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LEARNING OBJECTIVE: We will compare different proportional relationships and determine the rates of change. (G8M4L20)

ACTIVATING PRIOR KNOWLEDGE

We already know how to evaluate a proportional relationship and determine constant rates:

Erika set her stopwatch to zero and switched it on at the beginning of the walk. After she had gone 6 laps around the track ($1\frac{1}{2}$ miles), she looked at her watch to find out she had been walking for 30 minutes. Assuming she walks at a constant rate, what will her stopwatch say after she completes 12 laps?

60 minutes (1 hour)

What is her unit rate?

12 laps/hr. } 3 miles/hr.

.2 laps/min. } .05 miles/min.

Express the rate as a linear equation.

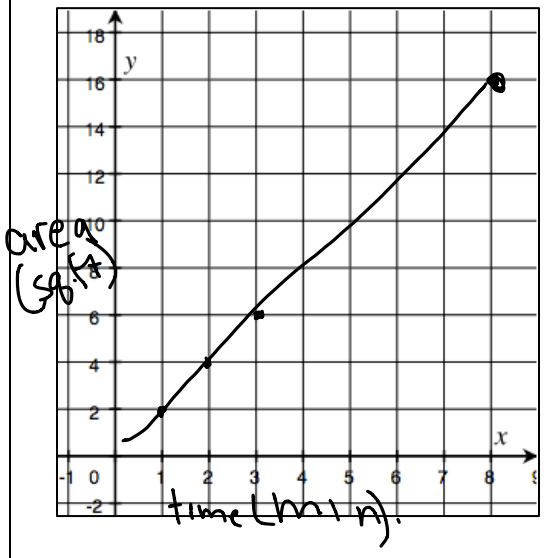
$y = 3x$

Peter paints at a constant rate of 2 square feet per minute. Assume he paints *y* square feet in *x* minutes.

Express Peter's rate as a linear equation in two variables.

$y = 2x$

Graph the equation below.



Determine the total area Peter paints after 8 minutes, $1\frac{1}{2}$ hours, and 2 hours.

16 sq. ft. 180 sq ft 240 sq ft

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CONCEPT DEVELOPMENT

When we are comparing two different proportional relationships, we can look for the constant rate to draw conclusions about the two different relationships.

Example:

Faucet A leaks at a constant rate of 7 gallons an hour. Suppose y gallons leak in x hours. Express this situation as a linear equation in two variables.

$y = 7x$

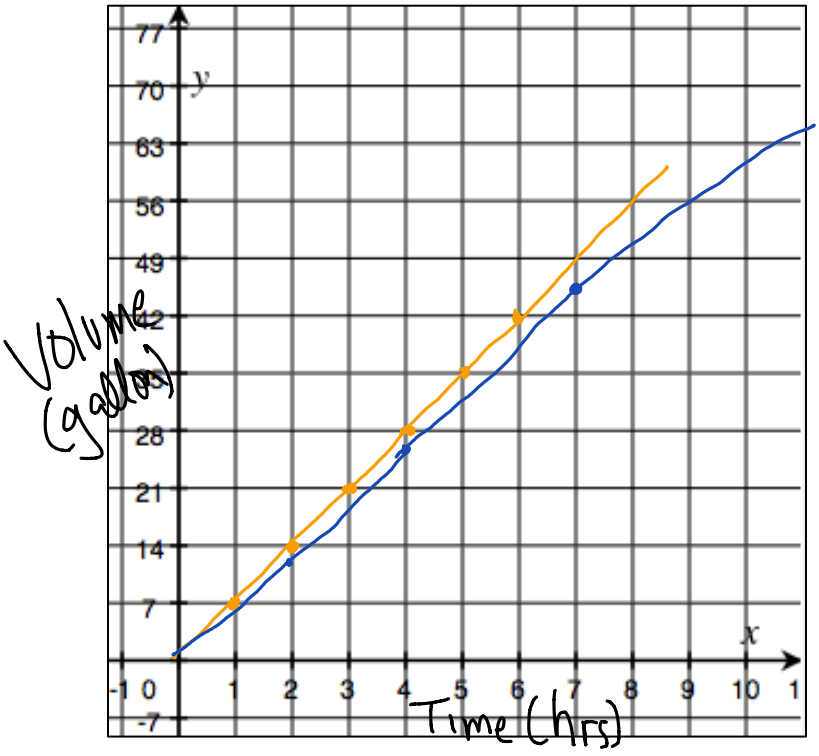
Faucet B leaks at a constant rate too. The table below shows the number of gallons, y, that leak in x hours.

Hours (x)	Gallons (y)
2	13
4	26
7	45.5
10	65

Express this situation as a linear equation in two variables.

