

## Lesson 7.1 Skills Practice

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### There's a Reason Behind the Rhyme Order of Operations

#### Vocabulary

Match each word to the best description.

- |                         |  |
|-------------------------|--|
| 1. conventions          | a. mathematical phrase containing numbers  |
| 2. numerical expression | b. tell you what to do with each value in a numerical expression (+, −, ×, and ÷)        |
| 3. evaluate             | c. set of rules that ensure the same result every time an expression is evaluated        |
| 4. operations           | d. rules developed over time and followed so that everyone knows what to do              |
| 5. parentheses          | e. symbols used to group numbers and operations to change the normal order of operations |
| 6. order of operations  | f. calculate an expression to get a single number or value                               |

#### Problem Set

Evaluate each numerical expression.

- |                                 |   |
|---------------------------------|---|
| 1. $18 \div 3 + 4 = 6 + 4 = 10$ | 2. $4 + 3 \cdot 5 - 12 =$               |
| 3. $11 - 2 \cdot 5 =$           | 4. $56 \div 8 + 3 \cdot 6 =$            |
| 5. $45 \div 5 \div 3 =$         | 6. $13 + 9 \cdot 2 - 14 \div 2 =$       |
| 7. $36 \div 3 \cdot 4 =$        | 8. $9 \cdot 8 - 29 + 30 \div 15 - 15 =$ |

Evaluate each numerical expression.

**9.**  $4^2 \cdot 3 = 16 \cdot 3 = 48$

**10.**  $3^3 - 14 \div 2 + 5 =$

**11.**  $17 - 2^3 =$

**12.**  $144 \div 6^2 \cdot 8 + 2^2 =$

**13.**  $32 \div 4^2 =$

**14.**  $2^4 - 3 \cdot 5 + 9 =$

**15.**  $9 + 5^2 - 2 \cdot 3^2 =$

**16.**  $11^2 - 7 \cdot 6 - 4^3 \div 2 =$

Evaluate each numerical expression.

**17.**  $(4 + 3) \cdot 5 = 7 \cdot 5 = 35$

**18.**  $((3 \cdot 4^2) + 2) \div 5 =$

**19.**  $(13 - 8)^2 =$

**20.**  $(2^3 + 13) \div (12 - 9) =$

**21.**  $29 - (2^2 + 7) =$

**22.**  $((5 \cdot 7) - (8 \cdot 4))^3 - 10 =$

**23.**  $40 \div (11 - 9)^2 =$

**24.**  $7^2 + ((46 - 7 \cdot 2) \div 2^3)^2 =$

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For each problem, the numerical expression has been evaluated correctly and incorrectly. First, state how the order of operations rules were used correctly to evaluate the expression, and then determine the error that was made in the second calculation.

25.

$$\begin{array}{ll} 19 - 2 \cdot 4 & 19 - 2 \cdot 4 \\ = 19 - 8 & = 17 \cdot 4 \\ = 11 & = 68 \end{array}$$

First perform multiplication, and then subtract.

The error is that subtraction was performed before multiplication.

26.

$$\begin{array}{ll} 12 \div (4 - 2) & 12 \div (4 - 2) \\ = 12 \div 2 & = 3 - 2 \\ = 6 & = 1 \end{array}$$

27.

$$\begin{array}{ll} 72 \div 3^2 & 72 \div 3^2 \\ = 72 \div 9 & = 24^2 \\ = 8 & = 576 \end{array}$$

28.

$$\begin{array}{ll} (5 \cdot 2^3) \div 4 & (5 \cdot 2^3) \div 4 \\ = (5 \cdot 8) \div 4 & = 10^3 \div 4 \\ = 40 \div 4 & = 1000 \div 4 \\ = 10 & = 250 \end{array}$$

29.

$$\begin{aligned} & 3 \cdot (13 - 8) + 6 \div 3 \\ & = 3 \cdot 5 + 6 \div 3 \\ & = 15 + 2 \\ & = 17 \end{aligned}$$

$$\begin{aligned} & 3 \cdot (13 - 8) + 6 \div 3 \\ & = 3 \cdot 5 + 6 \div 3 \\ & = 15 + 6 \div 3 \\ & = 21 \div 3 \\ & = 7 \end{aligned}$$

30.

