

Are You Ready?**Properties of Exponents****Teaching Skill 59**

Objective Simplify expressions using properties of exponents.

Review with students the vocabulary at the top of the student page and then the rule for multiplying variables with the same base.

Ask: **Do the expressions x^2 and y^2 have the same base?** (No) **What is the product of x^2 and y^2 ?** (x^2y^2) **Do you add the exponents?** (No) **Why not?** (The bases are not the same.)

Review with students how to multiply expressions that have numbers and variables. Ask: **In the expression $7x^5$, what is the number 7 called?** (the coefficient)

Emphasize that to find the product of two expressions, multiply the coefficients but add the exponents of those variables that have the same base.

Also point out that when a variable does not have a coefficient, it is understood to be 1. Likewise, when a variable does not have an exponent, it is understood to be 1.

Work through each of the examples and then have students complete the practice exercises.

PRACTICE ON YOUR OWN

In exercises 1–12, students use properties of exponents to simplify expressions.

CHECK

Determine that students understand properties of exponents.

Students who successfully complete the **Practice on Your Own** and **Check** are ready to move on to the next skill.

COMMON ERRORS

When multiplying variables with exponents, students may multiply the exponents rather than adding them.

Students who made more than 2 errors in the **Practice on Your Own**, or who were not successful in the **Check** section, may benefit from the **Alternative Teaching Strategy**.

Alternative Teaching Strategy

Objective Simplify expressions using properties of exponents.

Some students may benefit from seeing numbers and variables raised to exponents written in expanded form.

Write the following on the board: 3^4 . Ask: **How would you write this expression without an exponent?** ($3 \cdot 3 \cdot 3 \cdot 3$).

Next, write the following on the board: $3^4 \cdot 3^2$. Ask a volunteer to come to the board and rewrite the product without using any exponents. ($3 \cdot 3 \cdot 3 \cdot 3 \cdot 3 \cdot 3$) Ask: **How would you write this in exponential form?** (3^6) Write $3^4 \cdot 3^2 = 3^{4+2} = 3^6$ and point out that the result is the same.

Move on to variables. Write: x^7 . Ask: **How would you write this expression without an exponent?** ($x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x$) Have the students write the following problem on their paper: $x^4 \cdot x^6$. Instruct them to rewrite the problem without using exponents and to simplify their final answer.

$$(x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x \cdot x = x^{10})$$

Finally, present an example with variables and coefficients. Write on the board: $3n^4 \cdot 7n^2$. Ask: **What are the coefficients in this problem?** (3 and 7) **What do you do with them?** (multiply them)

Instruct students to rewrite the problem without using exponents and simplify. ($3 \cdot 7 \cdot n \cdot n \cdot n \cdot n \cdot n \cdot n = 21n^6$)

Have students use this technique to simplify the expressions below. Remind students that if a variable does not have a coefficient or an exponent, they are understood to be 1.

$$2x \cdot 12x^5 (24x^6); 5n^3 \cdot 8n^7 (40n^{10});$$

$$6p^2 \cdot p^4 (6p^6); 7h^5 \cdot 7h^5 (49h^{10})$$

When students are comfortable writing out and simplifying expressions, have them redo the problems using properties of exponents; $x^a \cdot x^b = x^{a+b}$. Remind students that you multiply coefficients and add exponents.

SKILL
59 **Are You Ready?**
Properties of Exponents

Vocabulary: X^3 → exponent
 ↓
 → base

To multiply variables with the same base, add the exponents.

Rule: $x^a \cdot x^b = x^{a+b}$

To multiply expressions that include numbers and variables:

- Multiply the coefficients. If a variable does not have a coefficient, it is understood to be 1.
- Add the exponents of those variables that are the same. If a variable does not have an expressed exponent, it is understood to be 1.

Example 1: $5n \cdot 6n$ $(5 \cdot 6)(n^{1+1}) = 30n^2$	Example 2: $-4x^3 \cdot 7x$ $(-4 \cdot 7)(x^{3+1}) = -28x^4$	Example 3: $h^3k \cdot 3h^5k^2$ $(1 \cdot 3)(h^{3+5})(k^{1+2}) = 3h^8k^3$
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Practice on Your Own
 Simplify each expression.

- | | | | |
|-----------------------------------|--------------------------------------|---|--------------------------------------|
| 1. $2x \cdot 5x$
_____ | 2. $-3a \cdot 7a^3$
_____ | 3. $-2 \cdot 8mn$
_____ | 4. $15p^2 \cdot 3pq$
_____ |
| 5. $5b^2c \cdot 5b^3c^3$
_____ | 6. $-2xy \cdot (-3xy)$
_____ | 7. $-16z^4 \cdot (-z)$
_____ | 8. $d^2e \cdot 8de$
_____ |
| 9. $6t \cdot (-3t)$
_____ | 10. $w^2 \cdot w \cdot w^5$
_____ | 11. $-2r \cdot 11r^2 \cdot (-r^4)$
_____ | 12. $5x \cdot 10y \cdot xy$
_____ |

Check
 Simplify each expression.

- | | | | |
|-------------------------------|--------------------------------|--------------------------------------|--------------------------------------|
| 13. $15f \cdot 2f$
_____ | 14. $-9 \cdot 3x^2y$
_____ | 15. $-20h \cdot (-3h^3)$
_____ | 16. $7ab \cdot 7ab$
_____ |
| 17. $p^3q \cdot 4pq$
_____ | 18. $-3u \cdot 7u^2v$
_____ | 19. $g^3 \cdot g^4 \cdot g$
_____ | 20. $-2y \cdot 8z \cdot yz$
_____ |

Are You Ready?

