Module 6 Working with Expressions

Section 6.1 Arithmetic Operations

Practice Problems 6.1

For Problem 1-16, use the arithmetic order of operations to solve the problem given.

1. $3 \times 2 \times 4 - 6$
2. $8 + 5 \times 6 - 4 \times 3 - 10$
3. $14 - 6.3 - 1.5 + 7 \times 1$
4. $33 \div 11 + 4 - 12$
5. $5 \times 4 + 8 - 7 + 2 \times 2$
6. $27 \div 9 + 4 - 9 \div 3$
7. $9 + 9 \div 9 - 9 - 9$
8. $120 - 48 \div 2 + 16$
9. $4.3 \times 2 - 1 \times 5.6$
10. $4 \times 6 \div 2 \times 6 \div 3$
11. $9 - 7 + 10 \times 2.2$
12. $220 - 110 + 10 \times 9 \div 9$
13. $1.2 + 6.8 + 3 \times 3.1 - 12.4$
14. $4 \times 3 + 10 \times 2$
15. $44 \div 4 + 8 \div 4$
16. $100 - 10 \div 2 + 8 \times 8$

For Problem 17-21, solve the word problem given.

17. Lindsay added the numbers below to the left. When Randi looked at these numbers, she saw the digits in reverse order because of her dyslexia. Randi added the numbers below to the right.

$$\begin{array}{r} 83 \\ \underline{+\,27} \end{array} \qquad \begin{array}{r} 64 \\ \underline{+\,35} \end{array}$$

Why do both calculations result in the same sum?

$$\begin{array}{r} 38 \\ \underline{+\,72} \end{array} \qquad \begin{array}{r} 46 \\ \underline{+\,53} \end{array}$$

18. Suppose you are playing a game with an opponent. You have four cards numbered 1, 2, 3, and 4. Your opponent points to a number and you point to a second number to add to it. Then your opponent points to a number to add to that sum (numbers can be used more than once). The first player to the sum of 20 wins. What number can you point to on the second turn to assure you win?

19. Suppose you have several switches to activate a security code before you leave work. Each switch can be in the "on" or "off" position. If there are two switches, how many possible codes are there? How many possible codes are there for three switches? Four switches? Five switches? How many possible codes are there for n switches?

20. Suppose you put a dollar in a vending machine for a soda pop that is only 50 cents. You can get change in half dollars, quarters, dimes, and nickels. How many possible ways can you get your change?

21. The first day of Geography class, Brenda White saw her friends Shari Green and Vickie Black. When she realized Shari and Vickie did not know one another, she introduced them. Brenda noted how odd it was that none of the three of them wore the same color as their last name, yet each had a color on that was one of the others' last names! The one in a green dress replied that it did seem strange. Which color did each girl wear?

Section 6.2 Parenthesis First

Practice Problems 6.2

For Problem 1-10, evaluate the expression given.

1. $(11 \times 2 - 3) - 8 + 2 - 6$

2. $20 - 12 \times 2 + (12 \div 6 + 2 \times 5)$

3. $50 - (2 \times 5 \times 4) + 28 \div 4$

4. $10 \times 2 + (22 \div 11) - 15$

5. $(4 + 3) - 49 \div 7 + 1$

6. $(2.4 + 9.2) \times (13.6 - 7.4)$

7. $8 - 3 + (6 \times 2 \times 4) - 5 + 2$

8. $9 + 16 + (2 \times 6 - 3 \times 5)$

9. $(48 - 12 \div 4) + (16 - 8 \div 2)$

10. $2(3 - 8 + 4) \times 4(5 + 8 \times 1)$

For Problem 11 and 12, solve the word problem given.

11. Kendra bought a mathematics puzzle problem-solver for \$50. She sells it for \$60, buys it back for \$70, then sells it again for \$80. How much did Kendra earn or lose in her mathematics transaction?

12. A mathematics teacher tells her class they can have 1 minute of recess on the first day of school, 2 minutes of recess on the second day of school, 4 minutes of recess on the third day of school, 8 minutes of recess on the fourth day of school, etc. She says if they can tell her how many minutes of recess that they will have on the eighth day of school at the rate she is using, then they can have that amount of recess on the eighth day. If their answer is incorrect, they lose recess all together. What is the number of minutes of recess the students will have on the eighth day of school if they give their teacher the correct answer?

For Problem 13-20, use toothpicks to solve the problem.

13. There are thirteen toothpicks that make up the figure described below. Make the figure with toothpicks and then draw it to the right below.

a) None of the toothpicks overlap.

b) Each segment in the figure uses at least two toothpicks.

c) The figure has two triangles that are not congruent.

d) The two triangles share a common side of three toothpicks.

e) There is a quadrilateral with a perimeter of ten toothpicks in the figure.

14. There are eleven toothpicks in the figure described below. Make the figure with toothpicks and then draw it to the right below.

a) All the toothpicks are part of the pentagon or inside the pentagon.

b) The pentagon is not regular. (A regular polygon has all equal sides and equal angles.)

c) There are four triangles in the figure.

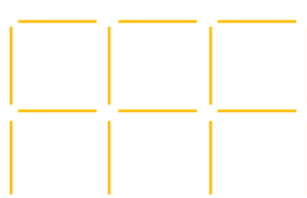
d) Three of the triangles are congruent, but one is larger than the others.

e) Each triangle shares toothpicks with two other triangles.

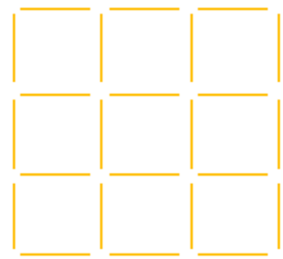
f) All of the triangles are equilateral.

15. Remove one of the thirteen toothpicks from the figure below to make three equal squares.

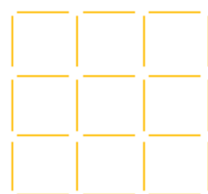
16. There are eight squares made with seventeen toothpicks in the figure below. Remove six toothpicks from the figure to make two squares.



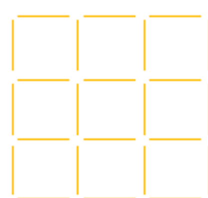
17. There are twenty-four toothpicks forming fourteen squares in the figure below. Remove eight toothpicks from the figure to make three squares. (Two of the squares are congruent, which means they have equal sides and equal angles.)



