



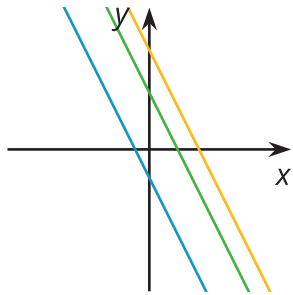
# On or Off the Line?

Let's interpret the meaning of points in a coordinate plane.

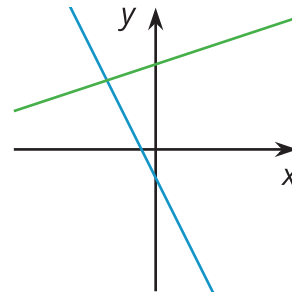
## 10.1 Which Three Go Together: Lines in the Plane

Which three go together? Why do they go together?

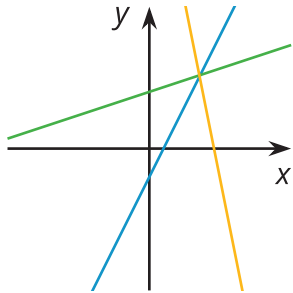
**A**



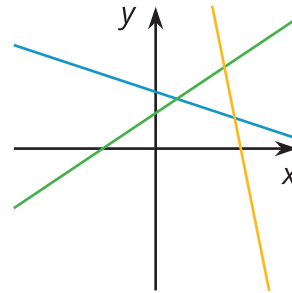
**B**



**C**



**D**



## 10.2

## Pocket Full of Change

Jada told Noah that she has \$2 worth of quarters and dimes in her pocket and 17 coins all together. She asked him to guess how many of each type of coin she has.

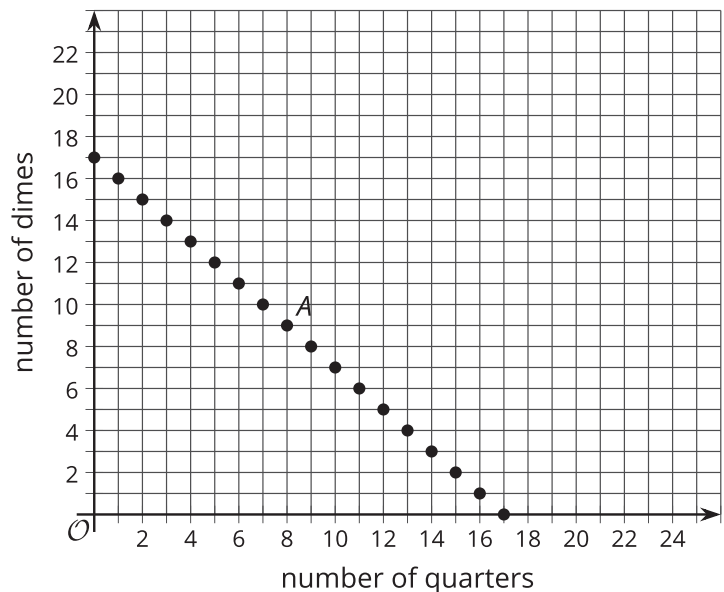
1. Here is a table that shows some combinations of quarters and dimes that are worth \$2. Complete the table.

| number of quarters | number of dimes |
|--------------------|-----------------|
| 0                  | 20              |
| 4                  |                 |
|                    | 0               |
|                    | 5               |
|                    |                 |

2. Here is a graph of the relationship between the number of quarters and the number of dimes when there are a total of 17 coins.

a. What does Point *A* represent?

b. How much money, in dollars, is the combination represented by Point *A* worth?

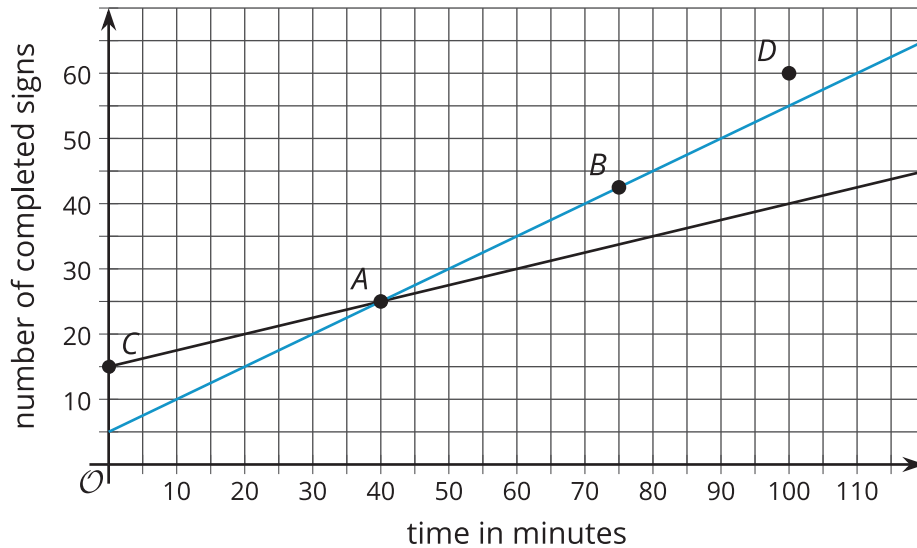


3. Is it possible for Jada to have 4 quarters and 13 dimes in her pocket? Explain how you know.
4. How many quarters and dimes must Jada have? Explain your reasoning.