Simple Interest

Teaching Skill 50

Objective Calculate simple interest.

Review with students the formula for finding simple interest. Point out that *principle* is always a dollar amount, *rate* is always a percent (but should be rewritten as a decimal), and *time* is always the number of years. Ask: **What if the time is given in months?** (It must be converted to years before substituting the value into the formula.)

Work through Example 1 with students. Explain that each given value should be substituted into the formula. Make sure students understand that they will be multiplying the three values.

Next, review with students how to find the interest rate when the amount of simple interest is already known. Point out that the same formula is used; it is simply solved for r and rewritten for convenience.

Have students complete the exercises.

PRACTICE ON YOUR OWN

In exercises 1–3, students find the products and quotients of decimals and whole numbers.

In exercises 4–8, students calculate simple interest and find simple interest rates.

CHECK

Determine that students know how to calculate simple interest and find simple interest rates.

Students who successfully complete the **Practice on Your Own** and **Check** are ready to move on to the next skill.

COMMON ERRORS

Students may forget to change the percent to a decimal before multiplying.

Students who made more than 2 errors in the **Practice on Your Own**, or who were not successful in the **Check** section, may benefit from the **Alternative Teaching Strategy**.

Alternative Teaching Strategy

Objective Calculate simple interest.

Materials needed: multiple copies of the game cards shown below (index cards cut in fourths work nicely)



Tell students they are going to play “Match Them Up.”

Give each student a set of well-shuffled game cards and instruct them to leave the cards face down.

Explain that there are four sets of four numbers that correctly complete the formula for simple interest.

Remind students that the formula for finding simple interest is $I = Prt$, where I represents the amount of simple interest; P is the amount of principle; r is the interest rate; and t is the number of years.

Ask: **What does Prt mean?** (the product of P times r times t)

Tell the students that when you say “Go,” they are to turn their cards over and try to match the correct cards. The first student to find all four sets wins.

Answers:

$$\text{Set 1: } \$630 = (\$7000)(3\%)(3)$$

$$\text{Set 2: } \$450 = (\$9000)(1\%)(5)$$

$$\text{Set 3: } \$640 = (\$4000)(8\%)(2)$$

$$\text{Set 4: } \$2000 = (\$5000)(4\%)(10)$$

SKILL

50

Are You Ready?**Simple Interest**

Finding the Amount of Interest	Finding the Interest Rate
Simple Interest Formula: $I = Prt$ P = principle (the amount invested) r = interest rate (written as a decimal) t = time (number of <u>years</u>)	Solve the Simple Interest Formula for r by dividing both sides of the equation by Pt . $\frac{I}{Pt} = \frac{Prt}{Pt} \longrightarrow r = \frac{I}{Pt}$
Example 1: What is the simple interest on an investment of \$3000 at 4% for 5 years? $I = Prt$ $P = \$3000; r = 4\% = 0.04; t = 5$ $I = (3000)(0.04)(5)$ $I = \$600$	Example 2: A savings account of \$1000 earned \$120 simple interest in 4 years. Find the interest rate. $r = \frac{I}{Pt}$ $I = \$120; P = \$1000; t = 4$ $r = \frac{120}{1000(4)} = 0.03 = 3\%$

Practice on Your Own
Evaluate.

1. $(500)(0.03)(5)$ _____ 2. $(4000)(0.02)(10)$ _____ 3. $\frac{120}{(1500)(4)}$ _____

Use the formula for simple interest, $I = Prt$, to answer the question.

4. What is the simple interest on an investment of \$5000 at 2% for 3 years? _____
 5. What is the simple interest on an investment of \$1800 at 4% for 2 years? _____
 6. What is the simple interest on an investment of \$10,000 at 4% for 5 years? _____
 7. A savings account of \$2500 earned \$225 simple interest in 3 years. Find the interest rate. _____
 8. A certificate of deposit in the amount of \$25,000 earned \$2000 simple interest in 2 years. Find the interest rate. _____

Check
Evaluate.

9. $(1000)(0.05)(4)$ _____ 10. $(2500)(0.04)(5)$ _____ 11. $\frac{180}{(6000)(2)}$ _____

Use the formula for simple interest, $I = Prt$, to answer the question.

12. What is the simple interest on an investment of \$8000 at 6% for 5 years? _____
 13. What is the simple interest on an investment of \$75,000 at 8% for 2 years? _____
 14. A savings account of \$50,000 earned \$25,000 simple interest in 10 years. Find the interest rate. _____

Are You Ready?

Solve for a Variable

Teaching Skill 72

Objective Solve an equation for a given variable.

Explain that there are equations that involve multiple variables and it is helpful to write the equation in terms of a particular variable. To do this, you solve for that variable.

Point out that solving for a variable works exactly the same as solving any equation. Once you have identified the variable that you are solving for, you isolate that variable using inverse operations.

Write the example provided on the board.

Ask: **If you are solving for y , what should your final answer look like on one side of the equation?** ($y = \text{something}$) **If you were solving for x instead, what should one side of your equation look like?** ($x = \text{something}$)

Work through the solution. Remind students that they should be following the order of operations in reverse when solving equations. Emphasize that the coefficient of the variable they are solving for should be 1 when they are done.

Have students complete the practice exercises.

PRACTICE ON YOUR OWN

In exercises 1–9, students solve an equation for a given variable.

CHECK

Determine that students know how to solve an equation for a given variable.

Students who successfully complete the **Practice on Your Own** and **Check** are ready to move on to the next skill.

COMMON ERRORS

Students may try to multiply or divide before they add and subtract.

