Name _____

Teacher Notes:

- Introduce Hint #45 "Rectangular Coordinates."
- Refer students to "Rectangular Coordinates" on page 26 of the Student Reference Guide.
- For additional practice, students may complete Targeted Practice Inv. 5.

page 319

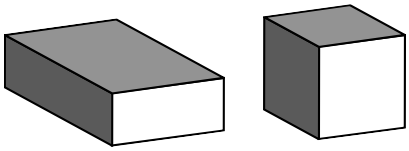
Focus on

- **Graphing**

Math Language

An **ordered pair** shows coordinates insides parentheses. For example, (1, 2) means move 1 unit to the right and 2 units up from the origin.

- A **prism** is a polyhedron with two parallel bases. In a **rectangular prism**, the bases are rectangles.
- A cube is a special type of rectangular prism. Each **face** of the cube is a square.



rectangular prism cube

- The **surface area** of a cube is the sum of the surface area of the its square faces. The table shows how the area of one face is related to the cube's surface area:

A	*S*
(Area of Each Side of a Cube) (cm^2)	(Surface Area of a Cube) (cm^2)
4	24
9	54
16	96
25	150

- The surface area of the cube is given by this formula:

$$S = 6A$$

This formula is an example of a function.
A **function** is a rule that changes an input number to an output number.
In a function, for each input number there is **one and only one output**.

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Example

Which of the following tables represents a function?

Table 1	
Input	**Output**
Day Number	Homework (minutes)
1	20
2	120
3	75
4	75

Table 2	
Input	**Output**
Month Number	Days in Month
1	31
2	28
2	29
3	30

Table 1 is a function. Although 75 occurs twice in the output column, each input has only one output.

Table 2 is not a function. The second month, February, can have 28 or 29 days. Because one input can have two different outputs, this is not a function.

- A function is a rule that changes an **input** number to an output number.
- If you know the rule, you can make a **function table** with pairs of input and output numbers.

Example

Make a function table for the formula for the perimeter of a square.

The side length of a square (s) is the *input* number.

The perimeter of the square (P) is the *output* number.

The function (or rule) is $P = 4s$.

The function table is shown at the right.

s	P
1	4
2	8
3	12
4	16

- If you have a function table but do not know the rule, ask yourself, "*What is done to the input number to make the output number?*" Make sure the rule works for *every number* in the function table.

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- You can use a function rule to find a missing value in a table.

Example

Find the rule for this function. Then use the rule to find the value of *m* when *l* = 7.

l	*m*
5	20
7	
10	25
15	30

1. Look at the table and try to guess the rule.

Try $l \times 4 = m$

This works for $l = 5$.

2. Try the rule for several inputs. If it does not work for every input, try another rule.

The rule does not work for $l = 10$.

Try $l + 15 = m$. This works for every input.

3. Apply the rule to find the missing output.

Substitute $l = 7$ into the rule:

$l + 15 = m$

$7 + 15 = m$

$22 = m$

The rule is $l + 15 = m$. The missing value is 22.

1. What is the missing number in the function table?

Rule: multiply *x* by _____, then subtract _____.

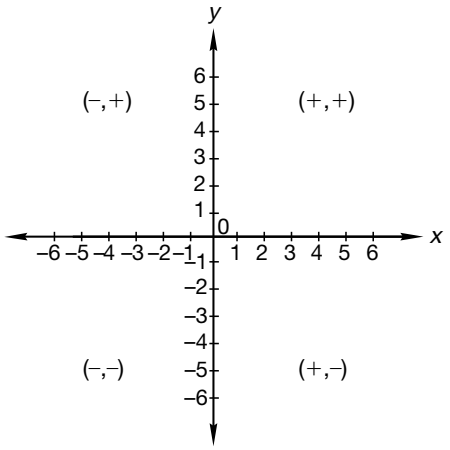
x	2	3	4
3*x* − 2	4	7	

(3 × _____) − 2 = _____

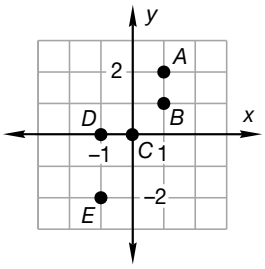
- A **coordinate plane** is a graph of perpendicular number lines.
- The origin is the point where the number lines cross.
- **The x-axis** is the **horizontal** number line (always the *first* number given).
- **The y-axis** is the **vertical** number line (always the *second* number given).

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- **Coordinates** are the two numbers that tell the location of a point.
- To graph a point:
  1. Always begin at the **origin.**
  2. Next move on the *x*-axis. ↔
     If the sign is positive, move right.
     If the sign is negative, move left.
  3. Last, move on the *y*-axis. ↕
     If the sign is positive, move up.
     If the sign is negative, move down.



