

Objective

Determine whether a relationship is proportional by checking for a straight-line graph.

Common Core State Standards

7.RP.2a Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.

Ratios and Proportional Relationships

Proportional Relationships I

Proportional relationships can be shown arithmetically, graphically, or algebraically. Students at this level will determine if two quantities are in a proportional relationship by graphing their values to see if they form a straight line through the origin. In the future, they will use the equation of a line, y = mx + b, to express a proportional relationship.

Try It! Perform the Try It! activity on the next page.

Talk About It

Discuss the Try It! activity.

- Ask: What does the x-axis represent? (time in minutes) What does the y-axis represent? (distance in kilometers) What is the scale on each axis? (x-axis: one space equals 10 minutes; y-axis: one space equals one kilometer)
- Say: Two points always define a line. Some lines represent proportional relationships and some do not. A line that represents a proportional relationship goes through the origin.
- Ask: Does the line go through the origin?

Solve It

Reread the problem with the students. Have students set up a graph and plot the points on the Centimeter Grid (BLM 1). Ask them to use a ruler to draw a line through the points and show that the line goes through the origin.

More Ideas

For other ways to teach about proportional relationships and straight-line graphs-

- Have students work a similar problem that starts with just one point: that a mackerel swims 22 km in 2 hours. Ask them to make a line showing other points that are proportional using the XY Coordinate Pegboard or the Centimeter Grid (BLM 1). Then have them list the points that form a proportional relationship.
- Have students start by making a straight line on their XY Coordinate Pegboard that will pass through the origin. Have them describe all of the points that make the proportional relationship of the line.

Formative Assessment

Have students try the following problem.

Which graph represents a proportional relationship?



Try It! 20 minutes | Pairs

Here is a problem about proportional relationships.

A herring swims 3 kilometers in 30 minutes. Another day, the herring swims 7 kilometers in 70 minutes. Is this a proportional relationship?

Introduce the problem. Then have students do the activity to solve the problem. Distribute the materials.

Materials

- XY Coordinate Pegboard
- BLM 1
- ruler



1. Have students set the axes to show the first quadrant of a coordinate plane. **Say:** The x-axis will represent time in minutes, and we'll have 1 space equal 10 minutes. The y-axis will represent distance, and we'll have 1 space equal 1 kilometer. Then have students plot the points (30, 3) and (70, 7) on their XY Coordinate Pegboards.



3. Ask: Where is the origin? Elicit that the origin is (0, 0). Encourage students to extend their lines to the origin. **Ask:** Are all three points on a straight line? Explain that since the points (30, 3) and (70, 7) lie on a straight line that goes through the origin, they express a proportional relationship.

🔺 Look Out!

define a line.

Students might think that any straight line indicates a proportional relationship. Emphasize that the line must go through the origin for the data to express a proportional relationship.

2. Ask students to connect the points with a

rubber band to make a line segment on the pegboard. Remind students that any two points





(Check students' work.)

Use an XY Coordinate Pegboard. Complete the model to answer the question.

1. You can buy 3 pounds of bananas for \$2 or 9 pounds for \$6. Is the relationship proportional?



Using an XY Coordinate Pegboard, model the problem. Draw the model and use it to answer the question.

2. In a bag, there are 4 red balls and 6 blue balls. In a second bag, there are 12 red balls and 8 blue balls. Is the relationship proportional?



Use Centimeter Grid Paper to determine if the relationship is proportional.

3. A baseball player got 14 hits in 35 turns at bat and 32 hits in 80 turns. Is the relationship proportional?



Yes

- **4.** If 20 people are ahead of you in the lunch line, it takes 12 minutes to get your lunch. If 30 people are ahead of you, it takes 18 minutes. Is the relationship proportional?
- **5.** It rained 15 times in 40 days, and it rained 45 times in 100 days. Is the relationship proportional?



Answer Key

Challenge! Explain how you make a graph to determine if some data are in a proportional relationship. Make up an example of a proportional relationship.

Challenge: Graph each data point on a coordinate grid. Draw a line through the points. If the straight line goes through the origin, then the relationship is proportional.





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Name

Centimeter Grid

BLM

1