Students who made more than 2 errors in the **Practice on Your Own**, or who were not successful in the **Check** section, may benefit from the **Alternative Teaching Strategy**.

Alternative Teaching Strategy

Objective Solve an equation for a given variable.

Some students may have difficulty determining in which order to take certain steps.

Write the equation $4x - 5 = 2y - 11$ on the board and tell students you are going to guide them in choosing the correct steps to solve this equation for the variable y . Write the following on the board:

$$4x - 5 + \square = 2y - 11 + \square$$

$$4x + \square = 2y$$

$$\frac{4x}{\square} + \frac{6}{\square} = \frac{2y}{\square}$$

$$\square x + \square = y$$

Have students fill in each box based on the operation that is being undone. Ask: **In the first step, if you want to isolate y , should you add 5 to both sides or 11?** (11) Point out that the second step is merely simplifying the addition from the first step. Ask: **In the third step, if you are solving for y , should you divide by 4 or by 2?** (2) Again, point out that the final step is merely simplifying the division from the third step.

When you get to the final step, ask: Have you solved for y ? (Yes) **How do you know?** (because y is completely by itself)

Set up and have students solve the additional problems provided below for the variable y in the first problem and for x in the second problem.

$$3x + 4y = 7y - 12 \text{ and } \frac{3x}{2} - 12 = y + 3$$

$$\text{Answers: } y = x + 4 \text{ and } x = \frac{2}{3}y + 10$$

When you are comfortable that students know in which order the inverse operations should be performed, have them solve other equations without providing the steps.

SKILL

72**Are You Ready?****Solve for a Variable**

Solving for a variable is the same thing as transforming an equation to represent one quantity in terms of another.

To solve for a variable, identify the variable in the equation that you wish to isolate and then use inverse operations on each side of the equation to isolate the desired variable.

Example: Solve the equation $8x + 3 = 2y + 15$ for y .

You want to isolate y , so you need to move everything else to the other side of the equation.

$$8x + 3 = 2y + 15$$

$$8x + 3 - 15 = 2y + 15 - 15 \quad \text{Subtract 15 from both sides.}$$

$$8x - 12 = 2y \quad \text{Simplify.}$$

$$\frac{8x - 12}{2} = \frac{2y}{2} \quad \text{Divide both sides by 2.}$$

$$4x - 6 = y \quad \text{Simplify.}$$

Practice on Your Own

Solve each equation for the indicated variable.

1. $3x + y = 15$; y

2. $y - 5 = 3x$; y

3. $l = prt$; t

4. $3x + 3y = 12$; y

5. $V = \pi r^2 h$; h

6. $7y - 21x = 14$; y

7. $A = \frac{1}{2}bh$; h

8. $2x + 4 = 9 - y$; y

9. $2x + 5 = 6y - 9$; x

Check

Solve each equation for the indicated variable.

10. $y - 6x = 11$; y

11. $V = \ell wh$; h

12. $7x + 7y = 42$; x

13. $8x + 2y = 22$; y

14. $3x - 4 = y + 8$; y

15. $5 - 2y = 8x - 1$; y

Are You Ready?

Symmetry

Teaching Skill 40

Objective Draw symmetric figures using a given line of symmetry.

Review with students the definition of line symmetry.

Draw a scalene triangle on the board. Then draw a line approximately through the center of the triangle. Ask: **Is one half of the triangle identical to the other half?** (No) **Is the triangle symmetric?** (No)

Draw a rectangle on the board. Then draw a vertical line approximately through the center of the rectangle. Ask: **Is one half of the rectangle identical to the other half?** (Yes) **Is the rectangle symmetric?** (Yes)

Point out that using the coordinate plane is one way to draw symmetric figures. Review the example. Stress that if the line of symmetry is horizontal, the top half of the image will be identical to the bottom half. Ask: **If the line of symmetry is vertical, which halves of the image will be identical?** (the left and right)

PRACTICE ON YOUR OWN

In exercises 1–6, students use a given line of symmetry to draw a symmetric figure.

CHECK

Determine that students know how to draw symmetric figures using a given line of symmetry.

Students who successfully complete the **Practice on Your Own** and **Check** are ready to move on to the next skill.

COMMON ERRORS

Students may incorrectly draw the other half of a figure when the line of symmetry is not vertical or horizontal.

Students who made more than 1 error in the **Practice on Your Own**, or who were not successful in the **Check** section, may benefit from the **Alternative Teaching Strategy**.

Alternative Teaching Strategy

Objective Find the lines of symmetry of given figures.

Some students may benefit from finding lines of symmetry given a symmetric figure.

Provide students with copies of the figures described below. (Figures should be drawn as precisely as possible.)

- 1) a square with sides of length 6 inches
- 2) a 6-inch by 4-inch rectangle
- 3) a parallelogram with a base of 6 inches and a height of approximately 4 inches
- 4) a 45°-45°-90° triangle with sides of length 6 inches
- 5) an isosceles triangle with a height of 6 inches and a base of 4 inches
- 6) a scalene triangle with sides of length 4, 5, and 6 inches
- 7) a circle with a diameter of 6 inches

Remind students that figures may have exactly one line of symmetry, more than one, or none.

Have students consider the square. Instruct them to fold the square in half, from top to bottom (vertically) and then unfold it. Next, have students trace the crease with a pen or pencil. Ask: **Is this a line of symmetry?** (Yes) **Why?** (The top of the square is identical to the bottom of the square.)

Next, have students fold the square in half from left to right (horizontally) and then unfold it. Repeat the instructions above to arrive at a horizontal line of symmetry.

