Launch Into Math 4

Launch Into Graphing

Street Sense

Many American cities are laid out on a grid. If you understand a city's grid system, it is easier for you to find your way around and not get lost.

The standard grid system is often set up so that avenues run north and south and streets run east and west. Miami uses the standard grid system, with north and south avenues and east and west streets.

When you first visit a city, study its street maps. If its avenues are perpendicular to its streets, it uses a grid system, and it will be much easier for you to explore the city and find fun things to do!

The Miami Street Grid

- Miami Avenue is 18.8 miles long and divides Miami into east and west avenues.
- Flagler Street is about 12.4 miles long and divides the city into north and south streets.
- The middle of Miami's city grid is where Miami Avenue and Flagler Street intersect.
- The Roads is a district in Miami that does not follow the grid and is instead at a 45° angle to the rest of the city streets.

Three Reads

First, read to understand the situation.

Next, read to understand the amounts.

Then, read to ask what mathematical questions could be asked about the problem.

Naomi and Kamal live in the same apartment building in Miami. To get to school, Naomi travels 3 blocks north and 4 blocks east. Kamal walks from the apartment building to a friend's house that is 3 blocks east and 1 block north, and then he and his friend walk 1 block east and 2 blocks north to get to school.

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Go Online
For the interactive lesson

Read the final question. Make a plan to solve the problem.

Naomi and Kamal live in the same apartment building in Miami. To get to school, Naomi travels 3 blocks north and 4 blocks east. Kamal walks from the apartment building to a friend's house that is 3 blocks east and 1 block north, and then he and his friend walk 1 block east and 2 blocks north to get to school.

Who walks the greater distance to get to school, Naomi or Kamal?

Aerial View of Miami, Florida

Write, model, or draw to solve the problem.

Discuss with a partner or in a group.

Math Talk

Suppose each block is a rectangle that is 200 meters from east to west and 400 meters from north to south. Does this make a difference? Explain why or why not.

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Chapter 17

Name _____

Graphs and Patterns

Show What You Know

Plotting Points on a Number Line

1. Plot 4 on the horizontal number line.

2. Plot 7 on the horizontal number line.

3. Plot 1 on the vertical number line.

4. Plot 8 on the vertical number line.

Extend Patterns

Find the missing numbers. Then write a description for each pattern.

5. 0, 5, 10, 15, _____, _____, _____
   description: _____

6. 70, 60, 50, 40, _____, _____, _____
   description: _____

7. 12, 18, 24, 30, _____, _____, _____
   description: _____

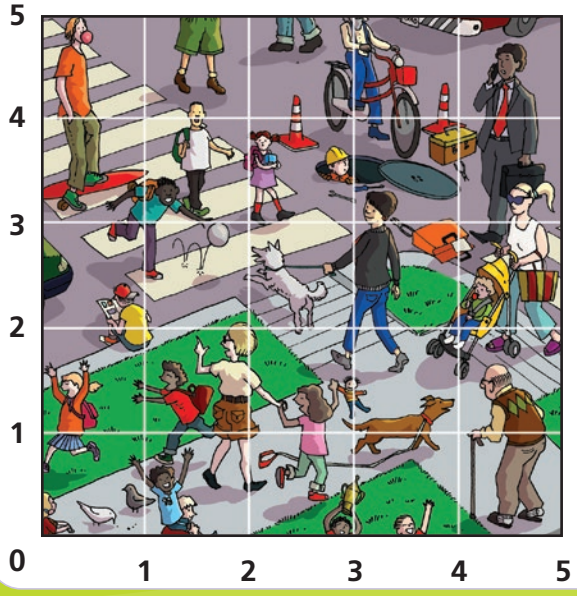
8. 150, 200, 250, 300, _____, _____, _____
   description: _____

9. 200, 180, 160, 140, _____, _____, _____
   description: _____

MATH in the Real World

Graph and connect the map coordinates to locate the secret documents in the lost briefcase.

(3, 3), (4, 2), (4, 4), (5, 3)



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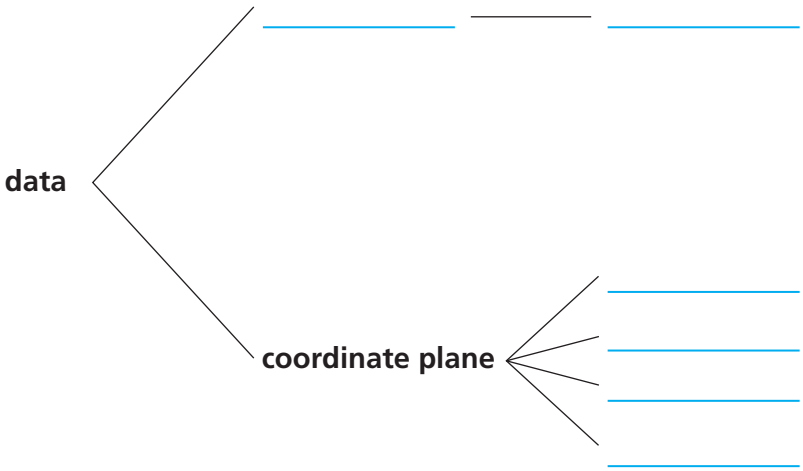
Vocabulary Builder

Go Online | For more help

Visualize It

Use the checked words to complete the tree map.



Connect to Vocabulary

Review Words
- data
- ✓ pattern
- ✓ rule

Preview Words
- ✓ ordered pair
- ✓ origin
- ✓ *x*-axis
- *x*-coordinate
- ✓ *y*-axis
- *y*-coordinate

Understand Vocabulary

Complete the sentences using the review words and preview words.

1. A _____ is an ordered set of numbers or objects.
2. The pair of numbers used to locate points on a plane is an _____.
3. The point, (0, 0), also called the _____, is where the *x*-axis and the *y*-axis intersect.
4. On a coordinate plane, the horizontal number line is the _____, and the vertical number line is the _____.
5. The first number in an ordered pair is the _____, and the second number in an ordered pair is the _____.

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Name _____

Record Inputs and Outputs in a Two-Column Table

Florida's B.E.S.T.

- **Algebraic Reasoning** 5.AR.3.2
- **Mathematical Thinking & Reasoning** MTR.1.1, MTR.2.1, MTR.4.1, MTR.5.1, MTR.6.1, MTR.7.1

I Can generate a number pattern.

CONNECT A pattern is an ordered set of numbers. You can use a rule or an equation to describe a pattern. When an equation describes the pattern, find the value of the unknowns to make a table or write the pattern.

UNLOCK the Problem

Real World

Luisa is making flan. For every egg, she can make three flans. The rule $f = 3e$ describes the relationship between the number of flans f and the number of eggs e. How many flans can Luisa make if she uses 5 eggs?

You can use an input/output table or a list to show a pattern. When a pattern is shown in a table, it shows the relationship between the inputs and outputs. When a pattern is shown in a list, it only shows the outputs in order.

Complete the input/output table. Replace e in the equation $f = 3e$ with the value shown in the table to find the value of the output f.

Input	Eggs	e	1	2	3	4	5
Output	Flans	f					

The pattern for the number of flans is 3, 6, _____, _____, _____.

The fifth number in the pattern is _____.

So, Luisa can make _____ flans.

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Explain how you can use the pattern to find how many flans can be made using 9 eggs.

- What if Luisa changed her recipe to make 4 flans with every egg? How would the pattern change?

_____

_____

_____

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Example Find the pattern.

The rule for the number of circles in a figure is $c = f + 2$ where c is the number of circles and f is the figure number. How many circles will be in Figure 8?

Figure 1

Figure 2

Figure 3

Complete the input/output table.

Input	Figures	f	1	2	3	4	5	6	7	8
Output	Circles	c								

The pattern for the number of circles

is 3, 4, _____, _____, _____, _____, _____, _____.

The eighth number in the pattern is _____.

So, there are _____ circles in Figure 8.

Share and Show

Use the rule to complete the table.

1. Rule: $g = 2n + 6$.

Input	Output
n	g
1	
2	
3	
4	

2. Rule: $p = r \times 12$.

Input	r	2	4	6	8
Output	p				

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Name _____

On Your Own

Use the rule to make an input/output table. Include four input/output pairs in your table.

3. For input x and output y, the rule is $y = x + 4$.

4. For input s and output a, the rule is $a = 11s$.

5. For input u and output v, the rule is $v = 7u$.

6. For input m and output n, the rule is $n = m \times 10$.

7. Explain how you can use the formula for the perimeter of a square, $P = 4s$, to generate a pattern. Use the pattern to find the perimeter of a square with sides that are 5 cm long.

8. Bao makes origami paper cranes for a mobile. He can make 5 cranes with each sheet of paper. Complete the input/output table to show the number of cranes Bao can make with 6 sheets of paper.

Input	Sheets	s	1	2	3	4	5	6
Output	Cranes	c						

9. Max decides to make paper owls. He can make 4 paper owls from each sheet of paper. Complete and use the input/output table to find how many sheets of paper Max would use to make 24 paper owls.

MATH on the Spot

Input	Sheets	s						
Output	Owls	o						

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Problem Solving · Applications

Fill in the bubble completely to show your answer.

10. Matilda is reading a map of the route to her grandfather's house in another state. The equation $m = 25i$ describes the relationship between i, the number of inches on the map, and m, the number of actual miles. How many miles are represented by 12 inches?

Ⓐ 200 miles Ⓒ 400 miles

Ⓑ 600 miles Ⓓ 300 miles

11. To find the total cost of a field trip, use the equation $c = 4s$, where s is the number of students and c is the cost of the field trip. How much will it cost for 14 students to attend the field trip?

Number of students (s)	3	6	9	12
Cost of field trip in dollars (c)	12	24	36	48

Ⓐ $15 Ⓒ $56

Ⓑ $17 Ⓓ $60

12. Robin places 3 roses and 2 daffodils in each vase. How many flowers will she need if she has 6 vases?

Ⓐ 30

Ⓑ 12

Ⓒ 18

Ⓓ 5

13. Sergei uses the pattern rule $y = 4 + b$ to generate the first three outputs in the pattern. Which of the following is the fifth output in the pattern?

Input	b	1	2	3	4	5
Output	y	5	6	7		

Ⓐ 5 Ⓒ 8

Ⓑ 9 Ⓓ 10

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Name _____

Record Inputs and Outputs in a Two-Column Table

Go Online
Interactive Examples

Use the rule to make an input/output table.
Include four input/output pairs in your table.