$$\begin{aligned} & 3 + 2(12 - 7) \\ & = 3 + 2 \cdot 5 \\ & = 3 + 10 \\ & = 13 \end{aligned}$$

$$\begin{aligned} & 3 + 2(12 - 7) \\ & = 3 + 24 - 7 \\ & = 27 - 7 \\ & = 20 \end{aligned}$$

31.

$$\begin{aligned} & 6 + 12 \div 4 + 4^2 \\ & = 6 + 12 \div 4 + 16 \\ & = 6 + 3 + 16 \\ & = 9 + 16 \\ & = 25 \end{aligned}$$

$$\begin{aligned} & 6 + 12 \div 4 + 4^2 \\ & = 18 \div 4 + 4^2 \\ & = 4.5 + 4^2 \\ & = 8.5^2 \\ & = 72.25 \end{aligned}$$

32.

$$\begin{aligned} & ((3 \cdot 6 \div 2) - 5)^3 \\ & = ((18 \div 2) - 5)^3 \\ & = (9 - 5)^3 \\ & = 4^3 \\ & = 64 \end{aligned}$$

$$\begin{aligned} & ((3 \cdot 6 \div 2) - 5)^3 \\ & = (18 \div 2) - 125 \\ & = 9 - 125 \\ & = -116 \end{aligned}$$

## Lesson 7.2 Skills Practice

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### Getting to the Root of It Exploring Squares, Cubes, and Roots

#### Vocabulary

Write the term that best completes each statement.

1. The \_\_\_\_\_ is calculated by multiplying the number by itself three times.
2. The symbol  $\sqrt{\quad}$  is called a \_\_\_\_\_.
3. The square of a whole number is called a \_\_\_\_\_.
4. A \_\_\_\_\_ is one of two equal factors of a nonnegative number.
5. The \_\_\_\_\_ is the quantity under a radical sign.
6. A \_\_\_\_\_ is the cube of a whole number.
7. Calculate the \_\_\_\_\_ by multiplying the number by itself.
8. One of three equal factors of a number is called the \_\_\_\_\_.

#### Problem Set

Write the square root for each perfect square.

1.  $\sqrt{25}$

$$25 = 5 \times 5$$

$$\sqrt{25} = \sqrt{5^2}$$

$$= 5$$

2.  $\sqrt{9}$

3.  $\sqrt{49}$

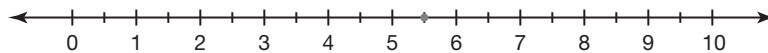
4.  $\sqrt{225}$

5.  $\sqrt{900}$

6.  $\sqrt{625}$

Estimate where each square root is located on the number line.

7.  $\sqrt{30}$

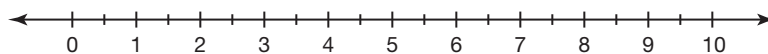


$$\sqrt{25} < \sqrt{30} < \sqrt{36}$$

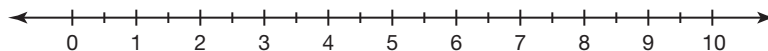
$$\sqrt{5^2} < \sqrt{30} < \sqrt{6^2}$$

$$5 < \sqrt{30} < 6$$

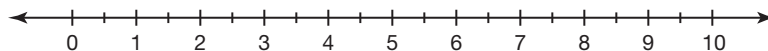
8.  $\sqrt{12}$



9.  $\sqrt{95}$

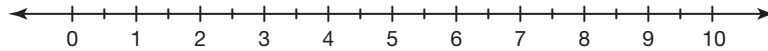


10.  $\sqrt{52}$

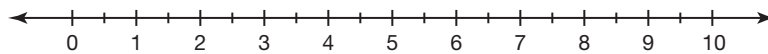


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11.  $\sqrt{3}$



12.  $\sqrt{45}$



Estimate each square root to the nearest tenth.

13.  $\sqrt{14}$

$$\sqrt{9} < \sqrt{14} < \sqrt{16}$$

$$\sqrt{32} < \sqrt{14} < \sqrt{42}$$

$$3 < \sqrt{14} < 4$$

$$(3.7)(3.7) = 13.69$$

$$(3.8)(3.8) = 14.44$$

$$\sqrt{14} \approx 3.7$$

14.  $\sqrt{38}$

15.  $\sqrt{7}$

16.  $\sqrt{22}$

17.  $\sqrt{93}$

18.  $\sqrt{147}$

Calculate each cube.

19.  $4^3 = 64$

20.  $9^3 =$

21.  $11^3 =$

22.  $20^3 =$

23.  $100^3 =$

24.  $35^3 =$

Write the cube root for each perfect cube.