Repeat the exercise by having students fold the square diagonally one way, and then diagonally the other way. When finished, ask: **How many lines of symmetry does a square have?** (4)

Have students follow this process to find the number of lines of symmetry for each of the figures provided. (rectangle = 2; parallelogram = 0; 45°-45°-90° triangle = 1; isosceles triangle = 1; scalene triangle = 0; and circle = infinitely many)

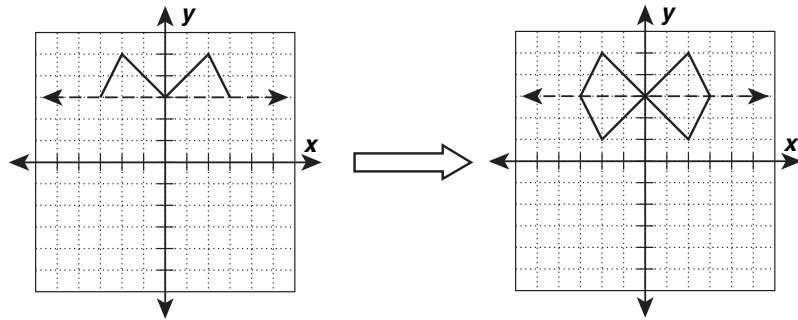
SKILL
40

Are You Ready?
Symmetry

Definition: If a plane figure can be folded across a line so that its two halves are exactly the same, then the figure has line symmetry. Some figures have only one line of symmetry, some have more than one, and some have none.

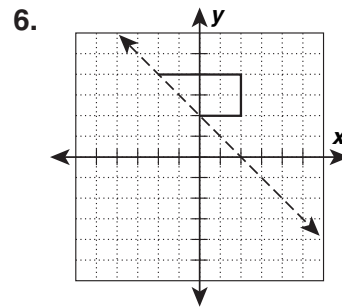
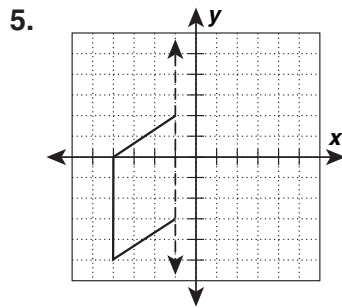
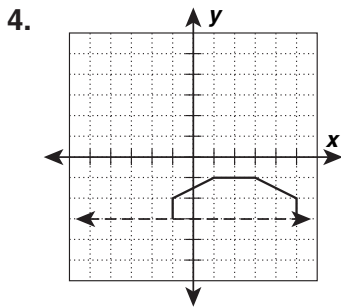
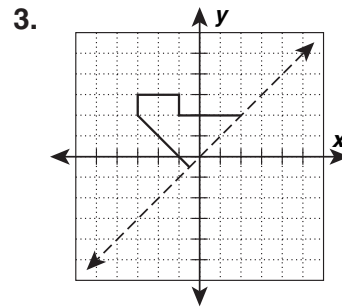
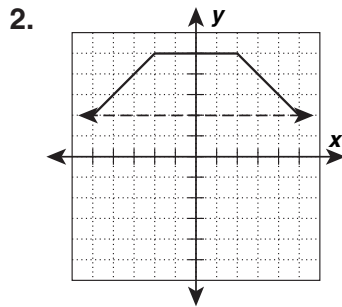
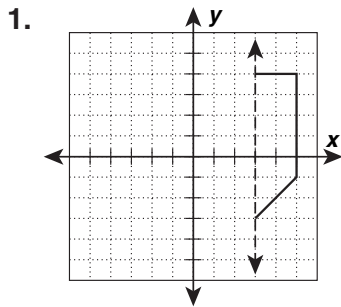
Example: Copy the graph and use the line of symmetry to complete the figure.

Answer: Copy the figure so that the image below the line is exactly the same as the image above the line.



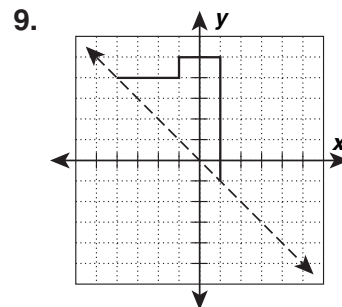
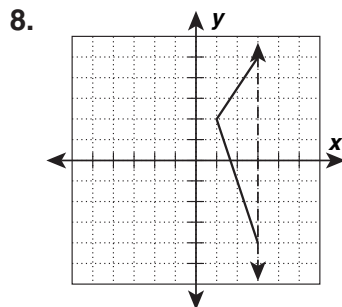
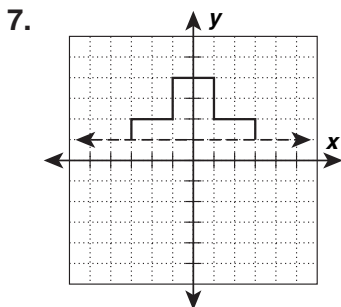
Practice on Your Own

Copy the graph and use the line of symmetry to complete the figure.



Check

Copy the graph and use the line of symmetry to complete the figure.



Are You Ready?

Scientific Notation

Teaching Skill 15

Objective Write numbers in scientific notation and in standard form.

Explain that scientific notation is a shorthand way to write very large and very small numbers.

Discuss with students the following examples: temperature at the sun's core (1,550,000 K); distance light travels in a year (5,880,000,000,000 miles); mass of an ant (0.000073 grams)

Point out that numbers with lots of zeros are sometimes difficult to work with, particularly when you are multiplying and dividing them.

Review the definition and the examples of scientific notation. Ask: **Is 42×10^3 written in scientific notation?** (No) **Why?** (42 is not a number between 1 and 10)

Walk through the steps for writing numbers. Review the example and then work through it in the reverse order to arrive back at the original standard form.