1. **Rule:** The output is $a + 5$.

2. **Rule:** The output is $3c$.

3. **Rule:** The output is $d \times 6$.

4. **Rule:** The output is $10 + b$.

5. **Rule:** The output is $8e$.

6. **Rule:** The output is $12f$.

7. **Rule:** The output is $8 + 2g$.

8. **Rule:** The output is $k \times 2$.

Problem Solving Real World

9. Suki uses toothpicks to build a number of separate shapes for her math project. She uses 1 toothpick for each side of a shape. Complete the input/output table to show how many toothpicks Suki needs to make 6 hexagons.

Input	Hexagons	*h*	1	2	3	4	5	6
Output	Toothpicks	*t*						

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Lesson Check

Fill in the bubble completely to show your answer.

10. If c is cups of sugar and b is number of batches of cookies, which rule matches the information in the table?

Input	Batches	b	2	3	4
Output	Cups	c	4	6	8

Ⓐ The output is $b \times 2$.

Ⓑ The output is $c \times 2$.

Ⓒ The output is $b + 2$.

Ⓓ The output is $c + 2$.

11. Tia hangs chili-shaped party lights in her back yard. The rule $c = 14f$ gives the number of chili lights c there are for each foot f of wire. How many lights are on 8 feet of wire?

Ⓐ 126

Ⓑ 112

Ⓒ 98

Ⓓ 96

12. Harlan uses the pattern rule $l = d + 2$ to represent the number of laps she swims each day for a week. Which is the number of laps she swims on the sixth day?

Input	Day	d	1	2	3
Output	Laps	l	3	4	5

Ⓐ 6

Ⓑ 7

Ⓒ 8

Ⓓ 9

13. Gage uses the equation $e = 25b$ to determine how much he earns for selling hand-carved bowls at the craft fair. If b represents the number of bowls sold and e represents his earnings, how much will Erik earn if he sells 9 bowls?

Number of bowls	1	2	3
Earnings	$25	$50	$75

Ⓐ $225

Ⓑ $100

Ⓒ $150

Ⓓ $45

Spiral Review

14. Multiply.

8.65×2.7

15. Subtract.

$13\frac{2}{8} - 6\frac{7}{8}$.

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Name _____

Write a Rule for Number Patterns in Tables

Florida's B.E.S.T.

- **Algebraic Reasoning** 5.AR.3.1
- **Mathematical Thinking & Reasoning** MTR.1.1, MTR.2.1, MTR.4.1, MTR.5.1, MTR.6.1, MTR.7.1

I Can write a rule to describe a pattern.

UNLOCK the Problem

When the output in a pattern depends on the input, you can write a rule to describe the relationship between inputs and outputs.

Ellery wants to buy light-up balls for a party. They cost $1 each. The store charges the same shipping fee regardless of how many light-up balls are ordered. So, Ellery has to pay for the light-up balls and pay a shipping fee. The table below shows the cost c for w light-up balls. How much will Ellery pay for 12 light-up balls?

Write a rule to describe the pattern in the table.

Input	w	2	4	6	8
Output	c	4	6	8	10

STEP 1 Describe the relationship between the number of light-up balls and the cost.

Think: Input ↓ Output ↓

$2 + 2 = 4$ 2 light-up balls + 2 = cost

$4 + 2 = 6$ 4 light-up balls + 2 = cost

$6 + 2 = 8$ 6 light-up balls + 2 = cost

$8 + 2 = 10$ 8 light-up balls + 2 = cost

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Explain how you can find the cost for 5 light-up balls.

The output is _____ more than the input.

STEP 2 Decide what operation to use to write a rule.

$c =$ _____ $+$ _____ **Think:** Add 2 to the input to get the output. Since the pattern is additive, use addition to write a rule.

STEP 3 Use the rule to find the cost of 12 light-up balls.

$c = w + 2$

$c =$ _____ $+ 2$ Replace w with the number of light-up balls.

$c =$ _____ Add to find the cost.

So, the 12 light-up balls cost $ _____.

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Example Find the rule.

Patterns can also involve multiplication.

The output is _____ times the input. The pattern is multiplicative.

The rule is $y =$ _____ $\times$ _____.

Think:

$1 \times$ _____ $= 7$

$2 \times$ _____ $= 14$

$3 \times$ _____ $= 21$

$4 \times$ _____ $= 28$

Input	Output
n	*y*
1	7
2	14
3	21
4	28

Try Another Problem

1. Use a rule to describe the pattern in the table.

Input	*s*	1	2	3	4
Output	*t*	9	18	27	36

Multiply by _____.

Rule: _____

Decide if the pattern shown in the table is additive or multiplicative. Write a rule to describe the pattern.

2.

Input	Output
a	*c*
2	5
4	7
6	9
8	11

The pattern is _____.

Rule: _____

3.

Input	*r*	1	2	3	4
Output	*p*	13	26	39	52

The pattern is _____.

Rule: _____

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Name _____

4. WRITE Math Explain how you can find a rule for a pattern in a table.

5. Explain whether the formula for the area of a rectangle can be used to show an additive pattern or a multiplicative pattern.

On Your Own

6. To make soup, Juan adds 3 cups of hot water to each package of dried soup. Write a rule for the pattern. Make a table to determine how many cups of hot water are needed for 18 packages of dried soup.

7. Liam and Nora are playing a spelling game. The number of points for each word a player spells correctly is the sum of the number of letters in the word and 3 bonus points for spelling correctly. The table below shows the scoring system. Find the rule and the number of points for spelling an eight-letter word correctly.

MATH on the Spot

Input	Letters	l	3	4	5	6
Output	Points	p	6	7	8	9

8. Kirk is building a storage cabinet. To be sure of having enough wood, he allows an extra 2 inches on measurements. Write a rule for the pattern. Determine the number of inches Kirk would measure if he wanted an 11-inch board.

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Problem Solving · Applications

Fill in the bubble completely to show your answer.
Use the table for 9–10.

Number of volcanoes	2	3	4	5
Flour (c)	12	18	24	30
Salt (c)	4	6	8	10
Cooking oil (tbsp)	8	12	16	20

9. Using the recipe shown in the table, how many cups of flour will you need to make 13 model volcanoes?

Ⓐ 30 cups
Ⓒ 78 cups
Ⓑ 48 cups
Ⓓ 54 cups

10. If v is the number of volcanoes and s is the number of cups of salt, which of the following rules describes the pattern in the table?

Ⓐ $v = s + 2$
Ⓒ $s = v + 2$
Ⓑ $s = v \times 2$
Ⓓ $v = s \times 2$

11. The table shows the shipping boxes received by Snazzy Stuff clothing store. Suppose that the store pays $8 for a shirt. How much money does the store pay for 10 boxes of shirts?

Input	Number of boxes	1	2	3	12
Output	Shirts	12	24	36	144

Ⓐ $120
Ⓒ $960
Ⓑ $96
Ⓓ $192

12. Which of the following rules describes the pattern in the table?

Input	b	1	2	3
Output	e	4	8	12

Ⓐ $e = b + 4$
Ⓒ $b = e + 4$
Ⓑ $e = b \times 4$
Ⓓ $b = e \times 4$

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Name _____

Write a Rule for Number Patterns in Tables

Go Online
Interactive Examples

Find the rule to describe the pattern in the table. Decide if the rule is additive or multiplicative.

1.

Input	Output
m	*n*
1	11
2	22
3	33
4	44

The rule is _____.

Rule: _____

2.

Input	*d*	3	5	7	9
Output	*f*	7	9	11	13

The rule is _____.

Rule: _____

3.

Input	*p*	2	3	4	5
Output	*q*	30	45	60	75

The rule is _____.

Rule: _____

4.

Input	Output
s	*t*
4	10
6	12
8	14
10	16

The rule is _____.

Rule: _____

Problem Solving Real World

5. Marco pours 12 ounces of cranberry juice into a punch bowl. He uses a container to add sparkling water to the bowl one ounce at a time. Write a rule to show the pattern and use it to calculate how many ounces of liquid Marco will have in the bowl after adding 8 containers of sparkling water.

_____

_____

_____

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Lesson Check

Fill in the bubble completely to show your answer.

6. The winning entry in the inventors' competition was a robot made with wheels, gears, and bolts. Using the table shown below, how many bolts are needed to make 7 robots?

Number of robots	1	2	3	4
Wheels	4	8	12	16
Gears	3	6	9	12
Bolts	8	16	24	32

Ⓐ 40
Ⓑ 21
Ⓒ 28
Ⓓ 56

7. Which of the following rules describes the pattern in the table?

Input	h	3	4	5
Output	j	12	13	14

Ⓐ $j = h + 9$
Ⓑ $j = 9h$
Ⓒ $h = j + 9$
Ⓓ $h = 9j$

8. The equation $c = \$0.75p$ represents the cost of mailing a package for each pound, where c is the cost and p is the number of pounds. If Leila mails a package that weighs 5 pounds, what is the total cost?

Ⓐ \$3.00
Ⓑ \$4.50
Ⓒ \$3.75
Ⓓ \$3.55

9. The equation $d = m + 16$ represents the total distance traveled after driving m number of miles. If Mrs. Kiki drives 35 miles, what is the total distance traveled?

Ⓐ 41 miles
Ⓑ 21 miles
Ⓒ 51 miles
Ⓓ 19 miles

Spiral Review

10. Which product is greater than $\frac{3}{8}$?

Ⓐ $\frac{3}{8} \times \frac{1}{2}$
Ⓑ $\frac{3}{8} \times \frac{7}{8}$
Ⓒ $\frac{3}{8} \times \frac{8}{7}$
Ⓓ $\frac{3}{8} \times \frac{11}{12}$

11. Which is another way to write $\frac{15}{9}$?

Ⓐ 15×9
Ⓑ 9×15
Ⓒ $15 \div 9$
Ⓓ $9 \div 15$

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Name _____

Graph a Number Pattern

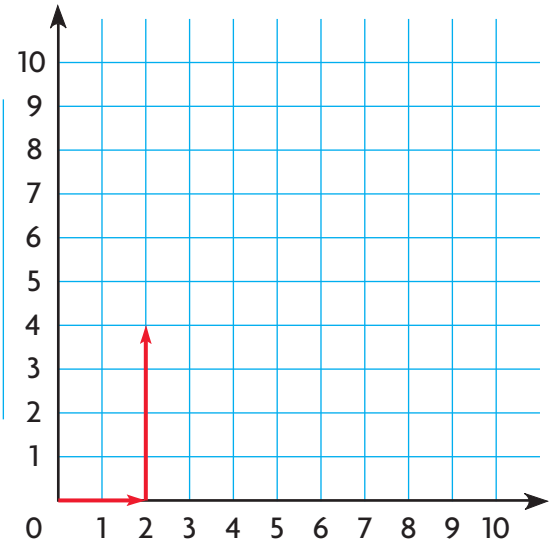
I Can graph a number pattern.