25.  $\sqrt[3]{125}$

26.  $\sqrt[3]{512}$

$$125 = 5 \times 5 \times 5$$

$$\sqrt[3]{125} = \sqrt[3]{5^3}$$

$$= 5$$

27.  $\sqrt[3]{1000}$

28.  $\sqrt[3]{1728}$

29.  $\sqrt[3]{27,000}$

30.  $\sqrt[3]{125,000}$



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Estimate each cube root to the nearest tenth.

31.  $\sqrt[3]{150}$

$$\sqrt[3]{125} < \sqrt[3]{150} < \sqrt[3]{216}$$

$$\sqrt[3]{5^3} < \sqrt[3]{150} < \sqrt[3]{6^3}$$

$$5 < \sqrt[3]{150} < 6$$

$$(5.3)(5.3)(5.3) = 148.877$$

$$(5.4)(5.4)(5.4) = 157.464$$

$$\sqrt[3]{150} \approx 5.3$$

32.  $\sqrt[3]{12}$

33.  $\sqrt[3]{113}$

34.  $\sqrt[3]{800}$

35.  $\sqrt[3]{299}$

36.  $\sqrt[3]{1300}$



## Lesson 7.3 Skills Practice

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### Things That Vary Understanding Variables

#### Vocabulary

Complete each statement with one of the following terms: *algebraic expression*, *equation*, *variable*.

1. A(n) \_\_\_\_\_ is a letter used to represent a quantity that varies.
2. A mathematical phrase involving at least one variable is called a(n) \_\_\_\_\_.
3. A(n) \_\_\_\_\_ is a mathematical sentence that contains an equals sign.

#### Problem Set

Write a numeric expression to answer each question. Then, write a sentence to explain how you can determine the answer for any amount given.

1. You have a coupon for \$5 off your total bill at Mama's Meals on Main. How much will you pay if your total bill is \$23.48? \$19.52? \$31.16?

$$23.48 - 5 = 18.48$$

You will pay \$18.48 if your total bill is \$23.48.

$$19.52 - 5 = 14.52$$

You will pay \$14.52 if your total bill is \$19.52.

$$31.16 - 5 = 26.16$$

You will pay \$26.16 if your total bill is \$31.16.

I can subtract \$5 from the total bill to determine the actual amount I will pay.

- 
- Private swimming lessons cost \$35 per hour. How much money will you spend if you register for 8 one-hour lessons? 12 lessons? 20 lessons?
  - You have 84 favors to divide equally between gift bags for your party guests. How many favors will be in each bag if you have 4 guests? 7 guests? 14 guests?
  - You have already read two and a half hours for the Read-a-thon. For how many hours will you have read if you read six and a quarter more hours? eight and a half more hours? eleven and three quarters more hours?

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5. Your school has twelve tables for students in the lunchroom. How many students can sit at each table if 60 students are at lunch? 96 students? 168 students?

6. You have \$40. How much will you have left if you buy a book for \$9.95? \$14.80? \$27.69?

Write an equation to describe each problem situation.

7. You have a coupon for \$5 off your total bill at Mama's Meals on Main. Let  $b$  represent the amount of your total bill and  $p$  represent the total amount you will pay after using the coupon.

$$b - 5 = p$$

8. Private swimming lessons cost \$35 per hour. Let  $n$  represent the number of swimming lessons you take and  $s$  represent the total you will spend on swimming lessons.

9. You have 84 favors to divide equally between gift bags for your party guests. Let  $g$  represent the number of guests at the party and  $f$  represent the total number of favors that will be in each gift bag.
10. You have already read two and a half hours for the Read-a-thon. Let  $h$  represent the number of additional hours you read and  $t$  represent the total number of hours read.
11. Your school has twelve tables for students in the lunchroom. Let  $s$  represent the number of students in the lunchroom and  $n$  represent the number of students at each table.
12. You have \$40 to spend at the bookstore. Let  $b$  represent the price of the book and  $m$  represent the amount of money you have left.

Define a variable and write an algebraic expression that represents each situation. Then, use the expression to calculate the answer to the problem.

13. Each seedling costs \$0.65 at the greenhouse. How much will you pay to plant a garden with 25 plants?

Let  $s$  represent the number of seedlings bought.

The expression that represents the situation is  $0.65s$ .

$$0.65(25) = 16.25$$

You will pay \$16.25.