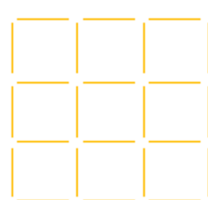
18. How many squares are in the figure below?



19. What are the dimensions of any rectangles within the square below?



20. How many rectangles are in the square below?



Section 6.3 Exponents Next

Practice Problems 6.3

For Problem 1-8, simplify the expression given.

1. $16 - (\frac{10}{5} + 6) \times 0.2$

2. $(10 + 3^3) - (6 \times 5^2)$

3. $4 \times (1{,}000 - 100) + (1{,}000 - 10)$

4. $3^2 - 2^2 \times 4^2 + 16 + 5.2$

5. $(8 - 5) + 2^3 + 6^2 + \frac{9}{3}$

6. $-\frac{15}{15} + 3 - (4 \times 8) + (16 \times 3)$

7. $99 + 16.2 \div 0.2 + 4^3$

8. $(-60 + 80) \times (-3)^4 - 25$

For Problem 9-12, solve the problem given.

9. Put parenthesis somewhere in the expression $36 \div 2 + 4 - 3^2$ so the answer is -3.

10. Which of the expressions is not equal to $36 \div 2 + 4 - 3^2$?

a) $(36 \div 2) + 4 - 3^2$

b) $(36 \div 2) + (4 - 3^2)$

c) $36 \div 2 + (4 - 3^2)$

d) $36 \div 2 + 4 + (-3)^2$

11. If a doctor prescribes you seven pills and tells you to take one every half hour, how long will they last from the time you take the first one?

12. Write an expression that uses five 9s, three of the four arithmetic operations, and is equal to ten.

For Problem 13-20, use addition, subtraction, multiplication, division, and/or parenthesis and/or exponents to solve the problem.

13. Use the numbers 1, 2, 3, 4, and 5 to get 13.

14. Use the numbers 1, 3, 5, and 7 to get 38.

15. Use the numbers 2, 4, 6, and 8 to get 12.

16. Use the numbers 7, 8, 9, and 10 to get -14.

17. Use the numbers 1, 2, 3, and 4 to get 13.

18. Use the numbers 5, 6, 7, and 8 to get 2.

19. Use the numbers 1, 3, 6, and 9 to get 8.

20. Use the numbers 2, 6, 10, and 14 to get 28.

Section 6.4 Order of Operations

Practice Problems 6.4

For Problem 1-12, simplify the expression given.

1. $2^3 \times 3 + 3^2 \times 7$

2. $-4^2 \times 5 + 8 \times 2$

3. $(24 + 6) \div (15 - 10)$

4. $(2 \times 3)^2 + (4 + 2)^2$

5. $(10 + 20)^2 \div (27 - 18)$

6. $(26 - 2) \div 2(1 + 3)$

7. $15 - 8 + 3 \times 20 \div 4$

8. $(15 - 6) - (4 + 3)$

9. $(20 - 6) + 4 \times 5 \div 2$

10. $3(9 - 5) + 8 \times 4$

11. $6 + 4 - 2(18 \div 9)$

12. $14 + 2(3 + 5) - 8$

For Problem 13-20, solve the word problem given.

13. Suppose six white socks and six black socks are all mixed up in your drawer. When you wake up, your room is pitch dark and you cannot see the color of the socks. What is the fewest number of socks you can take out of your drawer to make sure you have a matching pair?

14. If a pencil and an eraser cost $1.10 and the pencil is $1.00 more than the eraser, how much does the eraser cost?

15. It takes one minute to make a cut in a board. How long will it take to cut an eight-foot board into eight pieces?

16. Use four 5s and three of the arithmetic operations to get 26.

17. In the addition problem below, tell which of the digits 0 through 9 are used for H, I, and J to make it work.

$$\begin{array}{cccc} & & H & H \\ + & & I & I \\ \hline & J & I & J \end{array}$$

18. Use four 4s and any arithmetic operation to get 12. Let a square be an operation and not a number 2.

19. Use four 4s and any arithmetic operation to get 17.

20. Now we know how to find 12 and 17 using four 4s; Find all of the other numbers from 1 through 20 using four 4s.

Section 6.5 Algebraic Expressions

Practice Problems 6.5

For Problem 1-12, write the algebraic expression for the phrase given.

1. 24 less than a number

2. n divided by 8

3. -5 divided by n

4. the sum of 2.7 and p

5. the sum of a number and 6

6. 5 less than a number

7. the quotient 2.8 and p

8. p divided by 12.5

9. 20 more than a number m

10. 0 plus a number

11. the difference of 2 and a number

12. -3 minus a number

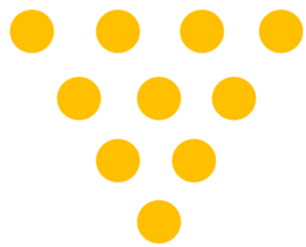
For Problem 13-20, solve the word problem given.

13. Natalie is 14 years older than Allison. Write an expression for Natalie's age in terms of Allison's age. Let N be Natalie and A be Allison.

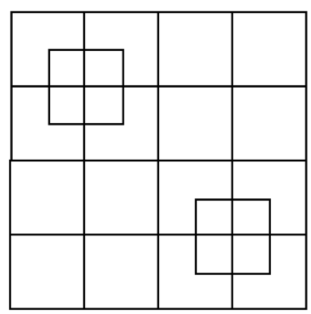
14. From Problem 13, write an expression for Allison's age in terms of Natalie's age.

15. There are 33 ounces of orange juice in a carton. How much is left after 7 ounces are used?

16. Put ten pennies in the formation shown below. Move three pennies so the triangle is pointed right-side up.



17. How many squares are in the diagram below?



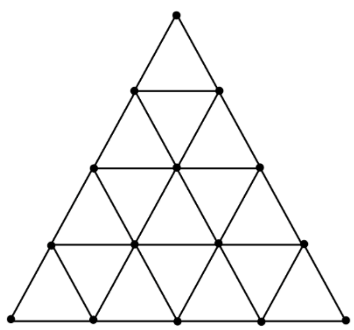
18. Use the numbers 0 through 9 to make the equation below true. Use each of them only once.

______ + ______ + ______ + ______ + ______ + ______ + ______ + ______ = ______ ______

19. Use any of the numbers 1 through 9 once each in the problems below to make them have the same sum.

	___	___	___			___	___
+		___	___	+		___	___
	1	7	1		1	7	1

20. How many triangles are in the triangle below?



Section 6.6 Multiple Operations

Practice Problems 6.6

For Problem 1-15, write the phrase given as an algebraic expression.