Florida's B.E.S.T.

- **Algebraic Reasoning** 5.AR.3.2
- **Geometric Reasoning** 5.GR.4.1
- **Mathematical Thinking & Reasoning** MTR.1.1, MTR.2.1, MTR.4.1, MTR.5.1, MTR.6.1, MTR.7.1

UNLOCK the Problem

An airport taxi uses the rule $f = m + 2$ to calculate the fare for passengers. The number of miles m is the input, and the output is the fare f in dollars. Graph the pattern.



_____

STEP 1 Label the horizontal number line to show that the input is number of miles. Label the vertical number line to show that the output is the fare.

STEP 2 Write a number pair and graph it.

For a trip that is 2 miles, the fare will be $_____.

The number pair is (2, _____).

Move right _____ units. Then move up _____ units and draw a point to represent the number pair.

STEP 3 Graph several number pairs.

Move right _____ units. (_____, _____) Move up _____ units.

Move right _____ units. (_____, _____) Move up _____ units.

Move right _____ units. (_____, _____) Move up _____ units.

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Explain what each number in the number pair represents.

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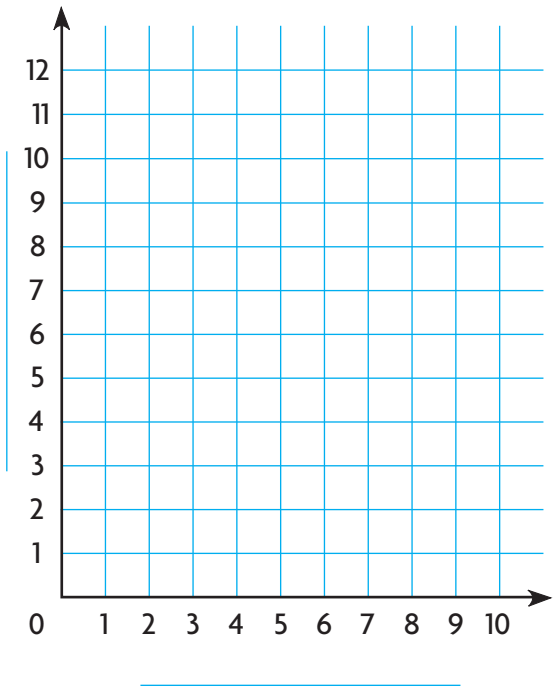
Example Graph a multiplicative pattern.

Celina is counting the number of wheels on tricycles. The rule is $w = 3t$, where t is the number of tricycles and w is the number of wheels. Use the rule to show a pattern on the graph.



STEP 1 Label the horizontal number line to show the input is the number of tricycles. Label the vertical number line to show the output is the number of _____.

STEP 2 Write a number pair and graph it.

The input _____ times 3 is equal to the output _____.

The number pair is (_____ , _____).

STEP 3 Graph several number pairs.

Move right _____ units. (_____, _____) Move up _____ units.

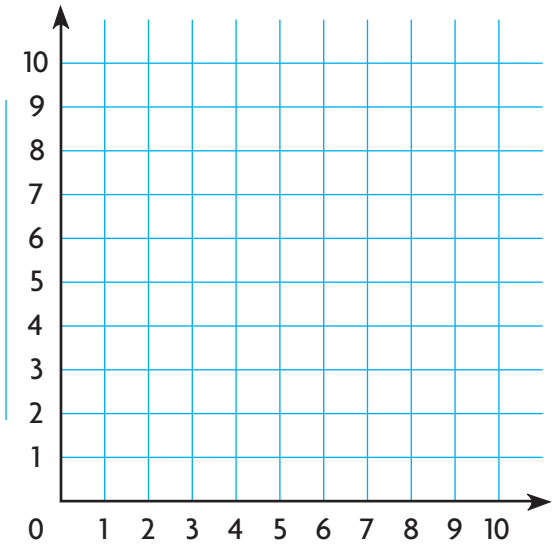
Move right _____ units. (_____, _____) Move up _____ units.

Move right _____ units. (_____, _____) Move up _____ units.

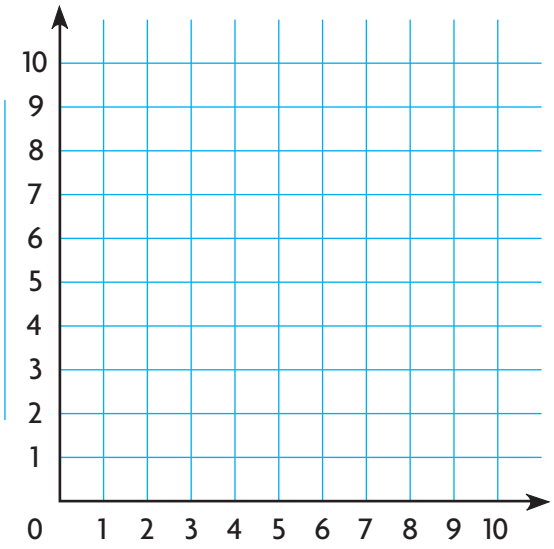
Try Another Problem

Use the rule to graph a pattern.

1. Each doll needs 2 shoes. The rule is $s = 2d$, where d is the number of dolls and s is the number of shoes.



2. The score for guessing the correct word is 4 and the number of letters in the word. The rule is $s = 4 + l$, where l is the number of letters and s is the score.



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Name _____

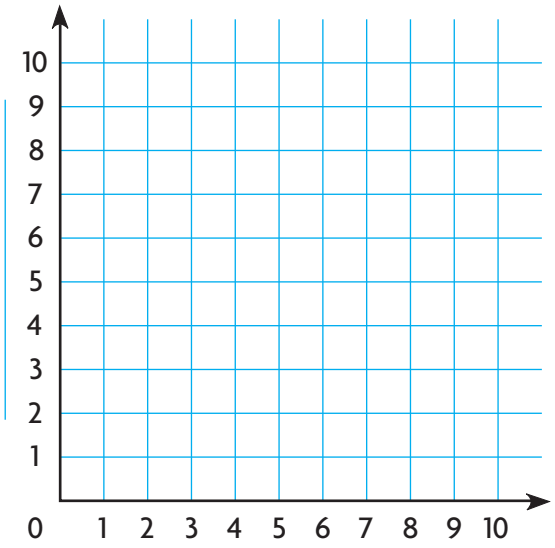
On Your Own

3. WRITE Math Explain how you can plot a point on the graph to represent a number pair.

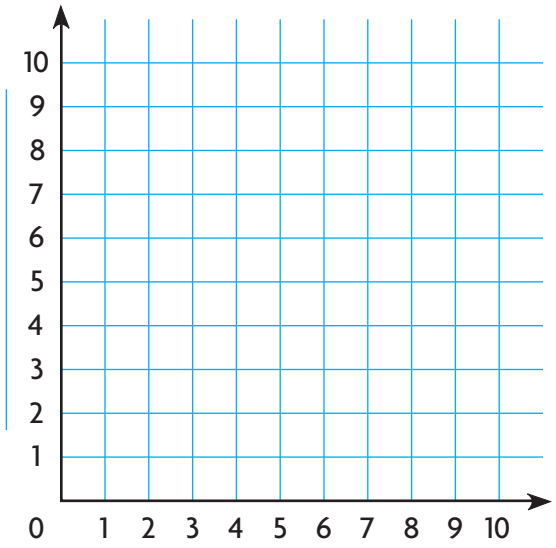
4. WRITE Math Explain how the first point in your graph for Problem 2 would change if the rule changes to $s = 5 + l$.

5. Rita uses red and blue ribbons in a design. The length of the blue ribbon b is always 3 inches greater than the length of the red ribbon r. Write a rule and plot 4 points on the graph to show the pattern.

MATH on the Spot



6. Mina uses green and red ribbons for her design. The length of the green ribbon g is always twice the length of the red ribbon r. Write a rule to describe Mina's design and plot 4 points on the graph to show the pattern.



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Problem Solving · Applications

Fill in the bubble completely to show your answer.

7. A recipe for carrot juice uses the formula $j = 6c$, where j is the amount of juice in ounces and c is the number of pounds of carrots needed. How many pounds of carrots are needed for a 30-ounce glass of carrot juice?

Ⓐ 5 pounds

Ⓑ 24 pounds

Ⓒ 180 pounds

Ⓓ 36 pounds

8. Khalid uses the rule $y = x + 5$ to complete a table and make a graph. Which number pair will be on the graph?

Input	Output
x	*y*
1	6
2	7
3	
4	
5	

Ⓐ (6, 1)

Ⓑ (4, 8)

Ⓒ (5, 0)

Ⓓ (4, 9)

9. The rule $d = 12t$ shows the cost in dollars d for the number of movie tickets t. Which two points could be on the graph?

Ⓐ (0, 12) and (36, 3)

Ⓑ (1, 11) and (2, 24)

Ⓒ (0, 0) and (3, 36)

Ⓓ (0, 12) and (3, 36)

10. Lamar uses the rule $s = 7g$ to show the number of snacks he needs s for the number of guests at his party g. Which number pair shows the number of snacks needed for 4 guests?