14. You have a \$15 merchandise credit for your favorite store. Assuming no sales tax, how much will you pay to buy a sweater that costs \$52.75?

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15. An activity bus can transport 32 students. How many buses will need to be reserved to transport the marching band to the away game if there are 128 band members?

16. By Thursday, Kevin has banked 75 minutes of video game time for the week. If he earns another 15 minutes for doing his chores on Friday, for how many minutes will he be allowed to play video games over the weekend?

17. You can walk an average of 3.5 miles an hour. How many miles will you average on a 2.5-hour hike?

18. Andrea can type 70 words per minute. How long will it take her to type a 1000-word essay?





## Lesson 7.4 Skills Practice

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### What's My Number? Writing Algebraic Expressions

#### Vocabulary

Write the term from the box that best completes each statement.

evaluate an algebraic expression    constant    numerical coefficient

1. A(n) \_\_\_\_\_ is a number, or quantity, that is multiplied by a variable in an algebraic expression.
2. To \_\_\_\_\_ means to determine the value of the expression.
3. A number, or quantity, that does not change its value is called a(n) \_\_\_\_\_.

#### Problem Set

Calculate the answers for each situation. Then, write a sentence to explain how you can determine the answer for any amount given.

1. The PTA sells school-spirit pencils to raise money for the school. Each pencil costs 35¢. How much money is raised if they sell 200 pencils? 550 pencils? 1200 pencils?

$$0.35(200) = 70$$

When 200 pencils are sold, \$70 is raised.

$$0.35(550) = 192.50$$

When 550 pencils are sold, \$192.50 is raised.

$$0.35(1200) = 420$$

When 1200 pencils are sold, \$420 is raised.

I can multiply the number of pencils sold by 35¢ (0.35) to determine the amount of money raised.



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4. Mr. Carter's car has an 18-gallon gas tank. How much money will he spend to fill up his tank if gas costs \$2.35 per gallon? \$2.86 per gallon? \$3.19 per gallon?

5. A clown goes to a party with a total of 275 balloons. Assuming each balloon animal he makes only requires one balloon, how many balloons will he have left at the end of the party if he makes 37 balloon animals? 69 balloon animals? 188 balloon animals?

6. A group of neighbors are sharing the cost of renting a bounce house for their block party. The cost to rent a bounce house is \$160. How much will each neighbor owe if five neighbors help pay the rental fee? eight neighbors? ten neighbors?

Write an algebraic expression that represents each situation.

7. You can type 90 words per minute. How many words can you type in  $m$  minutes?  
 $90m$
8. You have 4 key chains on your backpack. How many key chains will you have if you get  $k$  more key chains over the summer?
9. You buy 100 yo-yos to give away as prizes at a carnival. If  $p$  people win a prize, how many yo-yos will you have left?
10. You want to store an equal number of books on each of the 5 shelves on your bookcase. If you have  $b$  books, how many books will be on each shelf?
11. Bulk trail mix costs \$1.95 per pound. How much will you pay for  $t$  pounds of trail mix?
12. You have 300 phone minutes per month. How many  $m$ -minute calls can you make per month?

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Write an algebraic expression that represents each word expression.

13. a number,
- $x$
- , times twelve

$12x$

- 14.
- $r$
- divided by seven

15. thirty-four more than a number,
- $h$

16. sixteen minus
- $m$

17. twenty-eight divided by
- $s$

18. nine times
- $w$

- 19.
- $p$
- plus fifty-one

20. one hundred less than
- $g$

Use words to describe the algebraic expression.

- 21.
- $13v$

thirteen times any number,  $v$ 

- 22.
- $5 - h$

- 23.
- $m + 21$

- 24.
- $\frac{k}{10}$

25.  $w - 27$

26.  $\frac{200}{t}$

State the numerical coefficient and constant for each algebraic expression.

27.  $9 + y$

numerical coefficient: **1**

constant: **9**

28.  $46n$

numerical coefficient:

constant:

29.  $\frac{g}{3}$

numerical coefficient:

constant:

30.  $c - \frac{7}{8}$

numerical coefficient:

constant:

31.  $5.16d$

numerical coefficient:

constant:

32.  $29 - q$

numerical coefficient:

constant:

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Write the meaning of each algebraic expression. Then, evaluate the algebraic expression for the given value.