PRACTICE ON YOUR OWN

In exercises 1–6, students write numbers in scientific notation.

In exercises 7–12, students write numbers in standard form.

CHECK

Determine that students know how to write numbers in scientific notation and standard form.

Students who successfully complete the **Practice on Your Own** and **Check** are ready to move on to the next skill.

COMMON ERRORS

Students may move the decimal in the wrong direction and may confuse whether the exponent of 10 should be positive or negative.

Students who made more than 3 errors in the **Practice on Your Own**, or who were not successful in the **Check** section, may benefit from the **Alternative Teaching Strategy**.

Alternative Teaching Strategy

Objective Write numbers in scientific notation.

Materials needed: multiple copies of game card and pennies

Tell students they are going to play Tic-Tac-Toe using scientific notation.

Give students a copy of the following game card and nine pennies.

10^3	10^{-3}	10^6
10^{-4}	10^5	10^{-5}
10^4	10^{-6}	10^7

Review with students how to write a number in scientific notation.

Ask: **The 10 will have what kind of exponent if the original number is very small?** (negative) **The 10 will have what kind of exponent if the original number is very large?** (positive)

Write the numbers below on the board, one at a time. Instruct students to place a penny on the correct power of ten if the number is written in scientific notation. The student who calls out "Tic-Tac-Toe" first and correctly has three pennies in row (up, down, or diagonally) wins.

Game numbers: 4600 (10^3)
92,500,000 (10^7)
0.00049 (10^{-4})
0.0000055 (10^{-6})
824,000 (10^5)

Repeat the exercise using different numbers that you create to match the game board powers of 10.

LESSON

Are You Ready?

15

Scientific Notation

Definition: A number is in scientific notation if it is written as the product of a number between 1 and 10 and a power of 10 ($a \times 10^n$).

Examples: 6×10^7 and 4.99×10^{-15}

To write from standard form to scientific notation

Step 1: Make sure the number has a decimal point. If it doesn't, place a decimal after the last digit in the number: $47,000,000 = 47,000,000.$

Step 2: Move the decimal point until the number is between 1 and 10.

Step 3: Count the number of places you moved the decimal point—this will be your exponent of 10. If the original number was a very large number, the exponent will be positive; if the number was a very small number, the exponent will be negative.

To write from scientific notation to standard form

Case 1: If the exponent of 10 is positive, move the decimal point to the right as many times as the value of the exponent. Fill in zeros as needed and drop the power of 10.

Case 2: If the exponent of 10 is negative, move the decimal point to the left as many times as the value of the exponent. Fill in zeros as needed and drop the power of 10.

Example: Write 46,000,000 in scientific notation. $4.6 \underbrace{000000} = 4.6 \times 10^7$

Practice on Your Own

Write in scientific notation.

1. 5,400,000,000

2. 0.00026

3. 6 million

4. 0.00000000859

5. $112\frac{3}{4}$

6. $\frac{61}{100,000}$

Write in standard notation.

7. 4.22×10^6

8. 7.1×10^{-4}

9. 9×10^3

10. 1.365×10^{-9}

11. 6.84×10^8

12. 2×10^{-12}

Check

Write in scientific notation.

13. 0.00000000000012

14. 62,500,000,000

15. $206\frac{12}{25}$

Write in standard notation.

16. 4.1×10^2

17. 2.08×10^{-10}

18. 1.001×10^6

Answer Key continued

SKILL 56 ANSWERS:

Practice on Your Own

1. $5x + 30$
2. $5z - 35$
3. $2n - 4$
4. $12 + 4k$
5. $48 - 8y$
6. $6m + 18$
7. $10p + 10$
8. $60 - 3c$
9. $7q - 7$
10. $55 + 11t$
11. $14 + 2b$
12. $36 - 9w$

Check

13. $12c + 24$
14. $15 - 5a$
15. $25 + 25d$
16. $50 - 10j$
17. $4x + 12$
18. $30 + 15y$
19. $3g - 75$
20. $9m - 9$

SKILL 57 ANSWERS:

Practice on Your Own

1. $12x$
2. $4m$
3. $7a^2$
4. $-7t$
5. $-3b$
6. $8d^2$
7. $-x$

8. 0
9. $11h$
10. $-9y - 9$
11. $10 + 10x$
12. $5 - 5u$
13. $13y + 6x$
14. 4

Check

15. $10x$
16. $-3c$
17. $-3a^2$
18. $8.4z$
19. $10m + 11$
20. $8q - 5r$

SKILL 58 ANSWERS:

Practice on Your Own

1. $5 + n$
2. a number decreased by 15; 15 less than a number; the difference between a number and 15; etc.
3. $C = 3(9.95) + 2(14.98)$
4. $P = 7 + 10 + s$
5. $V = 12,000 + 500y$
6. $n = 56 - 3w$

Check

7. $n - 6$
8. $C = 6(6.99) + 2(22.98)$
9. $A = 400 + 150m$

SKILL 59 ANSWERS:

Practice on Your Own

1. $10x^2$
2. $-21a^4$
3. $-16mn$

Answer Key continued

4. $45p^3q$

5. $25b^5c^4$

6. $6x^2y^2$

7. $16z^5$

8. $8d^3e^2$

9. $-18t^2$

10. w^8

11. $22r^7$

12. $50x^2y^2$

Check

13. $30f^2$

14. $-27x^2y$

15. $60h^4$

16. $49a^2b^2$

17. $4p^4q^2$

18. $-21u^3v$

19. g^8

20. $-16y^2z^2$

SKILL 60 ANSWERS:

Practice on Your Own

1. 36

2. 28

3. -3

4. -27

5. 9

6. -2

7. -10

8. 8

9. -6

Check

10. 15

11. 2

12. 0

13. -6

14. -4

15. 2

SKILL 61 ANSWERS:

Practice on Your Own

1. $10m^4n^2$

2. $4x^2y$

3. $-20a^4b$

4. $\frac{5}{2t^3}$

5. $-\frac{f^2}{3}$

6. $-3p^3q^2r^3$

7. u^4v

8. $\frac{4c^2}{d^5}$

9. $144h^2k^2$

10. -1

11. $10xy^3z^2$

12. $-\frac{wz}{9}$

Check

13. $35s^4t$

14. $-\frac{x}{5y}$

15. $-8b^4c^4$

16. $5pq^3$

17. $-\frac{5mn}{3}$

18. $36u^3w^4$

19. $-10x^8y^2$

20. $\frac{7}{f}$

Answer Key continued

SKILL 50 ANSWERS:

Practice on Your Own

- 75
- 800
- 0.02
- \$300
- \$144
- \$2000
- 3%
- 4%

Check

- 200
- 500
- 0.015
- \$2400
- \$12,000
- 5%

SKILL 51 ANSWERS:

Practice on Your Own

- 5
- 4
- 25
- 17
- 11
- 11
- 19
- 6
- 5
- 17
- 0
- 15

Check

- 6
- 8
- 7
- 10
- 5
- 21
- 0
- 31

SKILL 52 ANSWERS:

Practice on Your Own

- 15
- 4
- 55
- 8
- 63
- 6
- 150
- 15
- 26
- 7
- 32
- 3

Check

- 70
- 6
- 72
- 7
- 64
- 12
- 9
- 12

Answer Key continued

4. $x = -1$

5. $y = -\frac{1}{4}$

6. $x = \frac{8}{9}$

7. $y = -\frac{4}{7}$

8. $x = \frac{3}{25}$

9. $y = \frac{1}{2}$

Check

10. $x = 4$

11. $y = \frac{4}{3}$

12. $x = \frac{2}{5}$

13. $y = -\frac{5}{11}$

14. $x = \frac{10}{7}$

15. $x = -\frac{1}{8}$

SKILL 72 ANSWERS:

Practice on Your Own

1. $y = 15 - 3x$

2. $y = 3x + 5$

3. $t = \frac{l}{pr}$

4. $y = 4 - x$

5. $h = \frac{V}{\pi r^2}$

6. $y = 2 + 3x$

7. $h = \frac{2A}{b}$

8. $y = 5 - 2x$

9. $x = 3y - 7$

Check

10. $y = 11 + 6x$

11. $h = \frac{V}{\ell w}$

12. $x = 6 - y$

13. $y = 11 - 4x$

14. $y = 3x - 12$

15. $y = -4x + 3$

SKILL 73 ANSWERS:

Practice on Your Own

1. $M = (\frac{7}{2}, 5); d = 5$

2. $M = (2, \frac{1}{2}); d = \sqrt{13}$

3. $M = (-\frac{5}{2}, \frac{9}{2}); d = 5\sqrt{2}$

4. $M = (0, 1); d = 4\sqrt{5}$

5. $M = (-3, -\frac{3}{2}); d = \sqrt{29}$

6. $M = (-2, -\frac{3}{2}); d = 5$

Check

7. $M = (5, 3); d = 10$

8. $M = (\frac{5}{2}, \frac{1}{2}); d = \sqrt{34}$

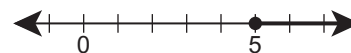
9. $M = (-\frac{1}{2}, -\frac{7}{2}); d = 3\sqrt{2}$

10. $M = (2, -4); d = 2\sqrt{5}$

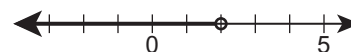
SKILL 74 ANSWERS:

Practice on Your Own

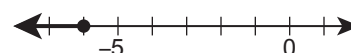
1. $x \geq 5$



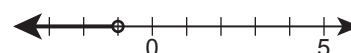
2. $n < 2$



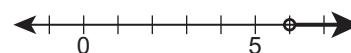
3. $y \leq -6$



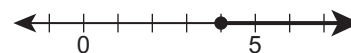
4. $b < -1$



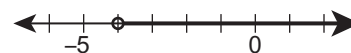
5. $y > 6$



6. $t \geq 4$



7. $p > -4$



8. $x < -2$

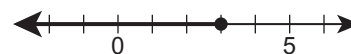


9. $m \leq -3$

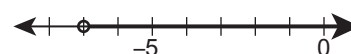


Check

10. $x \leq 3$



11. $n > -7$



12. $d \geq 1$



Answer Key continued

SKILL 39 ANSWERS:

Practice on Your Own

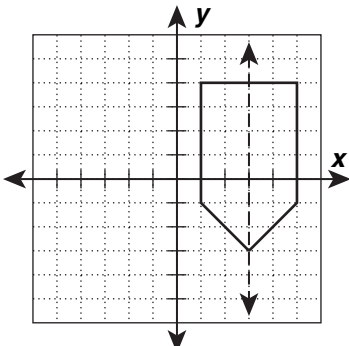
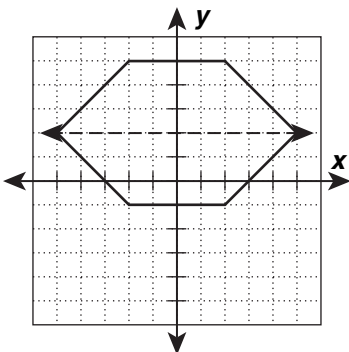
1. $C = 6\pi$ cm; $A = 9\pi$ cm²
2. $C = 12\pi$ in.; $A = 36\pi$ in.²
3. $C = 14\pi$ ft; $A = 49\pi$ ft²
4. $C = 22\pi$ m; $A = 121\pi$ m²
5. $C = 16\pi$ in.; $A = 64\pi$ in.²
6. $C = 13\pi$ m; $A = 42.25\pi$ m²
7. $C = 12$ cm; $A = \frac{36}{\pi}$ cm²
8. $C = 20$ ft; $A = \frac{100}{\pi}$ ft²

