

Objective

Develop a set of coordinate pairs for a proportional relationship; write and graph an equation for the relationship.

Common Core State Standards

- **7.RP.2b** Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
- **7.RP.2c** Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p , the relationship between the total cost and the number of items can be expressed as $t = pn$.*

Ratios and Proportional Relationships

Equations of Proportional Relationships

In previous lessons, students have learned about proportional relationships and have learned to find the constant of proportionality for a relationship using coordinate pairs. These coordinate pairs are related linearly, meaning that the graph of their relationship forms a straight line. In this activity, students will use a set of related coordinate pairs to graph and write the equation for a proportional relationship.

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

Talk About It

Discuss the Try It! activity.

- **Ask:** *Why aren't we pegging the number of people that Kelly meets each day?*
- **Ask:** *How do you know the graph shows a proportional relationship? Could we have known this without graphing the coordinates? Explain.*
- **Ask:** *What is the constant of proportionality?*

Solve It

Ask students to explain why Kelly's plan to meet three new people every two days is a proportional relationship. Encourage them to use their graph to explain their answer. Have students write the equation for the relationship.

More Ideas

For another way to teach about proportional relationships and equations—

- Give students a related set of ordered pairs. Have students use their XY Coordinate Pegboard to determine whether the set of ordered pairs defines a proportional relationship. Have them use the graph to explain their answer.

Formative Assessment

Have students try the following problem.

Which of the following lists of values shows a proportional relationship?

A.	x	y	B.	x	y	C.	x	y	D.	x	y
	1	1		4	2		0	-5		0	0
	2	4		8	4		1	-4		3	6
	3	9		12	6		2	-3		6	12
	4	16		16	4		3	-4		9	18
	5	25		24	2		4	-1		12	24

Try It!

20 minutes | Pairs

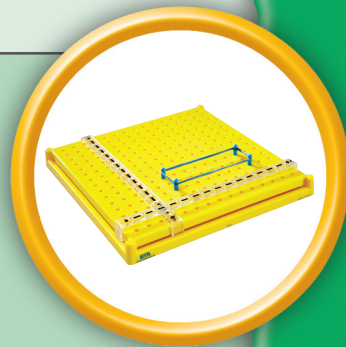
Here is a problem about proportional relationships and equations.

Kelly loves to meet new people. When she moved to a new school, she decided to meet three new people every two days. How many people will she have met after 10 days? After 16 days? Write an equation for the number of people Kelly will have met after x days.

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

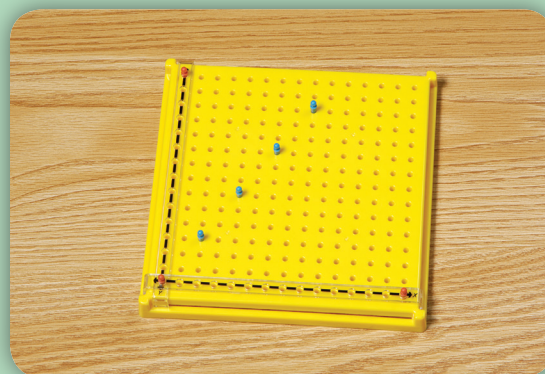
Materials

- XY Coordinate Pegboard
- paper

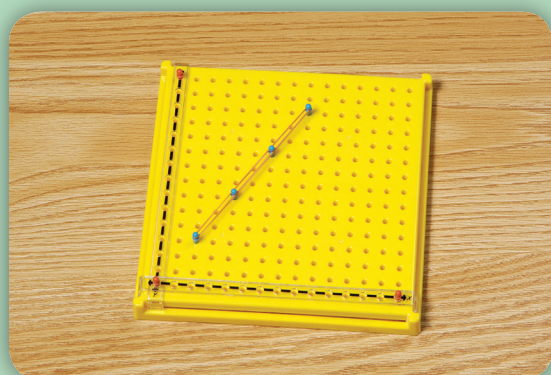


X Days	2	4	6	8	10	12	14	16	18	20
Y People	3	6	9	12	15	18	21	24	27	30

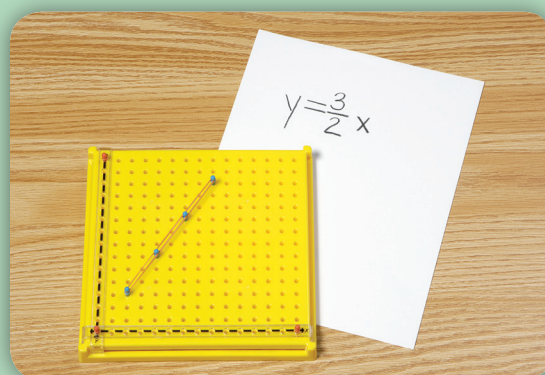
1. Have students set up a table of values showing each day and the number of new people Kelly has met by the end of that day. Have them start at $x = 2$ and continue through $x = 20$.



2. Have students peg the first few sets of coordinate pairs from their table of values.



3. Have students find the constant of proportionality. Tell them to look for a pattern. **Ask:** What is the rule for moving from one point on the graph to the next? Elicit from them that the pattern is "up 3, over 2."