Ⓐ (4, 28)

Ⓑ (1, 8)

Ⓒ (4, 14)

Ⓓ (28, 4)

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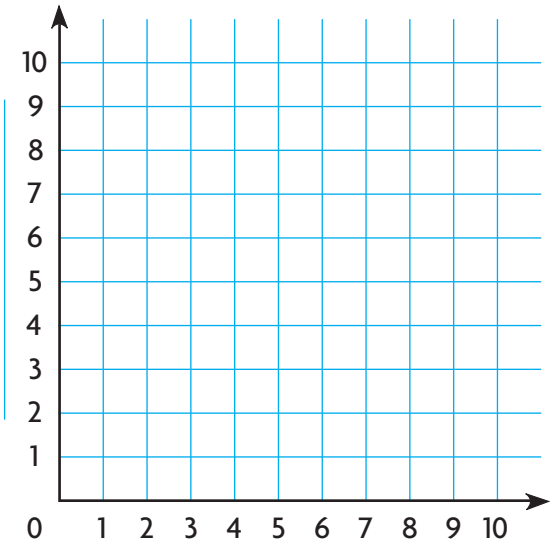
Name

Graph a Number Pattern

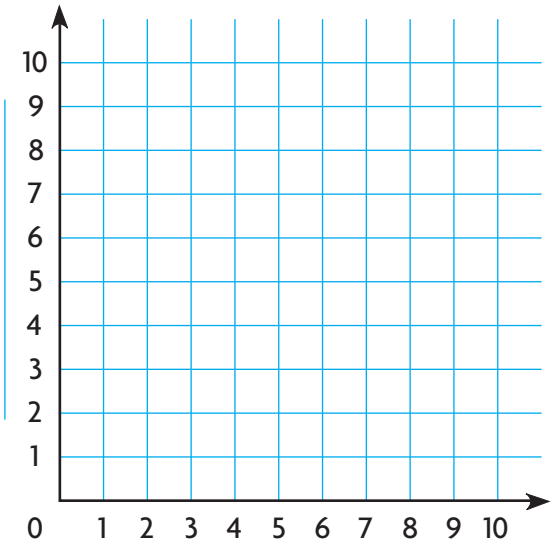
Go Online
Interactive Examples

Use the rule to graph a pattern.

1. The cost for printing pages at a print shop is a $5 processing fee and $1 for each page. The rule is $c = 5 + p$, where p is the number of pages and c is the total cost.

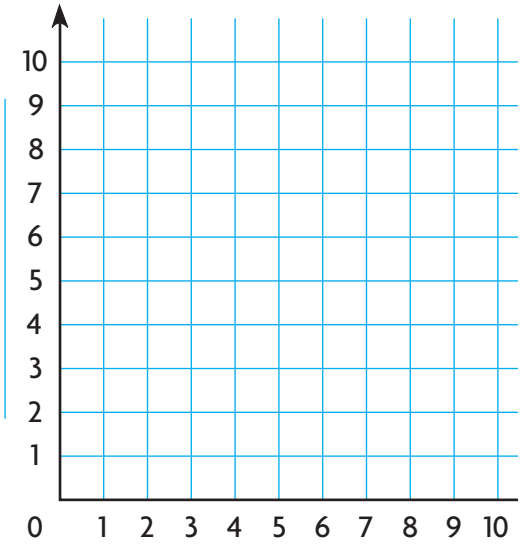


2. Mario uses craft sticks to form triangles. The rule is $c = 3t$, where c represents the number of craft sticks and t represents the number of triangles.



Problem Solving Real World

Use the graph for 3–4.



3. A department store offers free samples of a 2-ounce container of lotion with every fragrance purchase of any size. Write a rule to describe the number of ounces of product received for each purchase. Plot 3 points on the graph to show the pattern. Use t for the total number of ounces of product received and f for the ounces of fragrance sold.

4. Cristina buys 6 ounces of fragrance on Monday and returns to buy another 4 ounces of fragrance on Friday. How many ounces of fragrance will she have in all?

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Lesson Check

Fill in the bubble completely to show your answer.

5. Blanca uses the rule $b = 4a$ to complete a table and make a graph. Which number pair will be on the graph?

a	2	3	4	5
b	8			

Ⓐ (3, 12)

Ⓑ (3, 7)

Ⓒ (4, 8)

Ⓓ (12, 3)

6. The online music store charges a $6 fee for becoming a member and $1 to download each song. Noriko uses the rule $c = 6 + s$ to calculate her cost. Which number pair shows the cost of 5 songs?

Ⓐ (5, 6)

Ⓑ (5, 11)

Ⓒ (5, 5)

Ⓓ (1, 5)

Spiral Review

7. The camp counselors use the equation $c = 8g$ where c is the number of campers and g is the number of groups. Which number pair will not be a point on the graph of the equation?

Ⓐ (0, 0)

Ⓑ (3, 24)

Ⓒ (2, 16)

Ⓓ (8, 1)

8. The rule $j = 16p$ shows the number of ounces j for each pint p of orange juice. Which two points will be on the graph?

Ⓐ (2, 32) and (3, 48)

Ⓑ (0, 16) and (1, 32)

Ⓒ (2, 32) and (4, 40)

Ⓓ (1, 8) and (2, 16)

9. Bijoux buys 38 stamps that cost $0.56 each. How much does she spend on stamps?

10. Divide. 505.6 ÷ 64

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Name _____

Understand Ordered Pairs

Florida's B.E.S.T.

- **Geometric Reasoning** 5.GR.4.1, 5.GR.4.2
- **Mathematical Thinking & Reasoning** MTR.1.1, MTR.2.1, MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1, MTR.7.1

I Can identify and plot points.

CONNECT Locating a point on a coordinate plane is similar to describing directions using North-South and West-East. The horizontal number line on the plane is the ***x*-axis**. The vertical number line on the plane is the ***y*-axis**.

Each point on the coordinate plane can be described by an **ordered pair** of numbers. The ***x*-coordinate** is the first number in the ordered pair. It is the horizontal location, or the distance the point is from 0 in the direction of the *x*-axis. The ***y*-coordinate** is the second number in the ordered pair. It is the vertical location, or the distance the point is from 0 in the direction of the *y*-axis.

(x, y)

x-coordinate — *y*-coordinate

The *x*-axis and the *y*-axis intersect at the point (0, 0), called the **origin**.

UNLOCK the Problem

Real World

Write the ordered pairs for the locations of the arena and the aquarium.

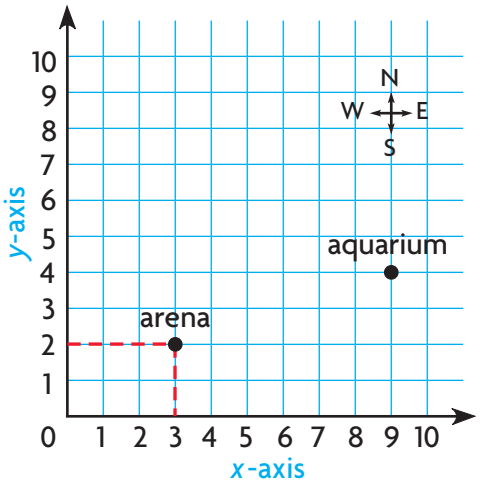
Locate the point for which you want to write an ordered pair.

Look below at the *x*-axis to identify the point's horizontal distance from 0, which is its *x*-coordinate.

Look to the left at the *y*-axis to identify the point's vertical distance from 0, which is its *y*-coordinate.

So, the ordered pair for the arena is (3, 2) and the ordered pair for the aquarium

is (_____, _____).



- Describe the path you would take to get from the origin to the aquarium, using horizontal, then vertical movements.

_____

_____

Math Talk

MTR 3.1 Complete tasks with mathematical fluency.

Use the *x*- and *y*-coordinates to describe the distance of the point (3, 2) from the *x*- and *y*-axes.

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Example 1 Use the graph.

A point on a coordinate plane can be labeled with an ordered pair, a letter, or both.

1. Plot the point (5, 7) and label it *J*.

From the origin, move right 5 units and then up 7 units.

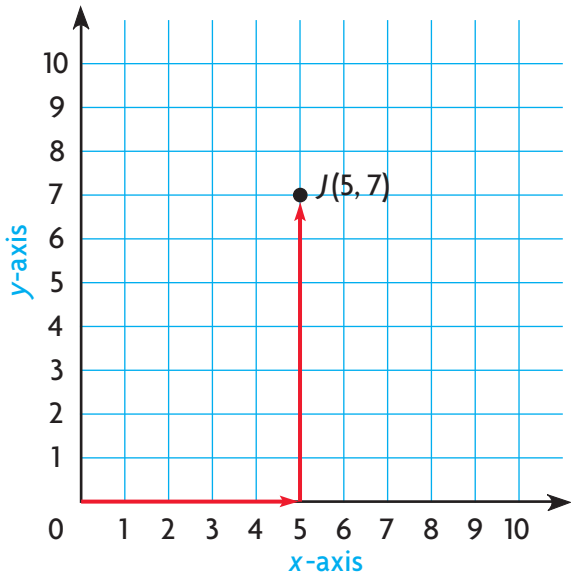
Plot and label the point.

2. Plot the point (8, 0) and label it *S*.

From the origin, move right _____ units and

then up _____ units.

Plot and label the point.

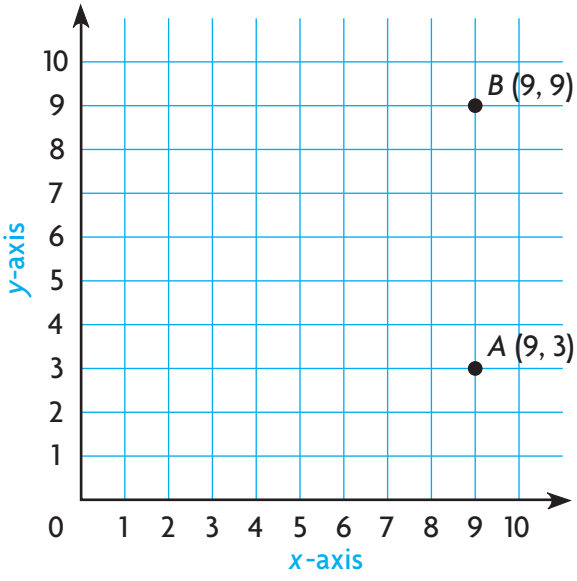


Example 2 Find the distance between two points.

You can find the distance between two points when the points are along the same horizontal or vertical line.

- Draw a line segment to connect point *A* and point *B*.
- Count vertical units between the two points.

There are _____ units between points *A* and *B*.



1. Points *A* and *B* form a vertical line segment and have the same *x*-coordinates. How can you use subtraction to find the distance between the points?

_____

_____

_____

_____

2. Graph the points (3, 2) and (5, 2). Explain how you can use subtraction to find the horizontal distance between these two points.