## 10.3

## Making Signs

Clare and Andre are making signs for all the lockers as part of the decorations for the upcoming spirit week. Yesterday, Andre made 15 signs and Clare made 5 signs. Today, they need to make more signs. Each person's progress today is shown in the coordinate plane.



- Which line represents Andre and which represents Clare?
- Based on the lines, mark the statements as true or false for each person.

| point    | what it says                                         | Clare | Andre |
|----------|------------------------------------------------------|-------|-------|
| <i>A</i> | At 40 minutes, I have 25 signs completed.            |       |       |
| <i>B</i> | At 75 minutes, I have 42 and a half signs completed. |       |       |
| <i>C</i> | At 0 minutes, I have 15 signs completed.             |       |       |
| <i>D</i> | At 100 minutes, I have 60 signs completed.           |       |       |

## Are you ready for more?



- 4 toothpicks make 1 square
- 7 toothpicks make 2 squares
- 10 toothpicks make 3 squares

Do you see a pattern? If so, how many toothpicks would you need to make 10 squares according to your pattern? Can you represent your pattern with an expression?

## Lesson 10 Summary

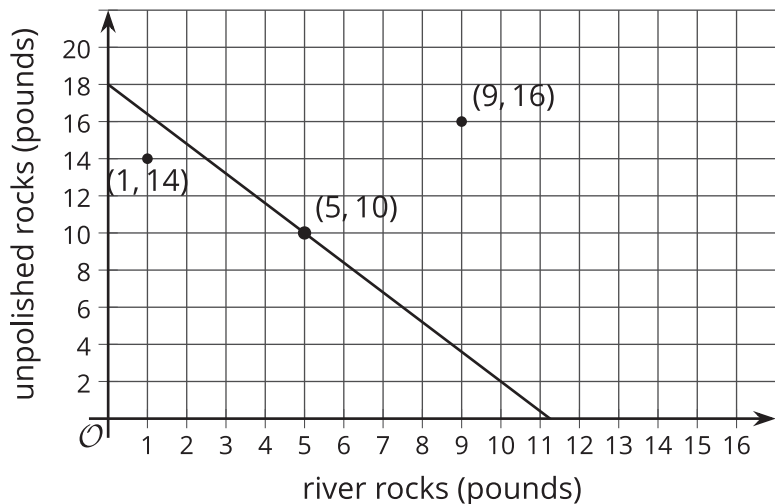
We studied linear relationships in an earlier unit. We learned that values of  $x$  and  $y$  that make an equation true correspond to points  $(x, y)$  on the graph.

For example, let's plan the base rocks for a terrarium. We have  $x$  pounds of river rocks that cost \$0.80 per pound and  $y$  pounds of unpolished rocks that cost \$0.50 per pound, and the total cost is \$9.00, so we can write an equation like this to represent the relationship between  $x$  and  $y$  :  $0.8x + 0.5y = 9$

Because 5 pounds of river rocks cost \$4.00 and 10 pounds of unpolished rocks cost \$5.00, we know that  $x = 5$ ,  $y = 10$  is a solution to the equation, and the point  $(5, 10)$  is a point on the graph.



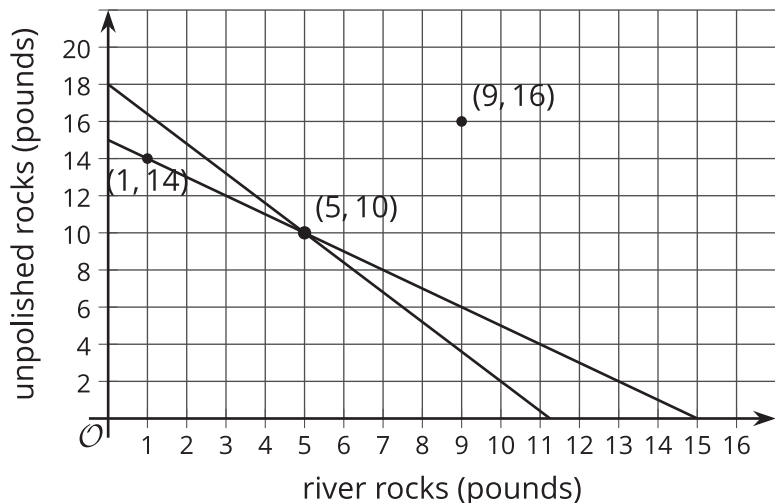
The line shown is the graph of the equation. Notice that there are 2 points shown that are not on the line. What do they mean in the context?



The point (1, 14) means that there is 1 pound of river rock and 14 pounds of unpolished rocks. The total cost for this is  $0.8 \cdot 1 + 0.5 \cdot 14$  or \$7.80. Because the cost is not \$9.00, this point is not on the line. Likewise, 9 pounds of river rocks and 16 pounds of unpolished rocks cost  $0.8 \cdot 9 + 0.5 \cdot 16$  or \$15.20, so the other point is not on the line either.

Suppose we also know that the river rocks and unpolished rocks together weigh 15 pounds. That means that  $x + y = 15$ .

If we draw the graph of this equation on the same coordinate plane, we see it passes through 2 of the 3 labeled points:



The point (1, 14) is on the graph of  $x + y = 15$  because  $1 + 14 = 15$ . Similarly,  $5 + 10 = 15$ . But  $9 + 16 \neq 15$ , so (9, 16) is not on the graph of  $x + y = 15$ .

In general, if we have 2 lines in the coordinate plane and we have their corresponding equations,

- The coordinates of a point on a line make that equation true.
- The coordinates of a point off of a line make that equation false.
- The coordinates of a point that is the intersection of the 2 lines make both equations true.