1. 5 times a number plus 7

2. 5 less than 6 times a number

3. the sum of 9 and m times 35

4. 13 minus the product of s and 10

5. the quotient of $4b$ and 64

6. 8.62 less than the sum of 8.1 and k

7. 8.37 more than the product of 1.3 and p

8. the quotient of 5 less than a number and 10

9. the quotient of 7 and 13 less than a number

10. 4 multiplied by a number added to three times that number

11. the sum of 9 and a number divided by 6 times that number

12. 15 plus the quotient of 30 and q

13. 22 less than 5 times a number

14. the quotient of t and 3 minus the quotient of q and 5

15. 21 minus the product of u and 15

For Problem 16-20, use the information given to solve the problem.

16. Look at the data in the table below to the left.

Hours Worked	Money Earned ($)
1	__
2	__
3	6
4	8

a) Which statement is true?

i) $\text{Money Earned} = \text{Hours Worked} \times 2$

ii) $\text{Money Earned} = \text{Hours Worked} + 2$

b) How much money is made per hour?

17. Which is the algebraic expression for the phrase: "the quotient of m and the sum of 6 and t."

a) $\frac{6+t}{m}$

b) $\frac{m}{6+t}$

c) $\frac{6}{t} + m$

d) $\frac{t}{m} + 6$

18. Which is the algebraic expression for the phrase: "the difference of q and the sum of 6 and r."

a) $\frac{6+r}{q}$

b) $q - (6 + r)$

c) $6 + \frac{r}{q}$

d) $6 + (r - q)$

19. Four married couples are going to a movie. The husbands are Byron, Kyreece, Jequan, and Eric; the wives are Allyson, Shelby, Kirsten, and April. Allyson is married to Jequan. Kirsten is Kyreece's sister. Eric and Kirsten were once engaged but broke up. April has four brothers, but her husband is an only child. If each of these people sit with their mate (husband/wife) at the movie, who will Shelby be sitting beside?

20. Greg owns a restaurant that has a certain number of stools. The stools each have 3 legs. There are a certain number of chairs in that same restaurant. The chairs each have 4 legs. If there are 29 legs of furniture in Greg's restaurant, how many stools and how many chairs are there in Greg's restaurant?

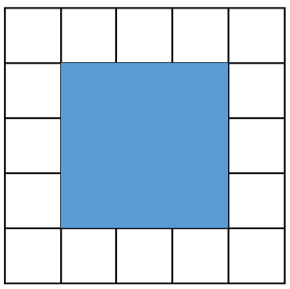
Section 6.7 Geometric Representations

Practice Problems 6.7

For Problem 1-5, solve the word problem given.

1. Draw the geometric diagram for the perimeter of a pool that is 6 feet longer than it is wide. Write the expression for the perimeter in terms of width.

2. A hot tub measures 3 feet on each side. Its perimeter has border tiles surrounding it that measure 1 foot on each side. What is the area of the surface of the hot tub water (in blue)? How many border tiles are there around the hot tub?



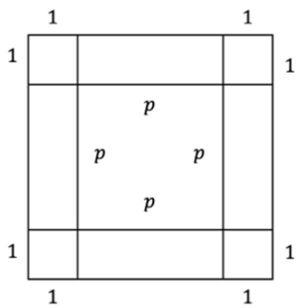
3. A square pool has a side length of p. Write an expression for the total number of border tiles (B) in terms of p.

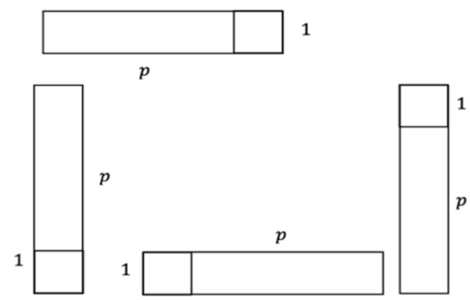
4. Is the relationship from Problem 3 between the length of the side of the pool (in terms of p) and the number of border tiles surrounding the pool (in terms of B) linear?

5. Is there another method to get the same expression for border tiles in terms of side length (p) as in Problem 3?

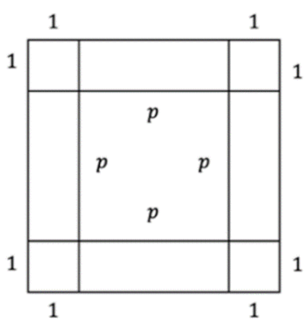
For Problem 6 and 7, use the diagrams given to solve the problem.

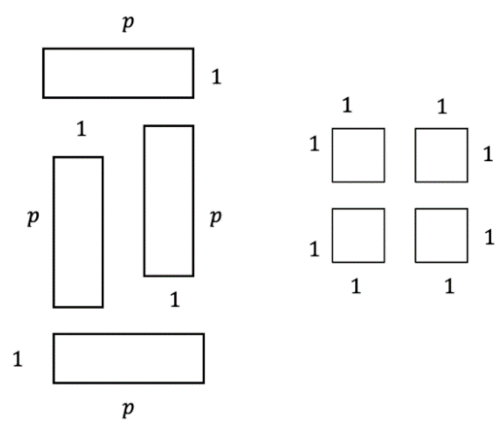
6. The diagram on the left below is a geometric representation of the pool from Problem 3 surrounded by its border tiles. Write an expression for the diagram on the right below, which represents only the border tiles.





7. The diagram on the left below is a geometric representation of the pool from Problem 3 surrounded by its border tiles. Write an expression (different from the one in Problem 6) for the diagram on the right below, which represents only the border tiles.





For Problem 8 and 9, use the information given to solve the problem.

8. If B represents the number of border tiles from Problem 3, which of the solutions below is incorrect?

a) $B = p + p + p + p + 1 + 1 + 1 + 1$

b) $B = 2(p + 1) + 2p + 2$

c) $B = p + 1 + p + 1 + p + 1 + p + 1$

d) $B = 4p + 4$

e) $B = 2p + 2 + 2p$

9. If the length of the side of a pool is 5 tiles, how many border tiles surround the pool completely? Draw a diagram to demonstrate your solution.

For Problem 10-13, use the formula for border tiles to solve the problem.

