (page 431) — GO for Help

Simplify each expression.

1. $-(2.57)^0$ **−1**
2. 4^{-2} $\frac{1}{16}$
3. $(-5)^{-2}$ $\frac{1}{25}$
4. -5^{-2} $-\frac{1}{25}$
5. $(-4)^{-2}$ $\frac{1}{16}$
6. -3^{-4} $-\frac{1}{81}$
7. 2^{-6} $\frac{1}{64}$
8. -12^{-1} $-\frac{1}{12}$
9. $\frac{1}{2^0}$ **1**
10. 78^{-1} $\frac{1}{78}$
11. $(-4)^{-3}$ $-\frac{1}{64}$
12. -4^{-3} $-\frac{1}{64}$

Example 2 (page 431)

Copy and complete each equation.

13. $4n^{\blacksquare} = \frac{4}{n^2}$ **−2**
14. $\frac{x^{\blacksquare}}{2y} = \frac{1}{2x^{-3}y^4}$ **3; 4**
15. $\frac{a^{\blacksquare}}{3b} = \frac{b^3}{3}$ **0; −3**
16. $3xy^{\blacksquare} = \frac{3x}{y^5}$ **−5**

Simplify each expression.

17. $3ab^0$ **3a**
18. $5x^{-4}$ $\frac{5}{x^4}$
19. $\frac{1}{x^{-7}}$ x^7
20. $\frac{1}{c^{-1}}$ **c**
21. $\frac{5^{-2}}{p}$ $\frac{1}{25p}$
22. $a^{-4}c^0$ $\frac{1}{a^4}$
23. $\frac{3x^{-2}}{y}$ $\frac{3}{x^2y}$
24. $\frac{7ab^{-2}}{3w}$ $\frac{7a}{3b^2w}$
25. $x^{-5}y^{-7}$ $\frac{1}{x^5y^7}$
26. $x^{-5}y^7$ $\frac{y^7}{x^5}$
27. $\frac{8}{2c^{-3}}$ $4c^3$
28. $\frac{7s}{5t^{-3}}$ $\frac{7st^3}{5}$
29. $\frac{6a^{-1}c^{-3}}{d^0}$ $\frac{6}{ac^3}$
30. $2^{-3}x^2z^{-7}$ $\frac{x^2}{8z^7}$
31. $9^0y^7t^{-11}$ $\frac{y^7}{t^{11}}$
32. $\frac{7s^0t^{-5}}{2^{-1}m^2}$ $\frac{14}{m^2t^5}$

Example 3 (page 432)

Evaluate each expression for $r = -3$ and $s = 5$.

33. s^{-2} $\frac{1}{25}$
34. r^{-2} $\frac{1}{9}$
35. $-r^{-2}$ $-\frac{1}{9}$
36. s^0 **1**
37. $3s^{-2}$ $\frac{3}{25}$
38. $(2s)^{-2}$ $\frac{1}{100}$
39. $r^{-4}s^2$ $\frac{25}{81}$
40. $\frac{1}{r^{-4}s^2}$ $\frac{81}{25}$
41. s^2r^{-3} $-\frac{25}{27}$
42. r^0s^{-2} $\frac{1}{25}$
43. $5r^3s^{-1}$ **−27**
44. $2^{-4}r^3s^{-2}$ $-\frac{27}{400}$

Example 4 (page 432)

45. **a.** Suppose your allowance doubles every week. This week you receive $2.56. How much will your allowance be three weeks from now? How much was your allowance three weeks ago? **$20.48; $0.32**

b. Critical Thinking From a parent's point of view, is doubling your allowance each week a good plan? Explain.

No; the value of the allowance rapidly becomes very great.

B Apply Your Skills

Mental Math **Is the value of each expression *positive* or *negative*?**

46. -2^2 **neg.**
47. $(-2)^2$ **pos.**
48. 2^{-2} **pos.**
49. $(-2)^3$ **neg.**
50. $(-2)^{-3}$ **neg.**

Write each number as a power of 10 using negative exponents.

51. $\frac{1}{10}$ 10^{-1}
52. $\frac{1}{100}$ 10^{-2}
53. $\frac{1}{1000}$ 10^{-3}
54. $\frac{1}{10{,}000}$ 10^{-4}
55. $\frac{1}{100{,}000}$ 10^{-5}

Write each expression as a decimal.

56. 10^{-3} **0.001**
57. 10^{-6} **0.000001**
58. $7 \cdot 10^{-1}$ **0.7**
59. $3 \cdot 10^{-2}$ **0.03**
60. $5 \cdot 10^{-4}$ **0.0005**

61. **a. Patterns** Complete the pattern using powers of 5.