33.  $27 - c$  if  $c = 13$

27 minus  $c$  $27 - 13 \rightarrow$  Subtract 13 from 27.

14

34.  $6a + 11$  if  $a = 8$

35.  $7x - 9$  if  $x = 3$

36.  $34 - y^2$  if  $y = 5$

37.  $m^3 + 18$  if  $m = 2$

38.  $\frac{d}{5} + 42$  if  $d = 70$

39.  $56 - \frac{2}{3}w^2$  if  $w = 6$

40.  $\frac{7}{b^3} + \frac{1}{8}$  if  $b = 4$

Complete each table. Identify the relationship between the two columns given by the algebraic expression.

41.

$d$	$d - 5$
27	22
44	39
55	50
90	85

42.

$x$	$x + 13$
9	
17	
25	
58	

Each value in the right column is 5 less than the corresponding value in the left column.



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43.

$m$	$\frac{m}{3}$
18	
36	
6.9	
0	

44.

$q$	$q - 6$
6	
8	
10	
12	

45.

$n$	$7n$
2	
7	
11	
15	

46.

$c$	$2c - 8$
4	
9	
$\frac{9}{2}$	
8.5	

47.

$z$	$9 + 2z$
1	
3	
7	
2.2	

48.

$k$	$\frac{2k}{5} + 4$
0	
5	
2.5	
7	



## Lesson 7.5 Skills Practice

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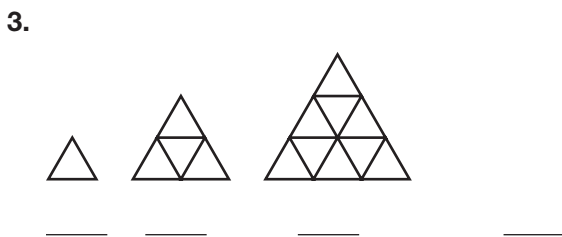
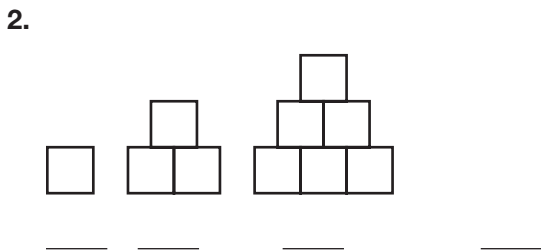
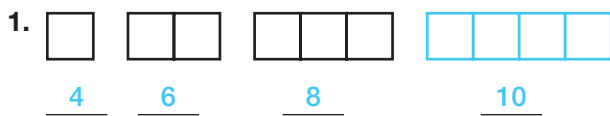
### Different Ways Multiple Representations of Algebraic Expressions

#### Vocabulary

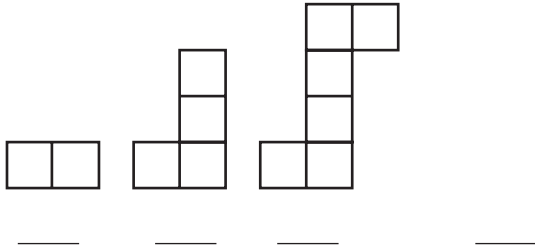
1. List at least three examples of multiple representations of a problem situation.

#### Problem Set

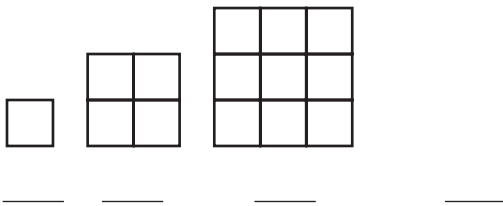
Draw the next figure in each pattern and determine the perimeter of each figure.



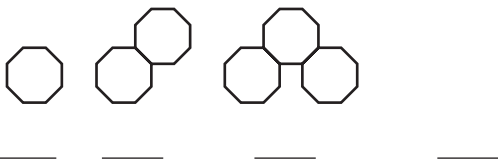
4.



5.



6.



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Determine the missing values in each table.