_____

_____

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Name _____

Share and Show

Math Board

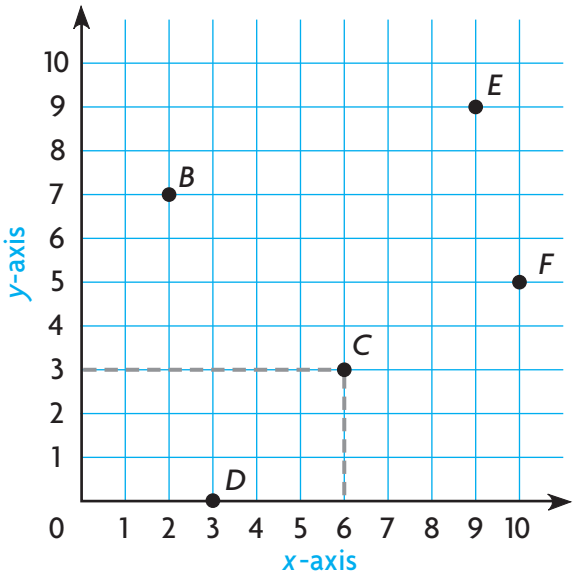
Use Coordinate Plane A to write an ordered pair for the given point.

1. C _____
2. D _____
3. E _____
4. ✓ F _____

Plot and label the points on Coordinate Plane A.

5. $M(0, 9)$
6. $H(8, 6)$
7. $K(10, 4)$
8. $T(4, 5)$
9. $W(5, 10)$
10. ✓ $R(1, 3)$

Coordinate Plane A



On Your Own

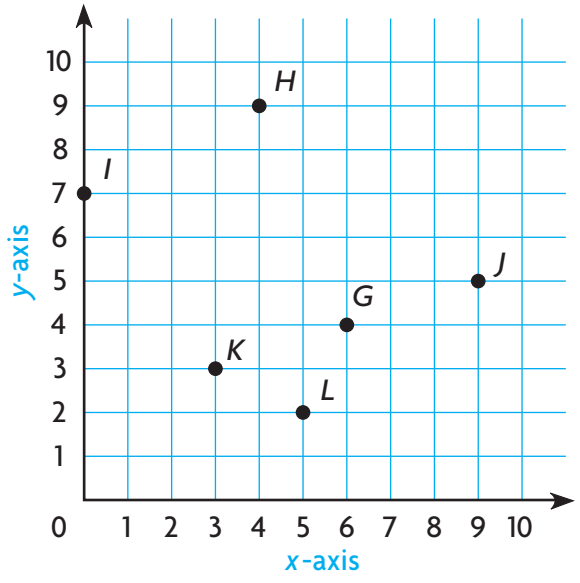
Use Coordinate Plane B to write an ordered pair for the given point.

11. G _____
12. H _____
13. I _____
14. J _____
15. K _____
16. L _____

Plot and label the points on Coordinate Plane B.

17. $W(8, 2)$
18. $E(0, 4)$
19. $X(2, 9)$
20. $B(3, 4)$
21. $R(4, 0)$
22. $F(7, 6)$
23. $T(5, 7)$
24. $A(7, 1)$

Coordinate Plane B



25. WRITE Math Explain how to find the distance between point F and point A.

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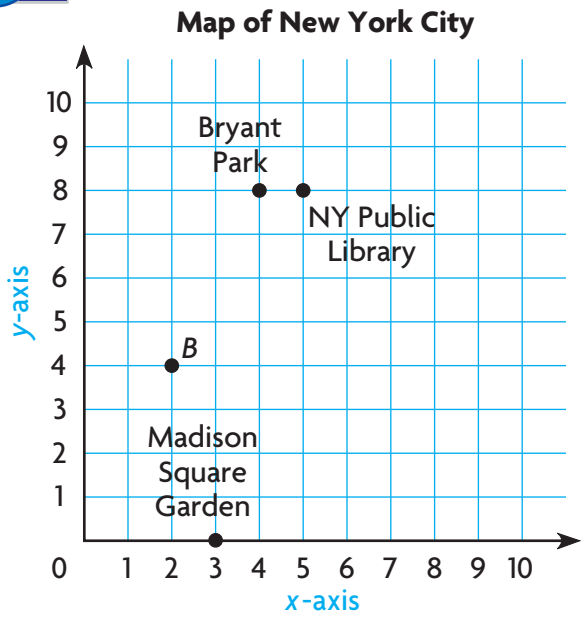
Problem Solving · Applications

Nathan and his friends are planning a trip to New York City. Use the map for 26–30. Each unit represents 1 city block.



26. What ordered pair gives the location of Bryant Park?

_____

27. MTR The Empire State Building is located 5 blocks right and 1 block up from (0, 0). Write the ordered pair for this location. Plot and label a point for the Empire State Building.

_____

28. Nathan says that Madison Square Garden is located at (0, 3) on the map. Is his ordered pair correct? Explain.

MATH on the Spot

_____

_____

29. Paulo walks from point *B* to Bryant Park. Raul walks from point *B* to Madison Square Garden. If they only walk along the plane lines, who walks farther? Explain.

_____

_____

30. Look at the map of New York City above. Suppose a subway station is located at (6, 5). Which of the following accurately describes the location of the subway station? Mark all that apply.

Ⓐ The station is 2 blocks right and 3 blocks down from Bryant Park.

Ⓑ The station is 4 blocks right and 1 block down from point B.

Ⓒ The station is 1 block right and 3 blocks down from the library.

Ⓓ The station is 5 blocks right and 3 blocks up from Madison Square Garden.

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Name _____

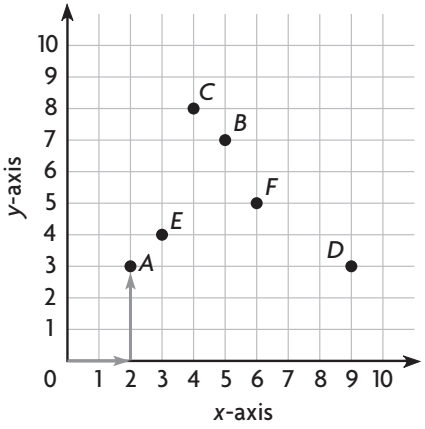
Understand Ordered Pairs

Go Online
Interactive Examples

Use Coordinate Plane A to write an ordered pair for the given point.

1. A (2, 3)
2. B
3. C
4. D
5. E
6. F

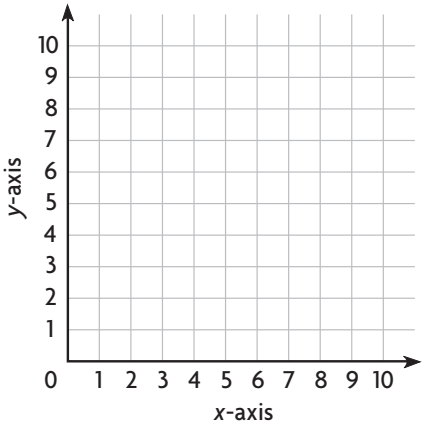
Coordinate Plane A



Plot and label the points on Coordinate Plane B.

7. $N\,(7, 3)$
8. $R\,(0, 4)$
9. $O\,(8, 7)$
10. $M\,(2, 1)$
11. $P\,(5, 6)$
12. $Q\,(1, 5)$

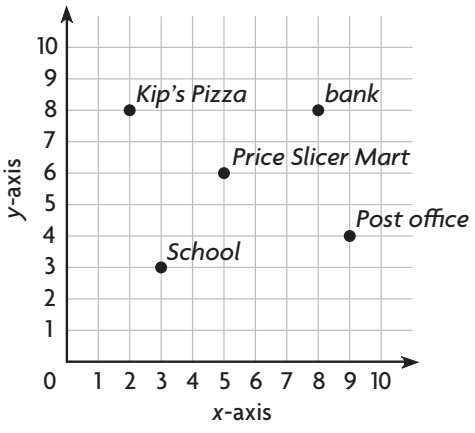
Coordinate Plane B



Problem Solving Real World

Use the map for 13–14.

Port Charlotte



13. Which building is located at (5, 6)?

_____

14. What is the distance between Kip's Pizza and the bank?

_____

15. WRITE Math What is a situation in which you might locate points on a coordinate plane?

_____

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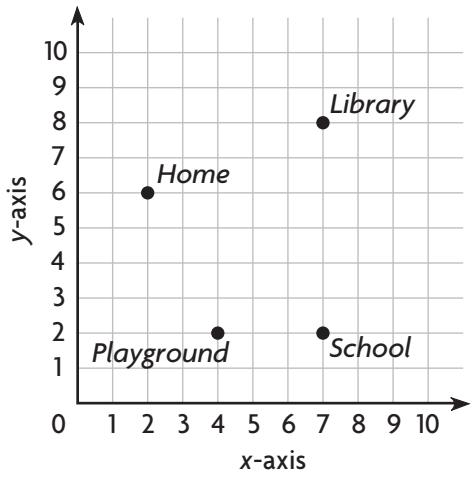
Lesson Check



16. What ordered pair describes the location of the playground?

_____

17. What is the distance between the school and the library?

_____

Spiral Review

18. What is the value of the underlined digit?

45,7<u>6</u>9,331

_____

19. Joji charges $18 for each lawn he mows. Suppose he mows 17 lawns per month. How much money will Joji make per month?

_____

20. Harlow can bicycle at a rate of 18 miles per hour. How many hours would it take him to bicycle a stretch of road that is 450 miles long?

_____

21. Yiren uses 192 beads to make a bracelet and a necklace. It takes 5 times as many beads to make a necklace as it does to make a bracelet. How many beads are used to make the necklace?

_____

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Name _____

Graph Data

I Can use a coordinate plane to display data collected in an experiment.

Florida's B.E.S.T.

- **Geometric Reasoning** 5.GR.4.1, 5.GR.4.2
- **Data Analysis & Probability** 5.DP.1.1
- **Mathematical Thinking & Reasoning** MTR.1.1, MTR.2.1, MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1, MTR.7.1

UNLOCK the Problem

Materials ■ paper cup ■ water ■ Fahrenheit thermometer ■ ice cubes ■ stopwatch

When data is collected, it can be organized in a table.

A. Fill the paper cup more than halfway with room-temperature water.

B. Place the Fahrenheit thermometer in the water and find its beginning temperature before adding any ice. Record this temperature in the table at 0 seconds.

C. Place three cubes of ice in the water and start the stopwatch. Find the temperature every 10 seconds for 60 seconds. Record the temperatures in the table.

Water Temperature

Time (in seconds)	Temperature (in °F)
0	
10	
20	
30	
40	
50	
60	

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Try Another Problem

1. Explain why you would record the beginning temperature at 0 seconds.

2. Describe what happens to the temperature of the water in 60 seconds, during the experiment.

3. MTR Analyze your observations of the temperature of the water during the 60 seconds, and explain what you think would happen to the temperature if the experiment continued for 60 seconds longer.