Refer to the coordinate plane below to answer questions **2–6.**



2. What are the coordinates of point *A?*

(,)

3. Which point has the coordinates (0, 0)?

Point _____

4. What are the coordinates of point *B?* (,)

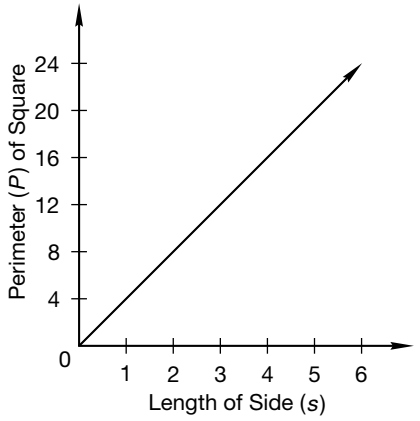
5. Which point has the coordinates (−1, −2)? Point _____

6. What are the coordinates of point *D?* (,)

- **Graphing** a function is a way to show all the input and output numbers.

To graph a function:

1. Make a function table with at least four input and output numbers.
2. Plot each pair of input/output numbers on a coordinate plane. The input number is the *x*-coordinate, and the output number is the *y*-coordinate.
3. Draw a ray through the dots.



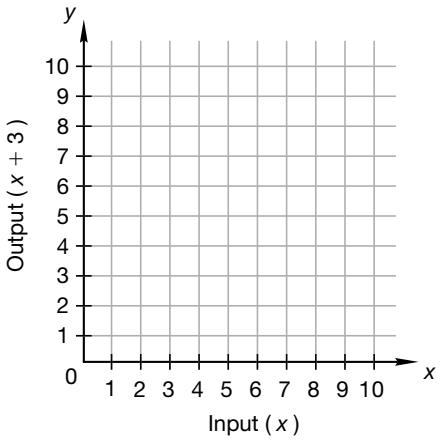
Example: The function for side length and perimeter of a square is graphed to the right.

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7. a. Graph the number pairs from the function table on the coordinate plane.

x	0	1	2	3
$x + 3$	3	4	5	6

b. Draw a ray through your dots. Extend the ray to the edge of the coordinate plane.

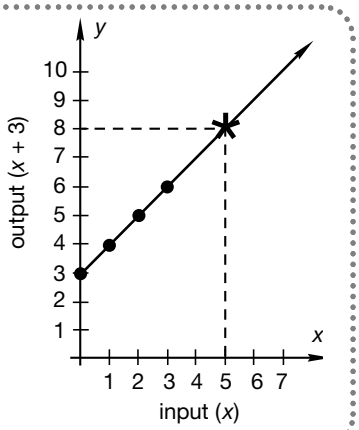


Example

What is x when $x + 3$ (output) is 8?

1. Go **up** to find the output value on the graph.
2. Go **across** until you intersect the ray.
3. Go **down** to find the x-value(input) for that point.

When $x + 3$ is 8, $x = 5$.



c. What is x when $x + 3$ is 10?

Go **up** to _____ on the y-axis.

Go **across** until you hit the r_____.

Go **down** to find the i_____ value for that point. x = _____

- You can also write and solve an equation to find missing x-values.

Example

Use an equation to find x when x + 3 is 8.

1. Write an equation: $x + 3 = 8$

2. Solve: $x = 8 - 3$

$x = 5$

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- You can use a graph to find missing x-values in a function table:

x	0	1	2	3		
$x + 3$	3	4	5	6	8	10

d. What is x when $x + 3$ is 10?

Write: $x + 3 =$ _____

Solve: $x =$ _____ $-$ _____

$x =$ _____

e. Check your answers by substituting your values for x in the rule.

x	Rule: $x + 3$	Follow the Rule?
0	$0 + 3 = 3$	Yes
3	$3 + 3 = 6$	Yes
5	_____ $+ 3 =$ _____	_____
_____	_____ $+ 3 = 10$	_____

8. a. Write the rule for this function table.

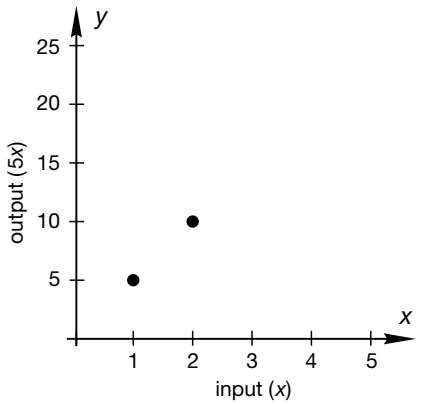
x	1	2	3	4	5
?	5	10	15	20	25

Rule: _____ x by _____.

b. Check that your rule works for every number.

x	Rule: _____	Matches the Table?
1	_____ = _____	
2	_____ = _____	
3	_____ = _____	
4	_____ = _____	
5	_____ = _____	

c. Graph the function on the coordinate plane. Draw a ray through the dots.



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