10. If the length of a pool is 10 tiles, how many border tiles surround it?

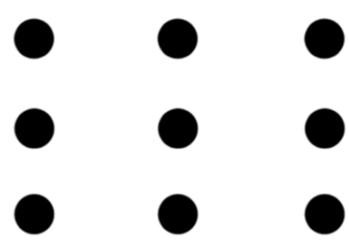
11. If a pool has a length of 20 tiles, how many border tiles surround it?

12. If the length of a pool is t tiles, how many border tiles surround it?

13. What is the area of the pool with a side length of only t tiles?

For Problem 14-20, solve the problem given.

14. Without lifting your pencil from the paper, draw four connected line segments that go through each of the nine circles below one time each.



15. A man looked at something and said: “Brothers and sisters, I have none, but the man’s father is my father’s son.” What was he looking at?

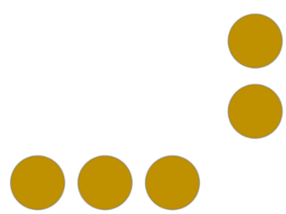
16. A train has cars that make it one mile long. It travels at a rate of one mile per minute and goes through a tunnel that is one mile long. Once the train enters the tunnel, how long is it before the train completely exits the tunnel (in minutes)?

17. Use the digits 0 through 9 to find a letter for each digit in the cryptarithm below.

F:	E:
O:	N:
R:	S:
T:	I:
Y:	X:

```
  FORTY
    TEN
+   TEN
-------
  SIXTY
```

18. Arrange five pennies so they look like the diagram below. Move one so that each row and column has exactly three pennies showing.



19. Use the numbers 0 through 9 once each to make a true equation.

_______ _______ − _______ − _______ + _______ + _______ + _______ + _______ + _______ + ______ = 100

20. Use three 8s and any number of mathematical operations to get the number 7.

Section 6.8 Tabular Representation

Practice Problems 6.8

For Problem 1-6, use the information given to solve the problem.

1. Complete the table to find the algebraic expression relating the number of rows in the garden to the number of plants in the garden.

Rows in Garden	Number of Plants in Garden
1	5
2	10
3	15
4	
n	

2. Complete the table to find the algebraic expression relating the number of workers to the number of ceiling fans built in a warehouse.

Number of Workers	Ceiling Fans Built
1	1.5
2	3
3	4.5
4	
w	

3. Given n is the number of nickels in a purse, write an algebraic expression that represents the value of the nickels.

4. Given i represents the number of ice cream cones sold and each ice cream cone costs $\$0.95$, write an algebraic expression that represents the total amount of money made in ice cream cone sales at the end of the day or anytime during the day.

5. Given p is the number of pieces of cake eaten at a wedding, and given the cake was cut into a total of 360 pieces, write an algebraic expression that represents the number of pieces left over when the wedding reception ends.

6. Given 20 is the number of people at a theatre at the beginning of a show and given p represents the number of people that enter after the show begins, write an algebraic expression for the number of people in the theatre at the end of the show.

For Problem 7-10, use the given table below to the left to solve the problem.

Number of Tables	Number of Puzzles
1	2
2	4
3	
4	
w	

7. Complete the table to find the algebraic expression relating the number of tables to the number of puzzles.

8. How many puzzles are at each table?

9. Which is the independent variable?

10. Which is the dependent variable?

For Problem 11-20, solve the problem given.

11. Write an expression for each of the given phrases.

a) the sum of x and 18

b) the difference of x and 18

c) 4 more than a number t

d) 5.8 less than a number v

12. Which of the given equations models the relationship in the table? Let $r =$ row numbers and $T =$ total seats.

r	T
1	11
2	22
3	33
4	44
r	$11r$

a) $T = 11 + r$

b) $T = 11r$

c) $T - 11 = r$

d) $\frac{11}{T} = r$

13. Suppose you have all dimes and nickels in your bank; there are twenty coins that total $1.35. How many of each (dimes and nickels) do you have?

14. An older Canadian and a younger Canadian went hunting. The younger Canadian was the older Canadian's son but the older Canadian was not his father. How is that possible?

15. If 3 kiwis can be traded for 2 peaches, how many peaches can be traded for 24 kiwis? Make a table to solve the problem.

16. How many games are played in a single elimination basketball tournament with 64 teams?

17. Using each once, put numbers 0 through 9 in three groups so that the sum of each group is 15.

18. Use four 1s, four 2s, four 3s, and four 4s so that each row, column, and diagonal below have the same sum. The magic sum is 10.

19. Use numbers 0 through 15 once each so the magic sum for each row, column, and diagonal below is 30.

20. Use numbers 1 through 9 once each to find the magic sum of each row, column, and diagonal below.

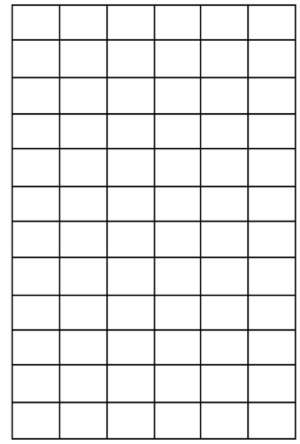
Section 6.9 Graphical Representations

Practice Problems 6.9

For Problem 1-20, use the information given to solve the problem.

1. Complete the table below and draw the graph that represents the data.

Length of Square Side in Inches	**Perimeter of Square in Inches**
1	4
2	8
3	12
4	
5	

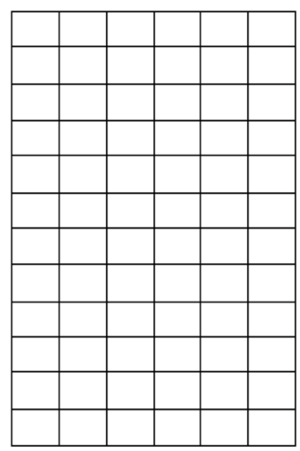


2. What interval did you use for the y-scale in Problem 1? Why?

3. What interval did you use for the x-scale in Problem 1? Why?

4. Complete the table below and draw the graph that represents the data.

Number of Shoes Sold	**Total Money Earned**
1	$22.00
2	$44.00
3	
4	
5	



5. What interval did you use for the y-scale in Problem 4? Why?

6. What interval did you use for the x-scale in Problem 4? Why?

7. The triangular figurate numbers are as follows:

Number	Total Number of Dots
1	1
2	3
3	6
4	10

Would this graph be linear? Why or why not?

8. The Fibonacci Numbers by position are as follows:

Position	Fibonacci Number
1	1
2	1
3	2
4	3
5	5
6	8

Would this graph be linear? Why or why not?