You can use a coordinate plane to graph and analyze the data you collected in the experiment.

STEP 1 Write the related pairs of data as ordered pairs.

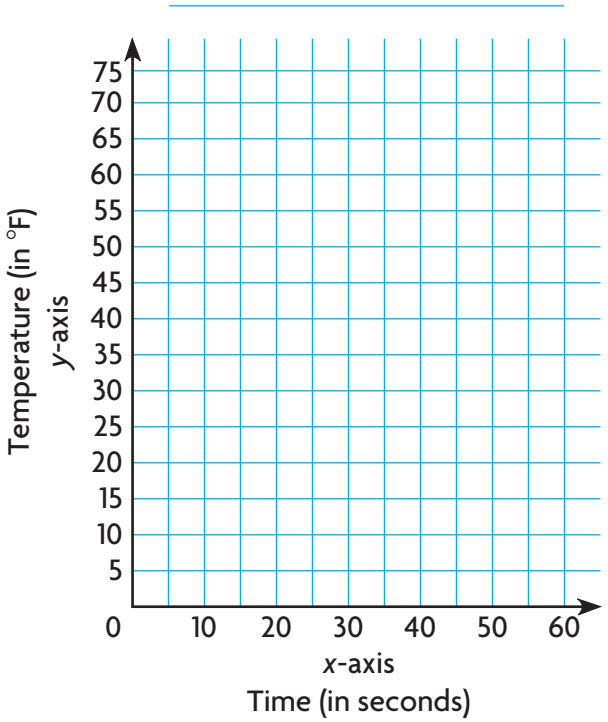
(0, _____) (20, _____) (40, _____)

(10, _____) (30, _____) (50, _____)

(60, _____)

STEP 2 Construct a coordinate plane and write a title for it.

STEP 3 Plot a point for each ordered pair.



Math Talk

MTR 1.1 **Actively participate in effortful learning.**

What is the ordered pair that you recorded for the data at 10 seconds? Explain what each coordinate represents.

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Name _____

On Your Own

For items 1–3, graph the data on the coordinate plane.

1. Write the ordered pairs for each point.

_____

2. What does the ordered pair (3, 38) tell you about Adelmo's age and height?

_____

_____

3. Why would the point (6, 42) be nonsense?

_____

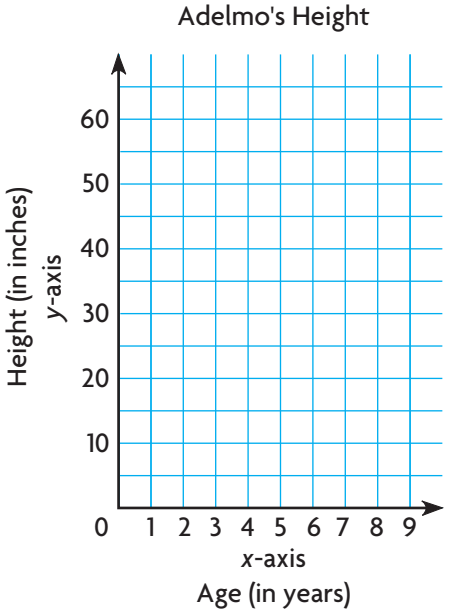
_____

_____

_____

_____

Adelmo's Height					
Age (in years)	1	2	3	4	5
Height (in inches)	30	35	38	41	44

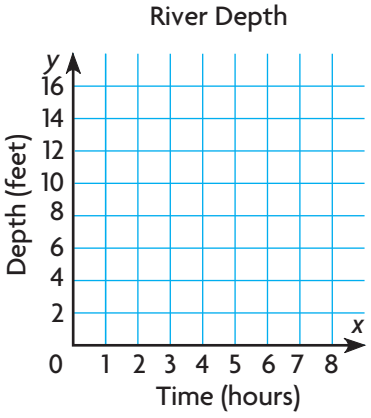


Problem Solving · Applications

4. The table shows the depth of the Dakota River at different times during a rainstorm.

Graph the ordered pairs from the tiles on the coordinate plane.

Dakota River					
Time (hours)	1	2	3	4	5
Depth (feet)	7	8	10	12	15



(1, 7)

(2, 8)

(3, 10)

(4, 12)

(5, 15)

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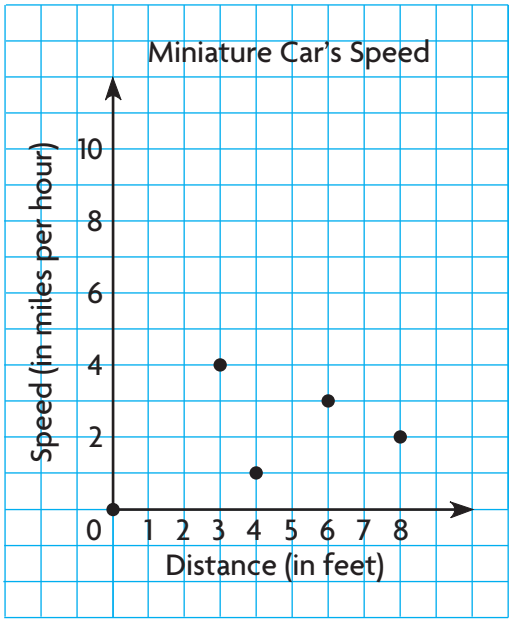
5. Mary places a miniature car onto a track with launchers. The speed of the car is recorded every foot. Some of the data is shown in the table. Mary graphs the data on the coordinate plane below.

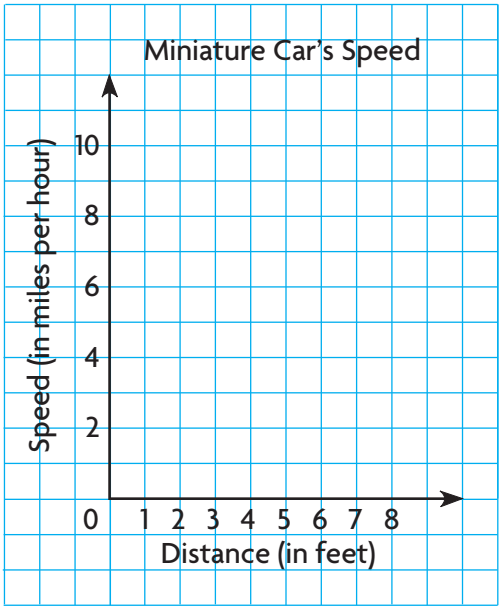
Miniature Car's Speed	
Distance (in feet)	Speed (in miles per hour)
0	0
1	4
2	8
3	6
4	3

MATH on the Spot

Look at Mary's graphed data. Find her error.



Graph the data and correct the error.



6. MTR Describe the error Mary made.

7. At what distance do you think the car will stop? Explain and write the ordered pair.

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Name _____

Graph Data

Go Online
Interactive Examples

Graph the data on the coordinate plane.

1.

Outdoor Temperature					
Hour	1	3	5	7	9
Temperature (°F)	61	65	71	75	77

a. Write the ordered pairs for each point.

_____

_____

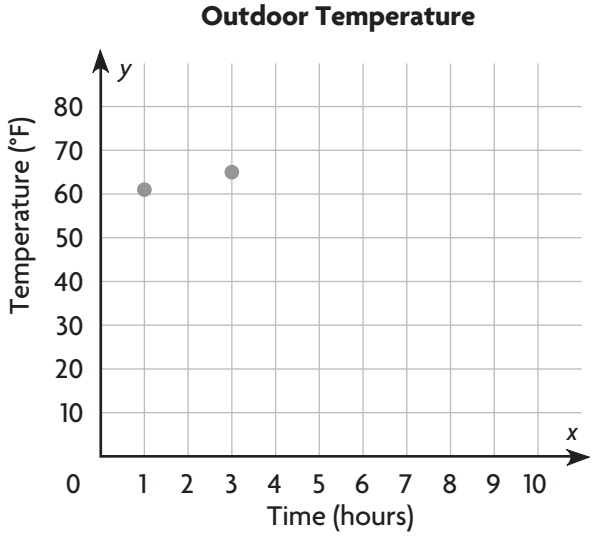
b. How would the ordered pairs be different if the outdoor temperature were recorded every hour for 4 consecutive hours?

_____

_____

_____

_____



Problem Solving Real World

2.

Windows Repaired					
Day	1	2	3	4	5
Total Number Repaired	14	30	45	63	79

a. Write the ordered pairs for each point.

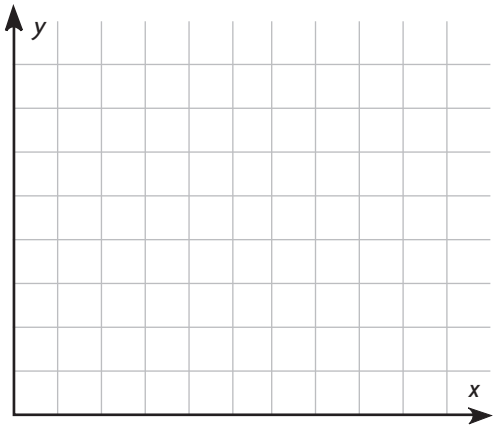
_____

_____

b. What does the ordered pair (2, 30) tell you about the number of windows repaired?

_____

_____



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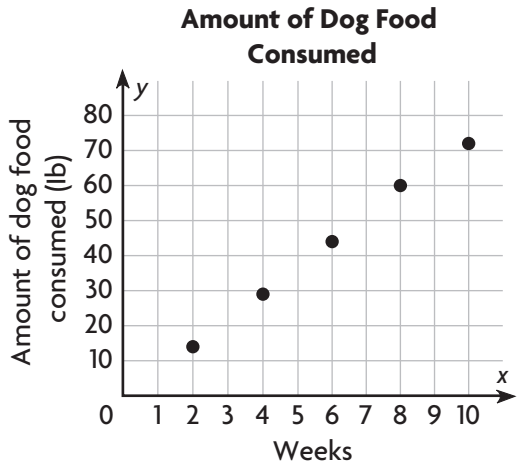
Lesson Check



3. About how many weeks did it take for the dog to consume 45 pounds of food?

4. By the end of Week 8, how much food had the dog consumed?

Spiral Review

5. A restaurant chain ordered 3,940 pounds of rice in 20-pound bags. About how many 20-pound bags of rice did the chain order?

6. The population of Linton is 12 times as great as the population of Ellmore. The combined population of both towns is 9,646 people. What is the population of Linton?