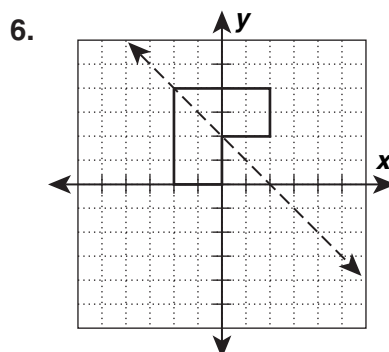
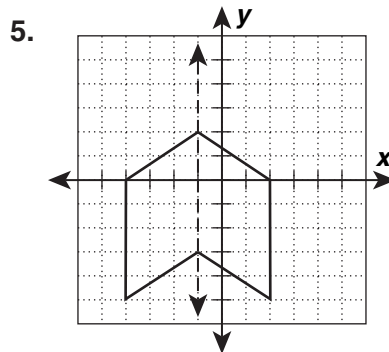
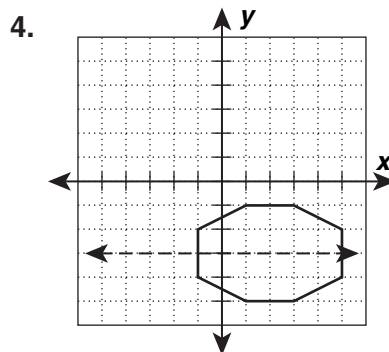
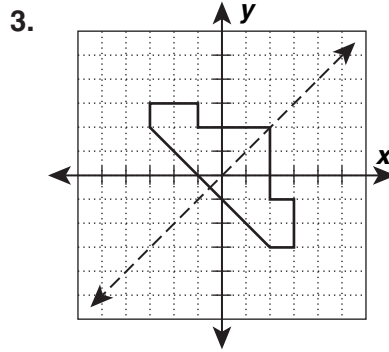
Check

9. $C = 18\pi$ cm; $A = 81\pi$ cm²
10. $C = 2\pi$ ft; $A = 1\pi$ ft²
11. $C = 24\pi$ m; $A = 144\pi$ m²
12. $C = 8$ in.; $A = \frac{16}{\pi}$ in.²

SKILL 40 ANSWERS:

Practice on Your Own

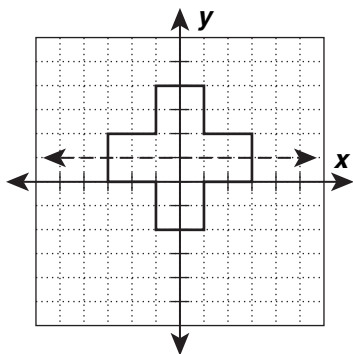
1. 
2. 



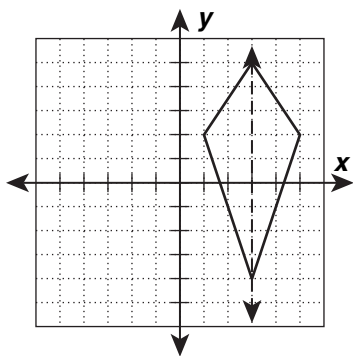
Answer Key continued

Check

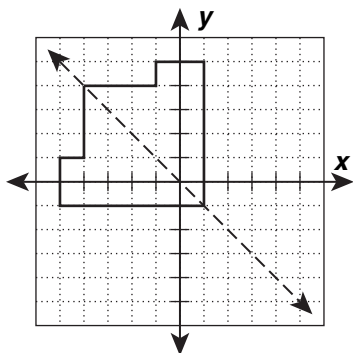
7.



8.



9.



SKILL 41 ANSWERS:

Practice on Your Own

1. 158 ft^2
2. 96 in.^2
3. 198 m^2
4. 158 m^2
5. 150 in.^2
6. 90 cm^2

Check

7. 390 cm^2
8. 376 ft^2
9. 600 in.^2

SKILL 42 ANSWERS:

Practice on Your Own

1. 120 ft^3
2. 64 in.^3
3. 108 m^3
4. 63 m^3
5. 125 in.^3
6. 54 cm^3

Check

7. 378 cm^3
8. 320 ft^3
9. 1000 in.^3

SKILL 43 ANSWERS:

Practice on Your Own

1. 54
2. 207
3. 74
4. 26
5. 28
6. 187
7. 79
8. 1395
9. 11
10. 94
11. 1064
12. 102

Check

13. 36
14. 245

Answer Key continued

Check

- 1 to 1; 1:1; $\frac{1}{1}$
- 2 to 3; 2:3; $\frac{2}{3}$
- 2 to 7; 2:7; $\frac{2}{7}$

SKILL 13 ANSWERS:

Practice on Your Own

- 58 miles per hour
- 260 calories per serving
- \$2.50 per hour
- 50 homes per subdivision
- 10 miles per gallon
- 75¢ per pen
- 4.5 grams per ounce
- 6 francs per dollar
- 5.75¢ per copy

Check

- 300 trees per acre
- \$45 per credit hour
- 0.25 km per minute
- 80 miles per hour
- 16 books per shelf
- 80¢ per ride