7. I have 1 teacup. Each year I buy 3 more for my collection.

Years	Teacups
1	4
2	7
3	10
4	13
5	16

8. I have 30 toys. Each year I donate 5 toys to the local daycare.

Years	Toys
1	
2	
3	
4	10
5	

9. I can solve 6 problems per minute. The first is done for me.

Minutes	Problems
0	7
1	
2	19
3	
	37

10. In my experiment, I found the total cells were 3 less than 6 times the original number.

Original	Total
2	
4	21
6	
8	
	57

11. My cousin is 11 years older than I am.

My Age	Cousin's Age
	21
14	
25	
	43
40	

12. For competing in the Spelling Bee, I get \$2 for each correct word plus \$50 for participating.

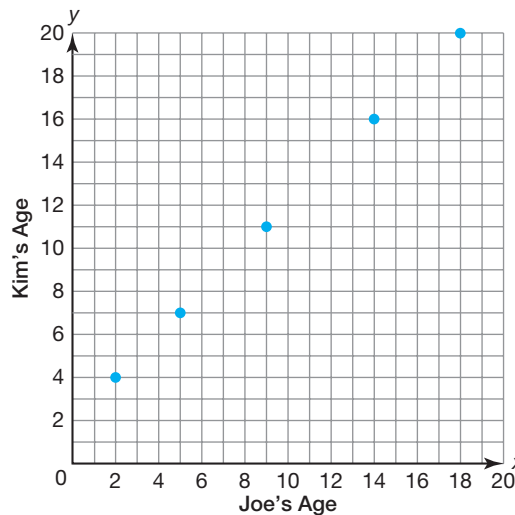
Correct Words	Money
30	
	86
	140
22	
	62

Plot the points from each table. Explain why you did or did not connect the points.

13.

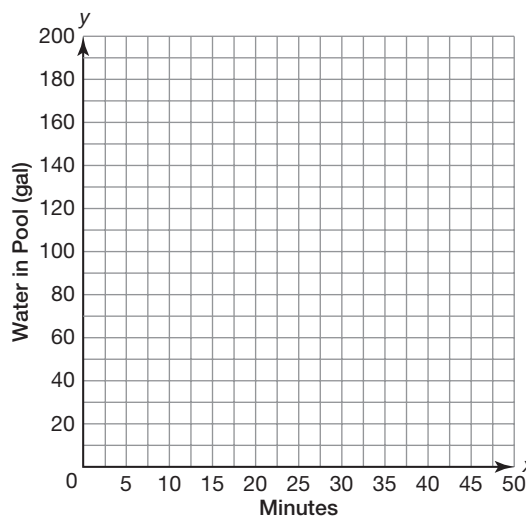
Joe's Age	Kim's Age
2	4
5	7
9	11
14	16
18	20

Did not connect points because the ages are whole numbers.



14.

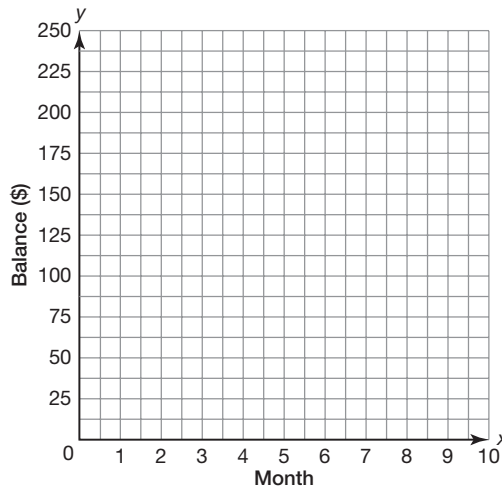
Minutes	Water in Pool (gal)
5	25
12	60
15	75
23	115
38	190



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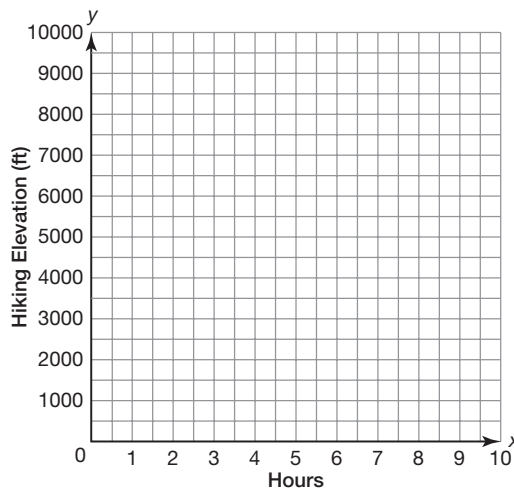
15.