$\frac{1}{5^2} = \blacksquare 5^{-2}$ $\frac{1}{5^1} = \blacksquare 5^{-1}$ $\frac{1}{5^0} = \blacksquare 5^0$ $\frac{1}{5^{-1}} = \blacksquare 5^1$ $\frac{1}{5^{-2}} = \blacksquare 5^2$

b. Write $\frac{1}{5^{-4}}$ using a positive exponent. 5^4

c. Rewrite $\frac{1}{a^{-n}}$ so that the power of a is in the numerator. $\frac{a^n}{1}$

62. **Multiple Choice** Which expression is equivalent to $\frac{3x^{-2}y^3}{9x^3y^{-5}}$? **D**

(A) $\frac{3x^{-5}}{y^8}$ (B) $\frac{xy^2}{3}$ (C) $3xy^2$ (D) $\frac{y^8}{3x^5}$

3. Practice

Assignment Guide

1 A B 1-32, 46-67, 73-78

2 A B 33-45, 68-72, 79-80

C Challenge 81-87

Test Prep 88-93

Mixed Review 94-103

Homework Quick Check

To check students' understanding of key skills and concepts, go over Exercises 12, 40, 66, 77, 79.

Error Prevention!

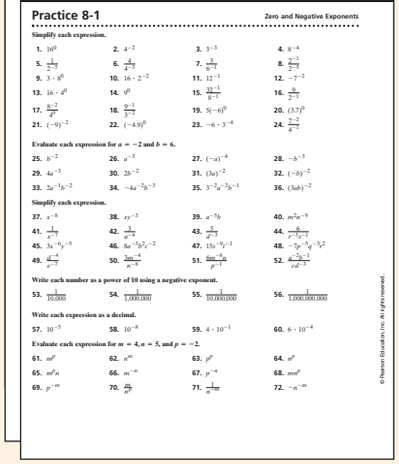
Exercises 1–12 Remind students to look at each problem carefully to determine whether a negative sign is part of the base of an exponent.

Math Tip

Exercises 51–55 Remind students that the exponent for a power of 10 is the same as the number of zeros when the number is written in standard form.

Differentiated Instruction Resources

- GPS Guided Problem Solving L3
- Enrichment L4
- Reteaching L2
- Adapted Practice L1
- Practice L3


Practice 8-1 Zero and Negative Exponents

4. Assess & Reteach

Lesson Quiz

PowerPoint

Simplify each expression.

1. 3^{-4} $\frac{1}{81}$
2. $(-6)^0$ 1
3. $-2a^0b^{-2}$ $-\frac{2}{b^2}$
4. $\frac{k}{m^{-3}}$ km^3
5. $8000 \cdot 4^0$ 8000
6. $4500 \cdot 3^{-2}$ 500

Alternative Assessment

Call on a student to give you a number from 1 through 4. Write this number on the board or overhead transparency. Ask another student to give you a positive or negative exponent. Write that number as the exponent for the base number on the board. Ask a third volunteer to simplify the expression. Ask this last student to give the first number for the next expression. Repeat the process.

Simplify each expression.

63. $45 \cdot (0.5)^0$ 45 **64.** $54 \cdot 3^{-2}$ 6 **65.** $\frac{5^{-2}}{10^{-3}}$ 40 **66.** $\frac{4^{-1}}{9^0}$ $\frac{1}{4}$ **67.** $\frac{(-3)^{-4}}{-3}$ $-\frac{1}{243}$

Evaluate each expression for $a = 3, b = 2$, and $c = -4$.

68. c^b 16 **69.** $a^{-b}b$ $\frac{2}{9}$ **70.** b^{-a} $\frac{1}{8}$ **71.** b^c $\frac{1}{16}$ **72.** $c^{-a}b^{ab}$ −1

73. Copy and complete the table below.

a	4	■ $\frac{1}{3}$	■ 6	$\frac{7}{8}$	■ 2
a^{-1}	■ $\frac{1}{4}$	3	$\frac{1}{6}$	■ $\frac{8}{7}$	0.5

74b. They are reciprocals for $a \neq 0$; $\frac{1}{a^n} = a^{-n}$ and $\frac{1}{a^{-n}} = \frac{1}{\frac{1}{a^n}} = a^n$.

74. a. Critical Thinking Simplify $a^n \cdot a^{-n}$. 1

b. What is the mathematical relationship of a^n and a^{-n}? Justify your answer. See left.

75. Which expression equals $\frac{1}{4}$? A, B, D

A. 4^{-1} **B.** 2^{-2} **C.** -4^1 **D.** $\frac{1}{2^2}$ **E.** 1^4 **F.** -2^{-2}

76. Open-Ended Choose a fraction to use as a value for the variable a. Find the values of a^{-1}, a^2, and a^{-2}. Check students' work.

77. No; $3x^{-2} \cdot 3x^2 = 9 \cdot x^0 = 9$. The product of reciprocals should be 1.

77. Critical Thinking Are $3x^{-2}$ and $3x^2$ reciprocals? Explain. See left.

78. The student multiplied b by zero instead of raising b to the zero power, which would equal 1.

78. Error Analysis A student simplified an expression as shown at the right. What error did the student make? See left.

$$\frac{x^n}{a^{-n}b^0} = \frac{a^n x^n}{b^0} = \frac{a^n x^n}{0} \text{ undefined}$$

79. Probability Suppose your history teacher gives a multiple-choice quiz. There are four questions, each with five answer choices. The probability p of guessing the answer to a question correctly is $\frac{1}{5}$. The probability q of guessing the answer to each question incorrectly is $\frac{4}{5}$.

a. The table has expressions to find the probability of correctly guessing a certain number of answers on this quiz. Copy and complete the table.