SKILL 14 ANSWERS:

Practice on Your Own

- 0.5
- 0.28
- 0.7
- 0.84
- 0.85
- 0.06
- 0.375
- 1.5

- 75%
- 60%
- 30%
- 9%
- 62.5%
- 45%
- 120%
- 125%

Check

- 0.97
- 0.8
- 0.025
- 0.11
- 80%
- 40%
- 5.5%
- 62%

SKILL 15 ANSWERS:

Practice on Your Own

- 5.4×10^9
- 2.6×10^{-4}
- 6×10^6
- 8.59×10^{-9}
- 1.1275×10^2
- 6.1×10^{-4}
- 4,220,000
- 0.00071
- 9000
- 0.000000001365
- 684,000,000
- 0.000000000002

Answer Key continued

Check

13. 1.2×10^{-13}
14. 6.25×10^{10}
15. 2.0648×10^2
16. 410
17. 0.000000000208
18. 1,001,000

SKILL 16 ANSWERS:

Practice on Your Own

1. <
2. >
3. >
4. <
5. <
6. =
7. >
8. >
9. $\frac{8}{12}$, 70%, 0.72, $\frac{3}{4}$
10. 140%, $1\frac{3}{7}$, 1.5, $\frac{8}{5}$
11. $\frac{3}{10}$, 0.33, $\frac{1}{3}$, 35%

Check

12. <
13. >
14. >
15. <
16. $\frac{3}{20}$, 16%, 0.165, $\frac{1}{6}$, $\frac{1}{5}$, 0.22

SKILL 17 ANSWERS:

Practice on Your Own

1. Rational, Integer, Whole, Natural
2. Rational, Integer
3. Rational, Integer, Whole
4. Rational

5. Rational, Integer, Whole, Natural
6. Rational
7. Rational
8. Rational
9. Rational, Integer, Whole, Natural

Check

10. Rational, Integer
11. Rational, Integer, Whole, Natural
12. Rational
13. Rational
14. Rational
15. Rational, Integer, Whole, Natural

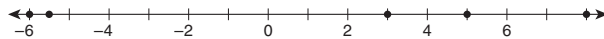
SKILL 18 ANSWERS:

Practice on Your Own

Exercises 1–5



Exercises 6–10



Check

Exercises 11–15



Exercises 16–20



SKILL 19 ANSWERS:

Practice on Your Own

1. 100 yd
2. 6 ft
3. 1.5 ft
4. $\frac{1}{10}$ gram
5. 300 mph

Answer Key continued

Check

- 1 to 1; 1:1; $\frac{1}{1}$
- 2 to 3; 2:3; $\frac{2}{3}$
- 2 to 7; 2:7; $\frac{2}{7}$

SKILL 13 ANSWERS:

Practice on Your Own

- 58 miles per hour
- 260 calories per serving
- \$2.50 per hour
- 50 homes per subdivision
- 10 miles per gallon
- 75¢ per pen
- 4.5 grams per ounce
- 6 francs per dollar
- 5.75¢ per copy

Check

- 300 trees per acre
- \$45 per credit hour
- 0.25 km per minute
- 80 miles per hour
- 16 books per shelf
- 80¢ per ride

SKILL 14 ANSWERS:

Practice on Your Own

- 0.5
- 0.28
- 0.7
- 0.84
- 0.85
- 0.06
- 0.375
- 1.5

- 75%
- 60%
- 30%
- 9%
- 62.5%
- 45%
- 120%
- 125%

Check

- 0.97
- 0.8
- 0.025
- 0.11
- 80%
- 40%
- 5.5%
- 62%

SKILL 15 ANSWERS:

Practice on Your Own

- 5.4×10^9
- 2.6×10^{-4}
- 6×10^6
- 8.59×10^{-9}
- 1.1275×10^2
- 6.1×10^{-4}
- 4,220,000
- 0.00071
- 9000
- 0.000000001365
- 684,000,000
- 0.000000000002

Answer Key continued

Check

13. 1.2×10^{-13}
14. 6.25×10^{10}
15. 2.0648×10^2
16. 410
17. 0.000000000208
18. 1,001,000

SKILL 16 ANSWERS:

Practice on Your Own

1. <
2. >
3. >
4. <
5. <
6. =
7. >
8. >
9. $\frac{8}{12}$, 70%, 0.72, $\frac{3}{4}$
10. 140%, $1\frac{3}{7}$, 1.5, $\frac{8}{5}$
11. $\frac{3}{10}$, 0.33, $\frac{1}{3}$, 35%

Check

12. <
13. >
14. >
15. <
16. $\frac{3}{20}$, 16%, 0.165, $\frac{1}{6}$, $\frac{1}{5}$, 0.22

SKILL 17 ANSWERS:

Practice on Your Own

1. Rational, Integer, Whole, Natural
2. Rational, Integer
3. Rational, Integer, Whole
4. Rational

5. Rational, Integer, Whole, Natural
6. Rational
7. Rational
8. Rational
9. Rational, Integer, Whole, Natural

Check

10. Rational, Integer
11. Rational, Integer, Whole, Natural
12. Rational
13. Rational
14. Rational
15. Rational, Integer, Whole, Natural

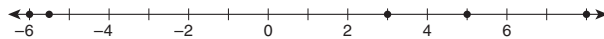
SKILL 18 ANSWERS:

Practice on Your Own

Exercises 1–5



Exercises 6–10



Check

Exercises 11–15



Exercises 16–20



SKILL 19 ANSWERS:

Practice on Your Own

1. 100 yd
2. 6 ft
3. 1.5 ft
4. $\frac{1}{10}$ gram
5. 300 mph