7. Dinesh needs $\frac{1}{2}$ cup of bread crumbs for a casserole and $\frac{1}{3}$ cup of bread crumbs for the topping. How many cups of bread crumbs does Dinesh need?

8. Jessie bought 3 T-shirts for $6 each and 4 T-shirts for $5 each. What expression can you use to describe how much Jessie spent?

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Name _____

Graph and Analyze Relationships

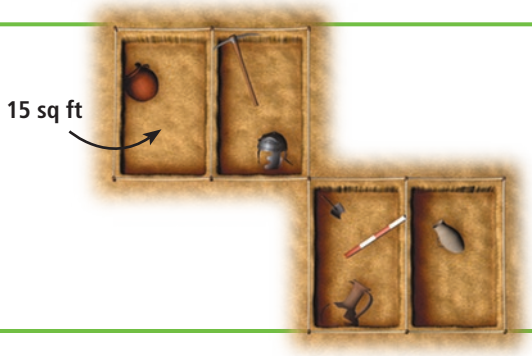
Florida's B.E.S.T.

- **Algebraic Reasoning** 5.AR.3.1, 5.AR.3.2
- **Mathematical Thinking & Reasoning** MTR.1.1, MTR.2.1, MTR.3.1, MTR.4.1, MTR.5.1, MTR.6.1, MTR.7.1

I Can use the strategy *solve a simpler problem* to help solve a problem with patterns.

UNLOCK the Problem

On an archaeological dig, Gabriel separates his dig site into sections with areas of 15 square feet each. There are 3 archaeological members digging in every section. What is the area of the dig site if 21 members are digging at one time?



Read the Problem

What do I need to find?

I need to find the

_____

_____

_____.

What information do I need to use?

I can use the area of each section, which is

_____, that

there are _____ members in each section, and that there are 21 members digging.

How will I use the information?

I will use the information to search for patterns to solve a _____ problem.

Solve the Problem

	Sections	1	2	3	4	5	6	7
Add 3.	Number of members	3	6	9	12	15	18	21
Add 15.	Area (in square feet)	15	30	45	60	75	90	

Multiply by _____.

Multiply by _____.

So, the area of the dig site if 21 members are digging is _____ square feet.

Possible Rules:

- Multiply the number of sections by _____ to find the number of members.
- Multiply the number of members by _____ to find the total area. Complete the table.

Math Talk

MTR 4.1 Engage in discussions on mathematical thinking.

Explain how you can use division to find the number of members if you know the dig site area is 135 square feet.

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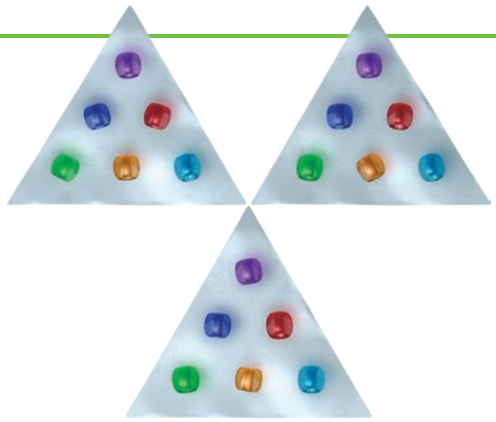
Try Another Problem

Mercy is making a design with triangles and beads for a costume. In the design, each pattern unit adds 3 triangles and 18 beads. Mercy uses 72 triangles in his design. How many beads does Mercy use?

Use the graphic organizer below to solve the problem.



Read the Problem

What do I need to find?	What information do I need to use?	How will I use the information?

Solve the Problem

So, Mercy uses _____ beads.

- What rule could you use to find an unknown number of beads if you know the related number of triangles?

_____

_____

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Name _____

On Your Own

1. Axel builds rail fences. For one style of fence, each section uses 3 vertical fence posts and 6 horizontal rails. How many rails does he need for a fence that has 27 posts?

1 Section

2 Sections

3 Sections

First, think about what the problem is asking and what you know. As each section of fence is added, how does the number of posts and the number of rails change?

Next, make a table and look for a pattern. Use what you know about 1, 2, and 3 sections. Write a rule for the number of posts and rails needed for 9 sections of fence.

Number of Sections	1	2	3	...	9
Number of Posts	3	6	9	...	27
Number of Rails	6	12	18	...	

Possible rule for posts: _____

_____

Possible rule for rails: _____

_____

Finally, use the rule to solve the problem. _____

2. What if another style of rail fencing has 6 rails between each pair of posts? How many rails are needed for 27 posts?

Number of Sections	1	2	3	...	9
Number of Posts	3	6	9	...	27
Number of Rails	12	24	36	...	

Possible rule: _____

Solution: _____

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Problem Solving · Applications Real World

3. MTR Etenia works as a limousine driver. She earns $50 for every 2–hour shift that she works. How much does Etenia earn in one week if she works 40 hours per week? Write a rule and complete the table.

Shift	1	2	3	...	20
Hours Worked	2	4	6	...	40
Jane's Pay ($)	50	100	150	...	

Possible rule: _____

The amount Etenia earns working 40 hours is _____

4. Rosa plays games at a fair. She can buy 8 game tokens for $1. Each game costs 2 tokens. How many games can she play with 120 tokens? Write a rule and complete the table.

Cost ($)	1	2	3	4	...	15
Tokens	8	16	24	32	...	120
Games	4	8	12	16	...	

MATH on the Spot

Possible rule: _____

Number of games played with 120 tokens is _____

5. Janelle is making snacks for her classmates. There are two cups of raisins in one batch. For every 2 cups of raisins, Janelle adds 4 cups of oats. How many cups of oats will she need if she has 10 cups of raisins? Draw a table and write a possible rule.

Possible rule: _____

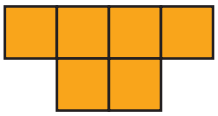
The number of cups of oats Janelle will need is _____

6. Look for a pattern.

Figure 1

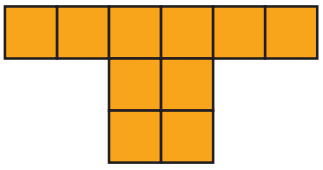
2 squares

Figure 2



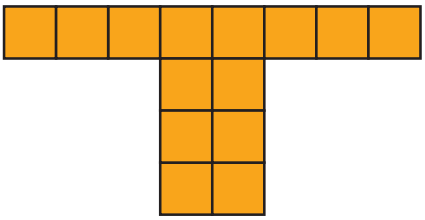
6 squares

Figure 3



10 squares

Figure 4



14 squares

What is a rule? _____

How many squares will there be in Figure 5? _____ squares

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Name _____

Graph and Analyze Relationships

Go Online
Interactive Examples

Write a rule and complete the table. Then answer the question.

1. Faye buys 15 T-shirts, which are on sale for $3 each. How much money does Faye spend?

Number of T-shirts	1	2	3	5	10	15
Amount spent ($)	3	6	9			

Possible rule:
Multiply the number of T-shirts by 3.

The total amount Faye spends is $45.

2. The Liang family joins a fitness center. They pay $35 per month. By the 12th month, how much money will the Liang family have spent?

Number of months	1	2	3	4	5	12
Total amount of money spent ($)	35	70				

Possible rule: _____

The Liang family will have spent _____.

3. Hettie is stacking paper cups. Each stack of 15 cups is 6 inches high. What is the total height of 10 stacks of cups?

Number of stacks	1	2	3	10
Height (in.)	6	12	18	

Possible rule: _____

The total height of 10 stacks is _____.

4. WRITE Math You have a table that shows a pattern. Describe two ways that you could find the 15th entry in the table.

_____

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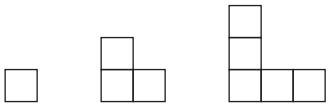
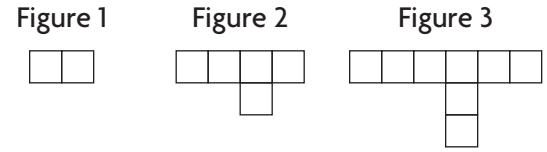
Lesson Check

5. How many squares are needed to make the eighth figure in the pattern?



6. What expression could describe the number of squares in the next figure in the pattern, Figure 4?



Spiral Review

7. Zima stores her collection of stickers equally in 7 sticker albums. If she has 567 stickers, how many stickers are in each album?

8. Ms. Angelino made 2 pans of lasagna and cut each pan into twelfths. Her family ate $1\frac{1}{12}$ pans of lasagna for dinner. How many pans of lasagna were left?

9. What is the next number in this pattern?

0.54, 0.6, 0.66, 0.72, ■, . . .

10. Jax is making a scarf that is 60 inches long and 5.5 inches wide. Jax wants to use decorative ribbon around the edges of the scarf. How much ribbon is needed?

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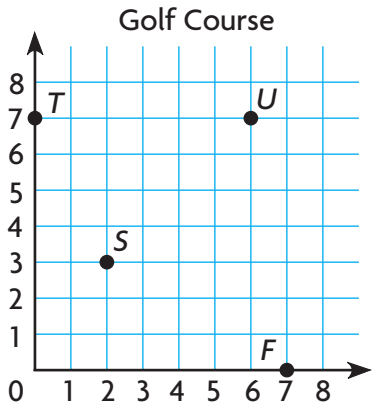
Name _____

Chapter 17

Chapter Review

1. The letters on the coordinate plane represent the locations of the first four holes on a golf course. Which of the following accurately describes the location of a hole? Mark all that apply.



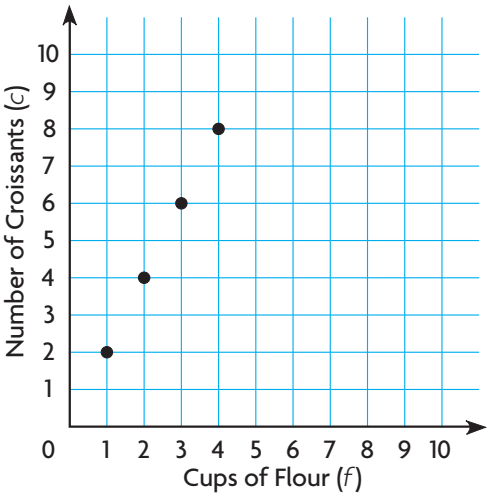
Ⓐ Hole U is 4 units left and 4 units down from hole S.

Ⓑ Hole F is 1 unit right and 7 units down from hole U.