Multiple-Choice Quiz

Number Correct	Expression	Probability
0	p^0q^4	$\left(\frac{1}{5}\right)^0\left(\frac{4}{5}\right)^4 = 0.4096$
1	$4p^1q^3$	■ 0.4096
2	$6p^2q^2$	■ 0.1536
3	$4p^3q^1$	■ 0.0256
4	p^4q^0	■ 0.0016

b. Which number of correct answers is most likely? 0 or 1

80. Communication Suppose you are the only person in your class who knows a certain story. After a minute you tell a classmate. Every minute after that, every student who knows the story tells another student (sometimes the person being told already will have heard it). In a class of 30 students, the expression $\frac{30}{1 + 29 \cdot 2^{-t}}$ predicts the approximate number of people who will have heard the story after t minutes. About how many students will have heard your story after 2 min? After 5 min? After 10 min?
about 4 students; about 16 students; about 29 students

GO Online Homework Help
Visit: PHSchool.com
Web Code: ate-0801

Challenge

Simplify each expression.

81. $2^3(5^0 - 6m^2)$ **8 − 48m²** **82.** $(-5)^2 - (0.5)^{-2}$ **21** **83.** $\frac{6}{m^2} + \frac{5m^{-2}}{3^{-3}}$ $\frac{141}{m^2}$

84. $(0.8)^{-3} + 19^0 - 2^{-6}$ **2.9375** **85.** $\frac{2r^{-5}y^3}{n^2} \div \frac{r^2y^5}{2n}$ $\frac{4}{nr^7y^2}$ **86.** $2^{-1} - \frac{1}{3^{-2}} + 5\left(\frac{1}{2^2}\right)$ $-7\frac{1}{4}$

87. For what values of n is $n^{-3} = \left(\frac{1}{n}\right)^5$? **1 and −1**

Test Prep

Gridded Response

88. Evaluate the expression xy^{-1} for $x = 2$ and $y = 3$. $\frac{2}{3}$

89. Simplify $\frac{3^{-2}b^2}{a^0b^2}$. $\frac{1}{9}$

90. Evaluate the expression $(4cd)^{-2}$ for $c = 2$ and $d = 1$. $\frac{1}{64}$

91. Simplify $-6(-6)^{-1}$. **1**

92. Write $26 \cdot 10^{-2}$ as a decimal. **0.26**

93. Write $0.2584 \cdot 10^3$ as a decimal. **258.4**

Mixed Review

Lesson 7-6

Solve each system by graphing. **94–96. See margin.**

94. $y > 3x + 4$, $y \leq -3x + 1$ **95.** $y \leq -2x + 1$, $y < 2x - 1$ **96.** $y \geq 0.5x$, $y \leq x + 2$

Lesson 6-7

97. Hat Sales Use the data in the table at the right.

a. Make a scatter plot of the data. Use 87 for 1987. **a–b.**

b. Draw a trend line. **See margin.**

c. Write an equation for the trend line. **See left.**

d. Use your trend line to predict the retail sales of women's hats in 2005. **See left.**

97c. Answers may vary slightly. Sample: $y = 53x - 4328$

d. Answers may vary slightly. Sample: $1,237,000,000

Estimated Women's Retail Hat Sales

Year	Sales (millions of dollars)
1987	300
1988	345
1989	397
1990	457
1991	510
1992	587
1993	664
1994	700
1995	770
1996	792
1997	830
1998	872
1999	915

SOURCE: Headwear Information Bureau

Lesson 6-2

Write an equation of the line with the given slope and *y*-intercept.

98. $m = -1, b = 4$ $y = -x + 4$

99. $m = 5, b = -2$ $y = 5x - 2$

100. $m = \frac{2}{5}, b = -3$ $y = \frac{2}{5}x - 3$

101. $m = -\frac{3}{11}, b = -17$ $y = -\frac{3}{11}x - 17$

102. $m = \frac{5}{9}, b = \frac{1}{3}$ $y = \frac{5}{9}x + \frac{1}{3}$

103. $m = 1.25, b = -3.79$ $y = 1.25x - 3.79$

Test Prep

A sheet of blank grids is available in the Test-Taking Strategies with Transparencies booklet. Give this sheet to students for practice with filling in grids.

Resources

For additional practice with a variety of test item formats:

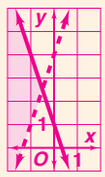
- Standardized Test Prep, p. 489
- Test-Taking Strategies, p. 484
- Test-Taking Strategies with Transparencies

Math Tip

Exercises 92, 93 Remind students that multiplying or dividing by 10 has the effect of 'moving' the decimal. Here they are dividing by 10 twice, and multiplying by 10 three times.

pages 433–435 Exercises

94.



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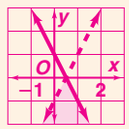

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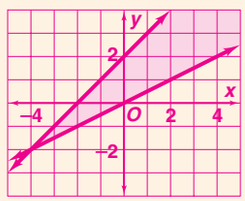

97a–b.