

GETTING READY FOR GRADE 7

GR3.3 Proportional Relationships and Graphs

Engage

ESSENTIAL QUESTION

How can you tell if a graph represents a proportional relationship?
A graph that is a line containing through the origin represents a proportional relationship.

Motivate the Lesson

Ask: What is another way, in addition to using a table of values, to tell whether a relationship is proportional? Begin the Explore Activity to find out.

Explore

EXPLORE ACTIVITY **Connect Vocabulary** **ELL**

Make sure that students understand what *origin* means. Explain that the point named $(0, 0)$ where the x - and y -axes meet is called the origin. Ask students to point to the origin on a graph.

Avoid Common Errors

Some students may see a straight-line graph and mistakenly assume that it has to represent a proportional relationship. Make sure that students understand that the origin must be a point on that line.

Explain

YOUR TURN **Avoid Common Errors**

Exercise 2 Some students may incorrectly graph the point $(1, 10)$ as $(10, 1)$. Emphasize that the first step in using any graph is to read all the labels.

GETTING READY FOR GRADE 7

LESSON GR3.3

Proportional Relationships and Graphs



ESSENTIAL QUESTION

How can you tell if a graph represents a proportional relationship?

EXPLORE ACTIVITY

You can use a graph to decide if a relationship is a proportional relationship. If the graph has a line that starts at the origin, the relationship is proportional.

Students sell banners for \$4 to raise money for their school. Is the relationship between the amount of money raised and the number of banners sold a proportional relationship?

- A** Complete the table to compare the amount raised to the number of banners sold.

Number Sold	1	2	3	5	8
Amount Raised (\$)	4	8	12	20	32

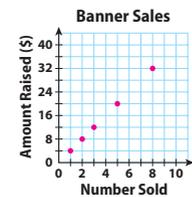
- B** Based on the table, is this a proportional relationship? How do you know?

Yes, the rate of change is constant at \$4 per banner.

- C** Use the table to create a list of ordered pairs (number sold, money raised). $(1, 4)$, $(2, 8)$, $(3, 12)$, $(5, 20)$, $(8, 32)$

- D** Plot the ordered pairs.

- E** If no banners are sold, how much money will be raised? What is the ordered pair for this situation? If you draw a line to connect the points on the graph, does the line go through the origin? **\$0; $(0, 0)$; yes**



REFLECT

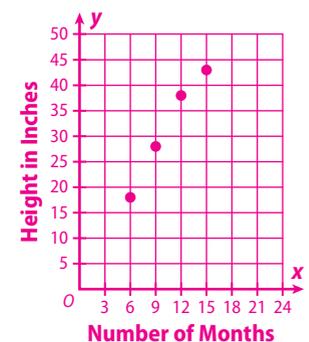
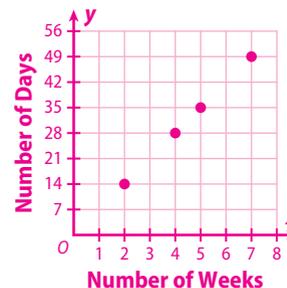
- 1.** The table and the graph are different ways to show the relationship between the amount of money raised and the number of banners sold is proportional. How are they similar? How are they different?

Both use the same set of points. The table, you must check whether the rate is constant. The graph, you have to see whether the points can be connected with a straight line that passes through the origin, $(0, 0)$.

ADDITIONAL PRACTICE

Plot the ordered points on a graph and then tell whether or not the relationship is a proportional relationship.

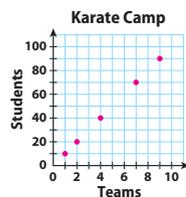
- 1.** (weeks, days): $(2, 14)$, $(4, 28)$, $(5, 30)$, $(7, 49)$ **Yes**
- 2.** (months, height in inches): $(6, 18)$, $(9, 28)$, $(12, 38)$, $(15, 43)$ **No**



YOUR TURN

2. There are 10 students on each team at a karate camp. Complete the table. Then graph the data as ordered pairs. Is the relationship a proportional relationship? Yes

Teams	1	2	4	7	9
Students	10	20	40	70	90



Guided Practice

Complete the table. Tell whether the relationship is proportional. Graph the points on the graph.

1. Randal uses apples to make apple cider. He uses 5 pounds of apples to make each quart. Complete the table to compare the pounds of apples Randal uses to the number of quarts he makes.

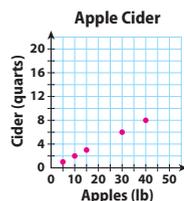
Apples (lb)	5	10	15	30	40
Cider (quarts)	1	2	3	6	8

Write the data in the table as ordered pairs.

(5, 1), (10, 2), (15, 3), (30, 6), (40, 8)

Plot the points on the graph.

Based on the graph, is the relationship between the pounds of apples and the quarts of apple cider a proportional relationship? yes



ESSENTIAL QUESTION CHECK-IN

2. What point must a proportional graph pass through? the origin, (0, 0)

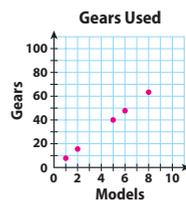
Independent Practice

Complete the table. Tell whether the relationship is proportional. Graph the points on the graph.

3. Zooley uses 8 gears on each model she builds.

Models	1	2	5	6	8
Gears Used	8	16	40	48	64

Proportional; the line will pass through the origin.



Elaborate

Talk About It Summarize the Lesson

Ask: How can you tell when a graph pictures a proportional relationship? To represent a proportional relationship, the graph must be a straight line that goes through the origin.

GUIDED PRACTICE

Questioning Strategies

- Why are the intervals used on the axes of the graph different for x and y ? A greater interval is needed for the total apples because the values go from 5 to 40.
- What two characteristics do you look for in the graph in order to decide whether the relationship is proportional? The points form a line and the line goes through the origin, (0,0)

Evaluate

LESSON QUIZ

On each page of Kyle's album, he puts 4 photos.

1. Write 5 ordered points that represent this relationship.
Sample answer: (0, 0), (1, 4), (2, 8), (3, 12), (4, 16)
2. Will your points be in a straight line on a graph? Yes.
3. Will the graph contain the origin? Yes.
4. Is this relationship a proportional relationship? Yes.



FOCUS ON HIGHER ORDER THINKING

1. **Represent Real-World Problems** Cynthia pays a \$10 entry fee and \$3 for each game she plays. Will the graph of this relationship (number of games she plays, total cost to her) be a straight line? Will the line contain the origin? Is this relationship a proportional relationship? Explain. Yes, it will be a straight line, but it will not contain the origin. Because her cost is \$10 even if she plays 0 games, it is not a proportional relationship. DOK 3; MP.7
2. **Critical Thinking** Do the units marked on the x -axis and the y -axis have to be the same in order for the graph to represent a proportional relationship? Explain. No, the units do not have to be the same as long as there is a constant ratio, it forms a line, and goes through the origin. DOK 3; MP.7