Ⓒ Hole T is 2 units left and 4 units up from hole S.

Ⓓ Hole S is 3 units left and 5 units up from hole F.

2. The graph shows the amount of flour it takes to make croissants. Which rule describes the pattern on the graph?



Ⓐ $c = f + 1$

Ⓑ $f = c + 1$

Ⓒ $c = 2f$

Ⓓ $f = 2c$

3. Steve uses the rule $l = 8s$ to determine the number of legs 5 spiders have. What is the value of ▢?

Spiders	s	2	3	4	5
Legs	l	16	24	32	▢

Ⓐ 8

Ⓑ 40

Ⓒ 10

Ⓓ 14

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4. Portia made a table to figure out how much she earned selling T-shirts.

Day	1	2	3	4	5
Number of T-shirts sold	5	10	15	20	25
Amount earned ($)	20	40	60	80	?

For problems 4a–4b, use the table to choose the correct values to describe how one sequence is related to the other.

4a. The unknown number in Day 5 is

90

100

120

.

4b. The rule that describes how the number of T-shirts sold relates to the amount earned is

add 15

multiply by 5

multiply by 4

.

5. Jawan made a table to figure out how much he earns at his job.

Job Earnings						
Week	1	2	3	4	...	6
Hours Worked	6	12	18	24	...	36
Amount Earned ($)	54	108	162	216	...	?

Part A

Write a rule that relates the amount Jawan earns to the number of hours worked. Explain how you can check your rule.

Part B

How much does he earn from his job in Week 6?

$ _____

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Name _____

6. Look for a pattern.

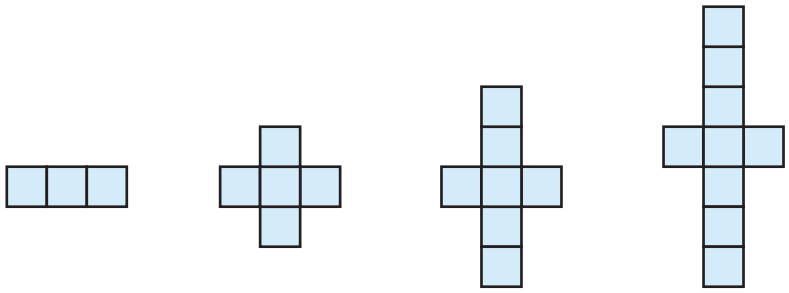
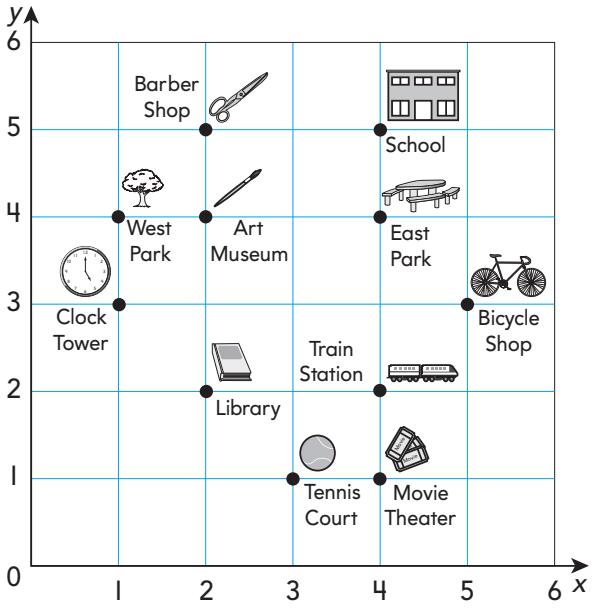


Figure 1 Figure 2 Figure 3 Figure 4

What is the rule? _____

How many squares will there be in Figure 5? _____ squares

7. Lindsey made a map of her town. Match each location below with the correct ordered pair that marks it on the coordinate plane. Not every ordered pair will be used.



Clock Tower ●

Art Museum ●

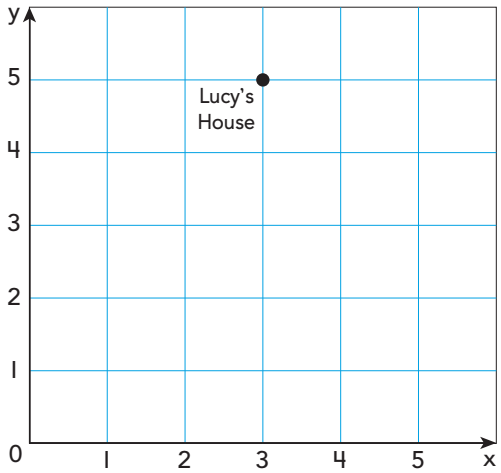
East Park ●

Movie Theater ●

School ●

- (4, 4)
- (4, 1)
- (1, 3)
- (5, 4)
- (4, 5)
- (3, 1)
- (2, 4)
- (1, 4)
- (4, 2)

8. Lucy's house is located at the point shown on the coordinate plane. Ainsley's house is located 2 units right and 3 units down from Lucy's house. Plot a point on the coordinate plane to represent the location of Ainsley's house.



What ordered pair represents the location of Lucy's house? ☐

What ordered pair represents the location of Ainsley's house? ☐

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The table shows the relationship between the number of eggs and the number of muffins.

Batches	1	2	3	4	5
Number of Eggs	2	4	6	8	10
Muffins	12	24	36	48	60

Use the table for problems 9 and 10.

9. Enter a number to complete the sentence.

Multiply the number of eggs by _____ to find the number of muffins.

10. Suppose the number of eggs is changed to 3 eggs for each batch of 12 muffins, and 48 eggs are used. How many batches and how many muffins will be made?

_____ batches and _____ muffins

11. The table shows how much a puppy weighs from 1 month old to 5 months old.

Puppy's Weight					
Age (in months)	1	2	3	4	5
Weight (in pounds)	12	18	23	31	34

What ordered pairs would you plot to show the puppy's weight on a coordinate plane? How do you think the ordered pairs would be different if the puppy's weight was measured every week instead of every month? Explain your reasoning.

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Name _____

12. Randy is training for a race. She makes a table that shows how long it takes her to run different distances.

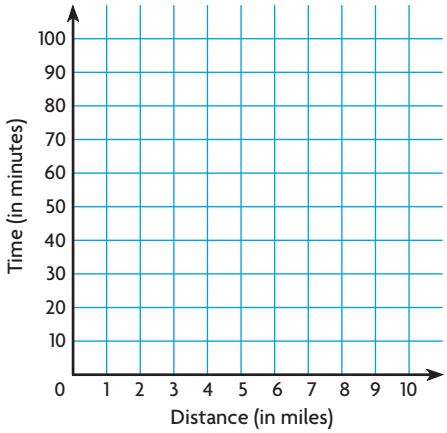
Running Time and Distance				
Distance (in miles)	1	2	3	4
Time (in minutes)	10	20	30	40

Part A

Write the number pairs as ordered pairs. Then write the rule to describe how the number pairs are related.

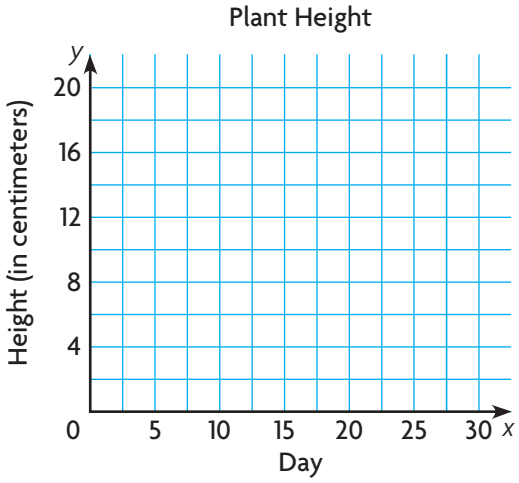
Part B

Graph the ordered pairs on the coordinate plane.



13.

Plant Height						
Day	5	10	15	20	25	30
Height (in cm)	1	3	8	12	16	19



a. Write the ordered pair for each point.

_____

_____

b. How would the ordered pairs be different if the heights of the plants were measured every 6 days for 30 days instead of every 5 days?

_____

_____

_____

_____

_____

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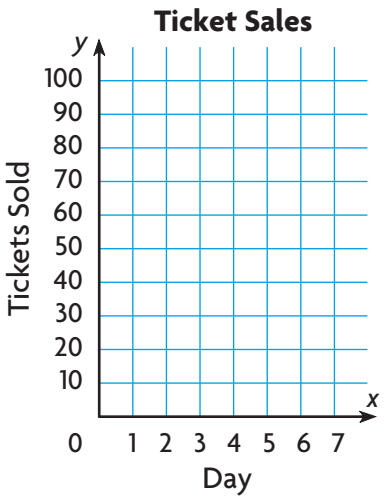
14. The table shows the total number of tickets sold for the school play each day for 5 days.

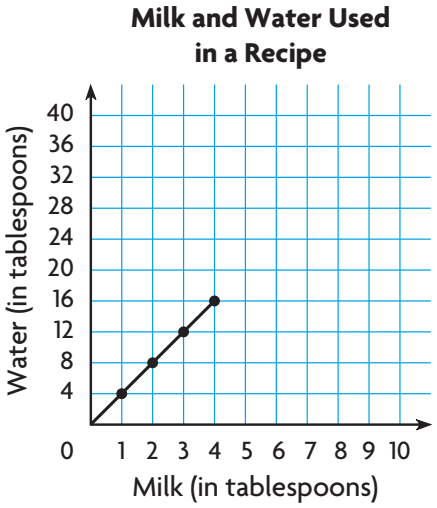
Ticket Sales					
Day	1	2	3	4	5
Tickets Sold	20	30	45	75	90

Graph the ordered pairs from the tiles on the coordinate plane.



- (1, 20)
- (2, 30)
- (3, 45)
- (4, 75)
- (5, 90)

15. The graph shows the relationship between the amounts of milk and water used in a recipe. Determine a rule that relates the amount of milk to the amount of water by writing the correct term or value from the tiles in each blank.



Subtract | Add | Multiply | Divide

1 | 2 | 4 | $\frac{1}{2}$ | $\frac{1}{4}$

Rule: _____ the amount of milk by _____.

16. Which equation describes the pattern in the table below?

Input	w	2	4	6	8
Output	c	8	16	24	32

Ⓐ $c = w \times 3$

Ⓑ $c = w \times 4$

Ⓒ $c = w + 4$

Ⓓ $w = c \times 3$

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