9. Are the ordered pairs in Problem 7 and Problem 8 represented by lines (continuous data) or dots (discrete data)? Explain why.

10. Which equation represents the data in Example 3 from the Lesson Notes given w represents week of payment and m represents total amount of money in the account?

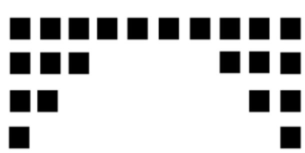
a) $m = \$20w$

b) $m = \$20w - \$20$

c) $m = \$200 - w$

d) $m = \$200 - \$20w$

11. What is a quick method to find the total number of squares?



12. Find another quick method to find the total number of squares.

13. What is a quick method to find the sum of the expression below?

$$35-28+28-21+21-14+14-7+7$$

14. What is another quick method to find the sum of the expression from Problem 13?

$$35-28+28-21+21-14+14-7+7$$

15. What is a quick method to find the sum of the expression below?

$$9-18+27-36+45-54+63-72+81$$

16. What is another quick method to find the sum of the expression from Problem 15?

$$9-18+27-36+45-54+63-72+81$$

17. Linda Lou Lee pays one dollar to get into a basketball game. She then loans friends half of what she has left and must pay another dollar to leave the game. She travels to another high school where the same thing occurs (pays one dollar to get in; loans half; pays one dollar to get out). At a third game, the same thing happens. Finally, Linda Lou Lee leaves the third game with only one dollar in her pocket (not what you would call a thrifty spender!). How much money did she start out with? Show your work.

18. Kioko, Nichelle, and Zola shared 24 teen magazines, each getting a number equal to her age three years before. The youngest kept half of the magazines she had and divided the rest equally between the other two. The middle then kept half of the remaining magazines accumulated and split the rest equally between the other two. The oldest then did the same. How old is each girl? Show your work.

19. Many years from now, two algebra students meet on the street and their conversation is as follows:

STUDENT 1: I am married now and have three fine sons.
STUDENT 2: Great! How old are they?
STUDENT 1: The product of their ages is 36.
STUDENT 2: Hmm. That's not enough information. How about another clue?
STUDENT 1: O.K. The sum of their ages is the number of the building in front of you.
STUDENT 2: That's almost enough to figure it out, but I still need one more clue.
STUDENT 1: This is it: the oldest is a brunette.
STUDENT 2: O.K. Now I've got it!

What are the ages of the three sons? How did STUDENT 2 figure it out? Show your work.

20. Niesz, Dinwiddie, Maskiell, Hudson, and Lozano were in a battle and one was killed:

a) Niesz was an ordained Catholic priest.
b) The wife of the slain man was the sister of Mrs. Hudson.
c) Mrs. Lozano's beautiful daughter died of lung disease.
d) Dinwiddie was sorry that Maskiell did not return on the same boat.
e) Mrs. Hudson regretted she never had a niece or nephew.

Who was killed? Show your work.

Section 6.10 Multiple Representations

Practice Problems 6.10

For Problem 1-4, use the given information to solve the problem.

A car travels at a rate of 60 miles per hour. The car travels a certain distance for several hours.

1. Which table models the situation: Table A or Table B?

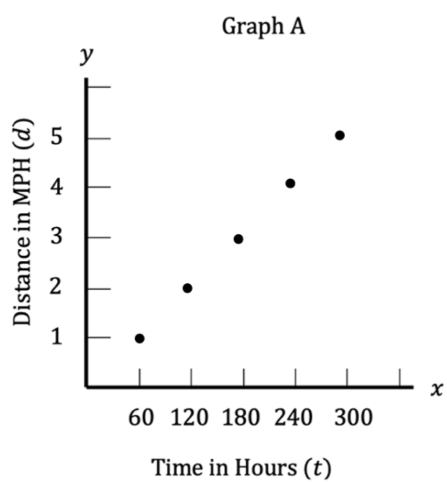
Table A

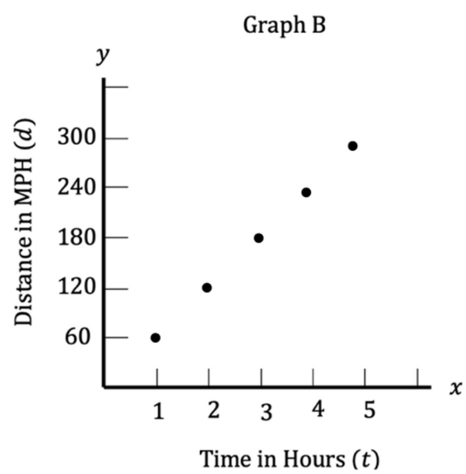
Time (t)	Distance (d)
1	60
2	120
3	180
4	240
5	300
t	$60t$

Table B

Time (t)	Distance (d)
1	60
2	120
3	180
4	240
5	300
t	$60 + t$

2. Which graph models the situation: Graph A or Graph B?





3. Which equation below models the situation?

a) $t = 60 + d$

b) $\frac{d}{t-60} = r$

c) $d = 60t$

d) $d - 60 = t$

4. How far has the car traveled…

a) … after 4 hours?

b) … after 5 hours?

c) … after 11 hours?

For Problem 5-8, use the information given to solve the problem.

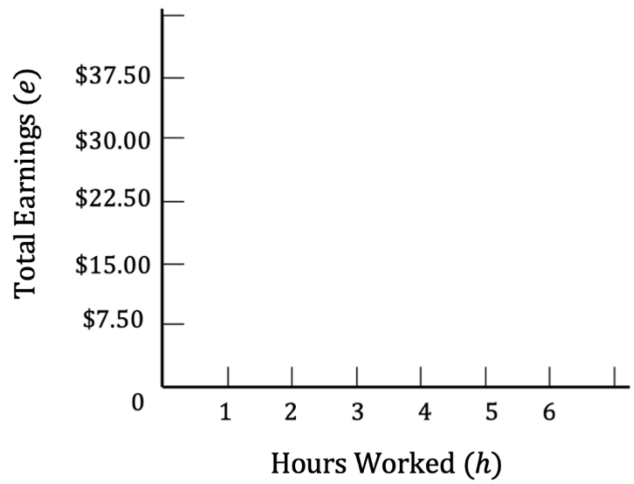
Hazel gets paid $\$7.50$ per hour at her job.