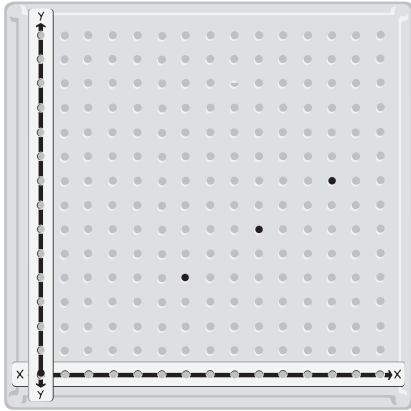


4. Have students write their solutions on a sheet of paper. Their formulas should be in the form $y = mx$.

Use an XY Coordinate Pegboard to plot the points shown. Make a table of ordered pairs. Graph the line. Write an equation.

(Check students' work.)

1.

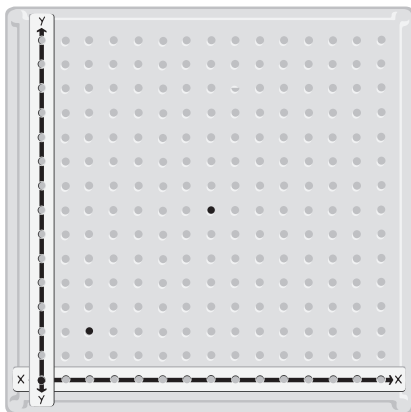


x	y
0	0
6	4
9	6
12	8
15	10
18	12

$$y = \frac{2}{3}x$$

Using an XY Coordinate Pegboard, graph the line that passes through the points given on the grid. Sketch the line. Make a table of ordered pairs. Write an equation.

2.

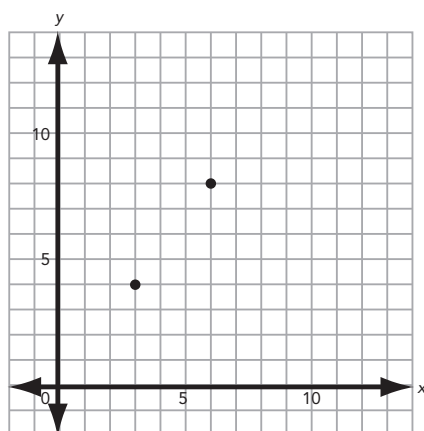


x	y
0	0
2	2
4	4
7	7
9	9
11	11

$$y = x$$

Graph a line that passes through the given points. Make a table of ordered pairs. Write an equation.

3.



x	y
0	0
3	4
6	8
9	12
12	16
15	20

$$y = \frac{4}{3}x$$

Answer Key

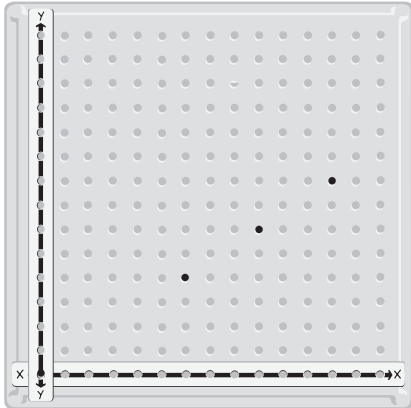
Challenge! How many points must you have to make a line? Why is it good to have three points to make a line?

Challenge: (Sample) Two points make a line. When you graph three points on a line, it is a good way to check that the first two points are graphed accurately.

[illegible]

Use an XY Coordinate Pegboard to plot the points shown. Make a table of ordered pairs. Graph the line. Write an equation.

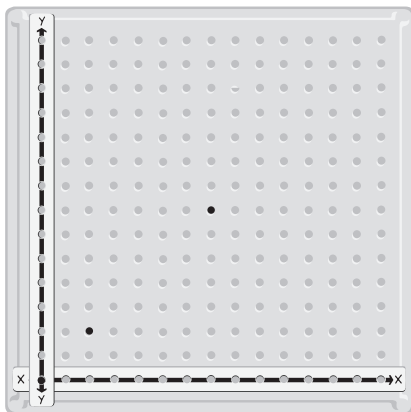
1.



x	y

Using an XY Coordinate Pegboard, graph the line that passes through the points given on the grid. Sketch the line. Make a table of ordered pairs. Write an equation.

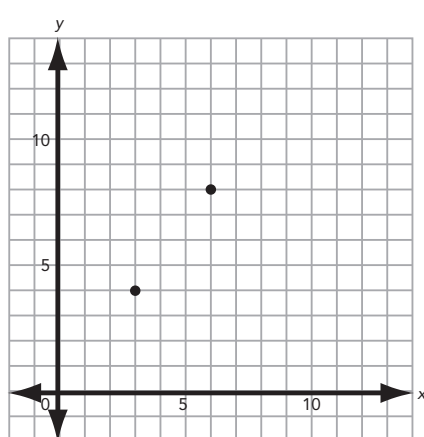
2.



x	y

Graph a line that passes through the given points. Make a table of ordered pairs. Write an equation.

3.



x	y

Name _____

Challenge! How many points must you have to make a line? Why is it good to have three points to make a line?

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