Month	Balance (\$)
0	36
2	86
4	136
6	186
8	236



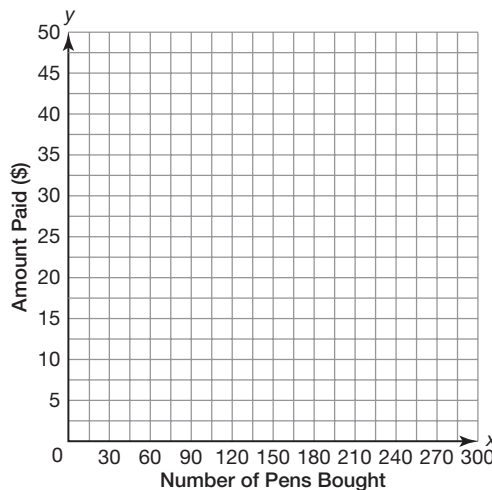
16.

Hours	Hiking Elevation (ft)
0	7000
1	6300
2	5600
3	4900
3.5	4550



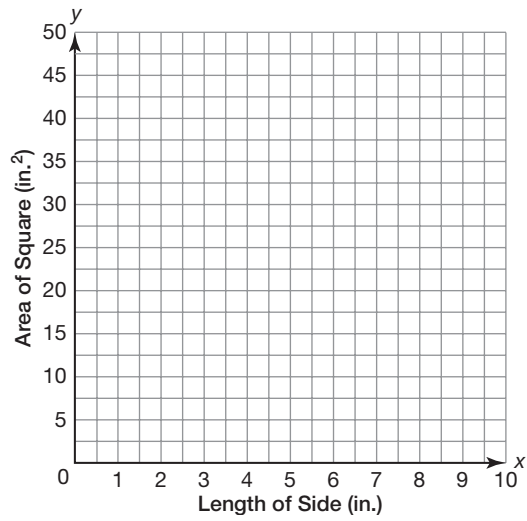
17.

Number of Pens Bought	Amount Paid (\$)
100	10
50	5
300	30
180	18
225	22.50



18.

Length of Side (in.)	Area of Square (in. <sup>2</sup> )
3	9
2.5	6.25
4	16
7	49
5.5	30.25





## Lesson 7.6 Skills Practice

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### There's More than One Way Using Multiple Representations of Problems

#### Problem Set

Use unit cubes to draw the cube described.

1.  $1 \times 1 \times 1$  unit cube



2.  $2 \times 2 \times 2$  unit cube

3.  $3 \times 3 \times 3$  unit cube

4.  $4 \times 4 \times 4$  unit cube

5.  $5 \times 5 \times 5$  unit cube

6.  $6 \times 6 \times 6$  unit cube

Complete the table to show the volume of cubes with different side lengths.

	Length of Each Side of Cube (units)	Volume of Cube (cubic units)
7.	1	1
8.	2	
9.	3	
10.	4	
11.	5	
12.	6	
13.	7	
14.	8	
15.	9	
16.	10	

Let  $s$  represent the side length of each face of a cube. Write and use an algebraic expression to determine the volume of cubes with the side length given.

17.  $s = 8$

$s^3 = 512$

18.  $s = 11$

19.  $s = 20$

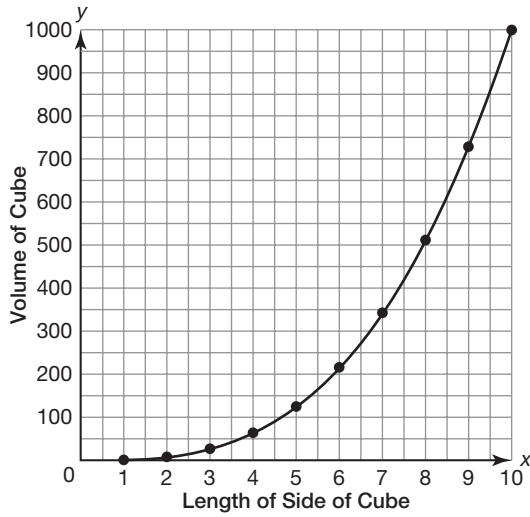
20.  $s = 15$

21.  $s = 50$

22.  $s = 100$

NAME \_\_\_\_\_ DATE \_\_\_\_\_

Use the graph to estimate the cube roots.



23.  $\sqrt[3]{100} \approx 4.6$

24.  $\sqrt[3]{250} \approx$

25.  $\sqrt[3]{50} \approx$

26.  $\sqrt[3]{500} \approx$

27.  $\sqrt[3]{625} \approx$

28.  $\sqrt[3]{850} \approx$