5. Write an equation to represent Hazel's earnings. Let $h = \text{hours worked}$ and $e = \text{earnings}$.

6. Complete the table below to model the situation.

Hours Worked (h)	Total Earnings (e)
1	
2	
3	
4	
5	
h	

7. Complete the graph below to model the situation.



8. How much does Hazel earn after working…

a) … 4 hours?

b) … 10 hours?

c) … 20 hours?

For Problem 9 and 10, use the given information to solve the problem.

The distance an object falls over time is represented by the equation $d = 16t^2 - 2t$ in which d represents distance and t represents time.

9. How many feet does the object fall after 5 seconds?

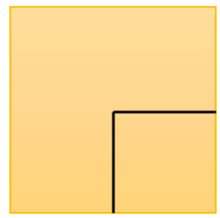
10. How much farther does the object fall after 8 seconds?

For Problem 11-20, use the given information to solve the problem.

A bakery cuts a square cake a different way each day. The yellow squares represent the cake and the black lines represent the cuts. Tell what fraction of the cake the piece given is.

11.

12.



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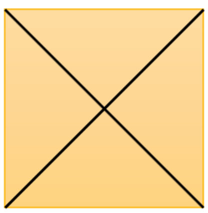

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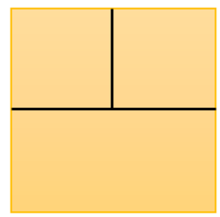

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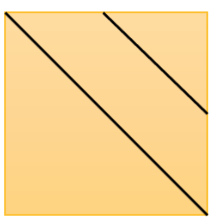

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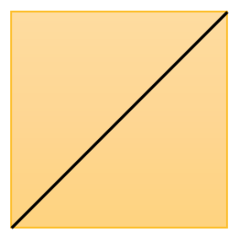
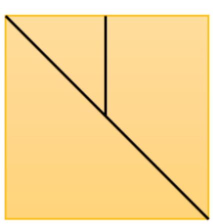
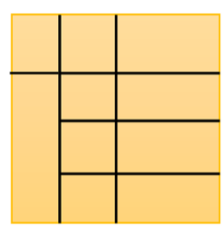


17.

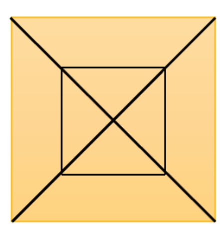


18.



19.

20.



Section 6.11 Algebraic Equations

Practice Problems 6.11

For Problem 1-4, solve the word problem given.

1. If r represents rows in a garden and there are 5 plants per row in the garden, and p represents the total number of plants in the garden, write an equation that represents the relationship between rows in the garden and the total number of plants in the garden.

2. If w represents the number of workers and f represents the total number of ceiling fans built in a warehouse, and the workers can build 1.5 fans per hour, write an equation to represent the relationship between the number of workers and the total number of fans built per hour in the warehouse.

3. If m is the total amount of money you have in your bag in quarters and q represents the number of quarters in your bag, write an equation to represent the relationship between the total amount of money you have in your bag and the number of quarters you have in your bag.

4. If m represents the total amount of money you have in half-dollars in your bag and d represents the number of half-dollars in your bag, how does the equation from Problem 3 change?

For Problem 5 and 6, write an equation to model the situation given.

5. Let $l =$ length of rope and $b =$ number of bridges built; the total length of the rope used is 40 times the number of bridges built.

6. Let $o =$ oranges eaten and $t =$ number of oranges in a bag; the total number of oranges left in a bag of 19 oranges once you have eaten some.

For Problem 7 and 8, complete the table given and write an equation to model the data to solve the problem.

7.

Number of CDs (d)	Total Cost of CDs (c)
1	\$15.00
2	\$30.00
3	\$45.00
4	\$60.00
d	

8.

Time in Days (d)	Total Length in Inches (l)
1	2.3
2	4.6
3	6.9
4	9.2
d	

For Problem 9 and 10, use the information given to solve the problem.

9. Let $n =$ nickels and $p =$ pennies; how much money is in a bag of pennies and nickels? Let $m =$ money.

10. Bart kept a log of how much money he received in a week for mowing lawns. However, the numbers on his log got smeared with sweat and the diagram below shows all that could be seen as a result. How much money did Bart make per lawn?

Lawns	Money
1	\$[illegible]5.00
2	\$3[illegible]
3	\$45.00
[illegible]	[illegible]

For Problem 11-18, using numbers 1 through 10 in pairs and the operations $(+)$, $(-)$, $(\times)$, and $(\div)$ once each, with one operation being used twice, get the sequence of five numbers given.

11. $3, 4, 9, 11, 15$

12. $2, 3, 4, 7, 7$

13. $1, 5, 5, 9, 9$

14. $1, 2, 2, 5, 7$

15. $1, 1, 2, 2, 9$

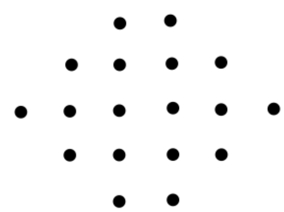
16. $3, 4, 10, 10, 13$

17. $1, 4, 5, 10, 12$

18. $3, 7, 11, 15, 19$ (Use all addition)

For Problem 19 and 20, solve the problem given.

19. Write three ways to group the dots below to show a total of 18 dots.



20. Suppose you pick one envelope from the selection of twelve below and get to keep the money inside it. A tax collector collects taxes on all the other factors of the number you pick. If an envelope has no factors remining, you cannot keep it because the tax collector wants their money! What is the most money you can get by picking envelopes once you have paid the tax collector?

\$1	\$2	\$3	\$4	\$5	\$6
\$7	\$8	\$9	\$10	\$11	\$12

Section 6.12 Evaluating Expressions

Practice Problems 6.12

For Problem 1-12, evaluate the expression given $m = -4$ and $n = 7$.

1. $m^3 - m^2$
2. $m^2n + mn$
3. $m \div 4 + n \div 7$
4. $m(m + n)^2$
5. $m^2n - m$
6. $m^2 + n$
7. $mn - n$
8. $(m + 3)(n - 8)$
9. $m - n^2$
10. $m - mn$
11. $(m - 10)(n + 10)$
12. $3m + 4n$

For Problem 13-20, solve the problem given.

13. Is $(m - n)^2$ the same as $m^2 - n^2$?
14. Is $(m + n)^2$ the same as $m^2 + n^2$?

15. Evaluate $(m+n)^2 = m^2 + n^2$ when $m = 0$ and $n = 0$. Is it true?

16. Evaluate $(m+n)^2 = m^2 + n^2$ when $m = 0$ and $n = 1$. Is it true?

17. Evaluate $(m+n)^2 = m^2 + n^2$ when $m = 1$ and $n = 0$. Is it true?

18. Evaluate $(m+n)^2 = m^2 + n^2$ when $m = 1$ and $n = 1$. Is it true?

19. What can be said about $(m+n)^2 = m^2 + n^2$? Is it sometimes, always, or never true?

20. If the length of a picture and its frame is l and the width of the picture and its frame is w, write an equation for the area of the picture given the width of the frame is 2 inches.

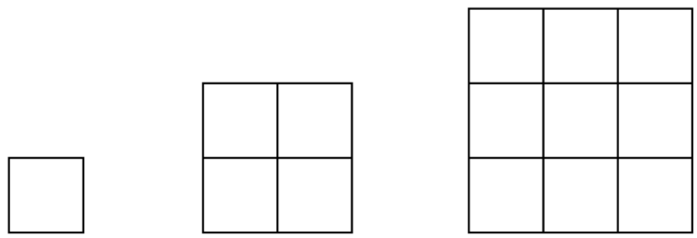
Section 6.13 Problem-Solving Strategies

Practice Problems 6.13

For Problem 1-10, use the information given to solve the problem.

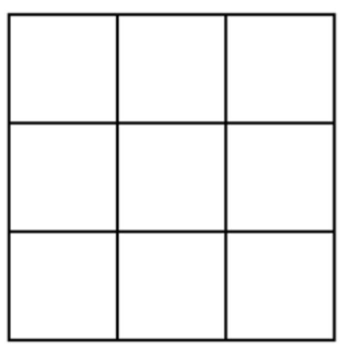
1. How many total squares are in a 10 x 10 square? Make a table to represent your data and look for patterns in it.

- A 1 x 1 square has only one square.
- A 2 x 2 square has four small squares and one large square for a total of five squares.
- A 3 x 3 square has nine small squares, four 2 x 2 squares, and one large square for a total of fourteen squares.



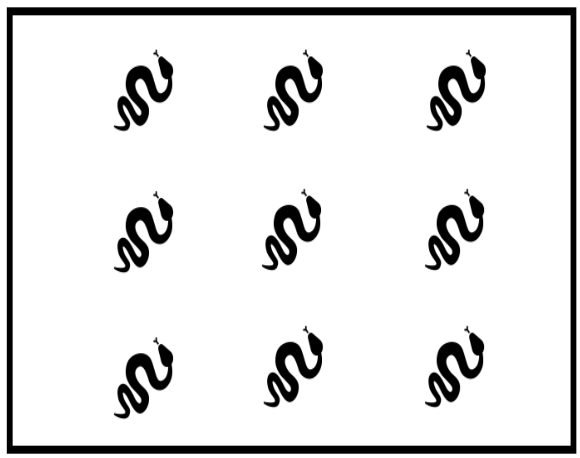
1 x 1 square 2 x 2 square 3 x 3 square

2. How many rectangles can you find in the square below? Remember, a square is a special rectangle; it is a rectangle with all sides equal.

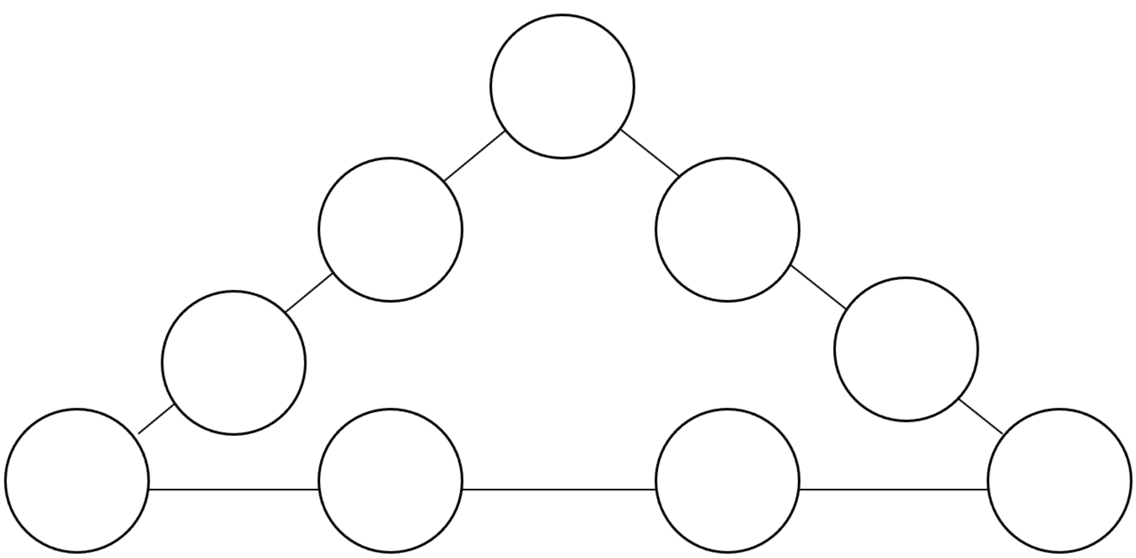


3. There are 1,000 lockers in a school. All of them are closed. The first person to get to school walks by and opens every locker. The second person walks by and closes every other locker, beginning with Locker 2. The third person opens the lockers that are closed, and closes the lockers that are open, beginning with Locker 3 and reversing all the lockers that are multiples of the number 3. The pattern continues. If 1,000 students enter the school and reverse the lockers according to this pattern (opening the closed lockers and closing the open lockers), how many lockers will remain open in the end? (Try this situation with 20 lockers first and keep adding lockers until you discover the pattern. Use pennies to represent lockers: Heads will represent open lockers and Tails will represent closed lockers.)

4. There are nine poisonous snakes in a pen that must be separated from each other. You must use only two square enclosures within the large pen to put each snake in its own cage.



5. Put the numbers 1 through 9 in the nine circles below so that the numbers along each side of the triangle add up to 20.



6. How could you make change for $1.00 using exactly 50 coins? Try it yourself with coins. (Guess and Check is a good strategy to use to solve this problem.)

7. A spider falls in a hole that is 21 feet deep. He climbs up 5 meters each day but falls back down 3 meters each night. When does the spider reach the top of the hole?

8. Three high school seniors work at a grocery store after school. They either stock shelves or bag groceries. Mr. Ebersold, the manager, assigns them their job each day according to three rules:

1) Either Roger or Bly will stock shelves, but not both.
2) If Roger stocks shelves, then Dave will bag groceries.
3) Dave and Bly will not both bag groceries.

Mr. Ebersold must use these rules, or two of the three seniors will stay in the stock room all day break-dancing to the latest tunes.

According to these rules, which of the seniors could have stocked shelves yesterday and bagged groceries today? Show your work.

9. During school hours, June, Becky, and Denise were continually loaning and borrowing supplies. These friends worked out a system of doing so: The first student loaned the second and third friend as many pencils as they already had. Then, three months later, the second student loaned the first and third student as many pencils as they already had. Finally, another three months later, the third student did the same for the first and second student. Each student now has 24 pencils. How many pencils did each student begin with? Show your work.

10. Suppose you are walking in the forest and come to a fork in the path. There is a right path to take and a wrong path to take, but you do not know which is which. There are two brothers standing at the fork who both know the right path to take. One brother is a truth teller who always tells the truth, and the other is a liar who always tells lies. You may question only one of the brothers. What question will you ask to decide which path to take? Show your work.

For Problem 11-17, fill in the blank(s) to complete the number pattern and solve the problem.

11. 4, 8, 12, __________, __________, __________

12. 10, 15, 20, __________, __________, __________

13. 2, 7, 12, __________, __________, __________

14. 10, 16, 22, __________, __________, __________

15. 40, 62, 84, __________, __________, __________

16. __________, 17, 21, 25, …

17. 5, __________, 19, 26, …

For Problem 18-20, fill in the blank(s) to complete the sequence and solve the problem.

18. □ ◇ ○ ◇ __________ ◇ ○ ◇

19. **$ # __________ P $ # L P**

20. **Q __________ S T Q R __________ T**

Section 6.14 Module Review

For Problem 1-9, simplify the expression given using order of operations.

1. $-20 + (-3) \cdot 5$

2. $\frac{18}{2} - 12 + 8$

3. $(13 + 3) + -3^2 + (-3)^2$

4. $(5.3)2 - 3.4$

5. $-(5 + 5x)$

6. $-4(x - \frac{1}{4})$

7. $(5b + 4)(3) - (17 - 14)5$

8. $12 - 7v + 18v - (w + 5w)$

9. $2b + 11 - (7b - 3) + 5b$

For Problem 10-13, evaluate the expression given. Let $p = -2, q = 3,$ and $r = 4$.

10. $-10p + 22 + 3q$

11. $(p + q)(q - r)$

12. $3pqr - 2(pqr)^2$

13. $\frac{r}{p} - pqr + 2^3$

For Problem 14 and 15, write an expression for the phrase given.

14. Negative sixteen plus two times a number

15. Six divided by the quantity of seven plus a number

For Problem 16-20, use the information given to solve the problem.

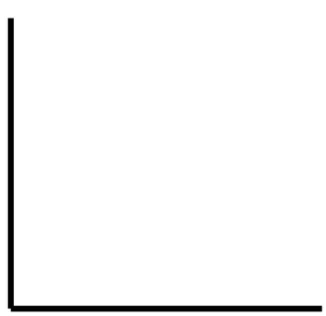
16. Write an equation to model the situation: The total cost of c cartons of chocolate milk is $3.90. Each individual carton costs $0.65.

17. DVDs are on sale for $9.95 each. Write an equation for the amount of money made (m) after a certain number of DVDs (d) are sold.

18. Complete the table to represent money made from the sales of 1 to 9 DVDs from Problem 17.

Number of DVDs (d)	**Total Amount of Money Made (m)**
1	
2	
3	
4	
5	
6	
7	
8	
9	

19. Draw a graph to represent money made from the sales of 1 to 9 DVDs from Problem 17.



20. Use the equation from your data from Problem 17-19 to find the total amount of money made for DVD sales for…

a) … 11 DVDs.

b) … 24 DVDs.

Section 6.15 Module Test

For Problem 1-9, simplify the expression given using order of operations.

1. $42 + (-10 + 3)4$

2. $(16 + 20) - 3(s)$

3. $49\left(\frac{1}{7}\right) + 3(-2) + (14 - 3)$

4. $(16 - 10) + 3(-3) + 3^2 - 8$

5. $\frac{33}{11} + 2 \cdot 3 \cdot 4 - (-6 + 8)$

6. $(20a + 6)2 - (12a - 3)5$

7. $-13n + 14m - 6n + (3m)^2$

8. $-(5 - 8x) - 6 + 3x$

9. $(31)(2) + \frac{30}{10} + (3m + 2^3) - 6m$

For Problem 10-13, evaluate the expression given $r = -5$, $s = 7$, and $t = 9$.

10. $r^2 - s^2 + t^2$

11. $(r + s)^2 - (s - t)^2$

12. $-5(2s + 3t)$

13. $(4r)^2 - 4s + t^3$

For Problem 14 and 15, write an expression for the phrase given.

14. Three-eighths times the quantity negative eleven plus a number

15. Eight divided by the quantity d plus six

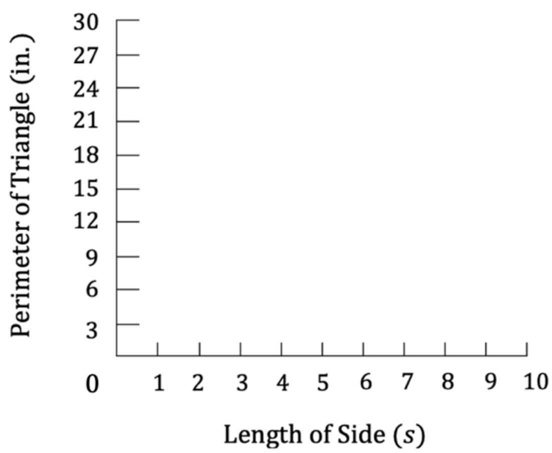
For Problem 16-20, use the information given to solve the problem.

16. Write an equation to model the situation: The perimeter of an equilateral triangle is 16.9 inches; the perimeter of the triangle is three times the length of a side (s).

17. Complete the table below to show the perimeter of an equilateral triangle for side lengths 3" to 10".

Length of Side (s)	**Perimeter of Triangle (in.)**
3	
4	
5	
6	
7	
8	
9	
10	

18. Draw a graph to show the perimeter of an equilateral triangle for side lengths 3" to 10".



19. What is the length of a side of an equilateral triangle that has a perimeter of 27 inches?

20. What is the perimeter of an equilateral triangle that has a side length of 13 inches?