$y = 6.5x$

Graph both leaks below.



Determine which leak is worse. How do you know?

FAUCET A!

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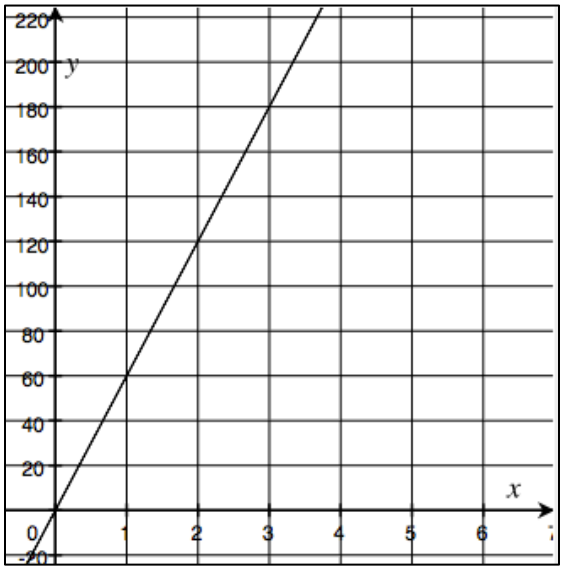
GUIDED PRACTICE

Steps for Evaluating Different Proportional Relationships

1. Determine the constant rate of change for each of the relationships.
2. Express the problem as a linear equation in two variables.
3. Explain your conclusion in the context of the problem.

Train A is traveling at a constant rate represented below in the graph.



Train B is also traveling at a constant rate. It travels 95 miles in $1\frac{1}{2}$ hours.

a. Express each rate as a linear equation in two variables.

Train A: Train B:

b. What is the unit rate for each train?

Train A: Train B:

c. Which one is going faster? How do you know?

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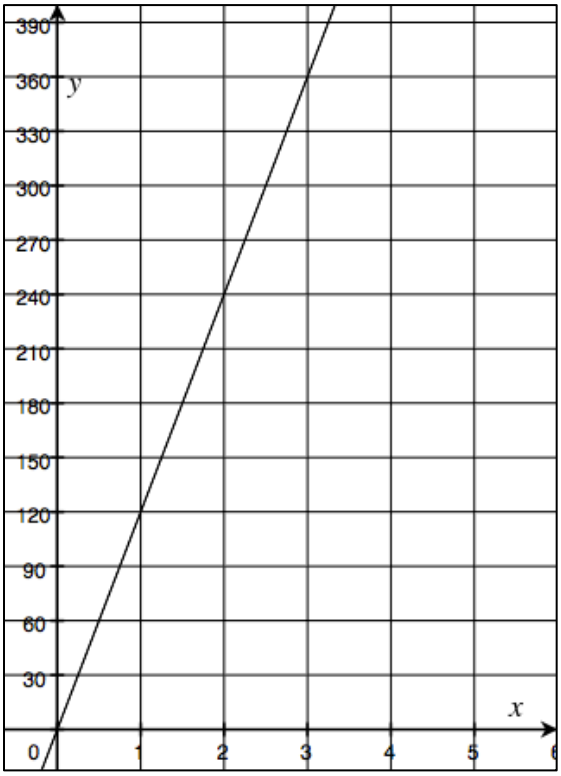
The Solar Company makes solar panels that produce a constant rate of watts of energy. This rate is shown in the graph below.



SunRun also makes solar panels that produce an average rate of 325 watts in 2.6 hours.

a. Express each rate as a linear equation in two variables.

The Solar Company: SunRun:

b. What is the unit rate for each solar panel (in watts per hour)?

The Solar Company: SunRun:

c. Which one produces more solar power? How do you know?

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INDEPENDENT PRACTICE

1. Nathan and Nicole are walking in a walkathon. Nicole walks 5 miles in 1.4 hours. Nathan's pace is shown in the table below. Assume they both walk at a constant rate.

Time, in hours (x)	**Distance, in miles (y)**
.5	2
1	4
1.5	6
2	8

a. Describe both Nathan and Nicole's rates as linear equations in 2 variables.

Nicole: Nathan:

b. Who walks at a greater speed? How do you know?

2. Susan can type 4 pages of text in 10 minutes. Anne can type at a constant rate described in the table below:

Minutes (x)	**Pages Typed (y)**
3	2
5	$\frac{10}{3}$
8	$\frac{16}{3}$
10	$\frac{20}{3}$

a. Describe both Susan and Anne's rates as linear equations in 2 variables.

Susan: Anne:

b. Who types at a greater speed? How do you know?

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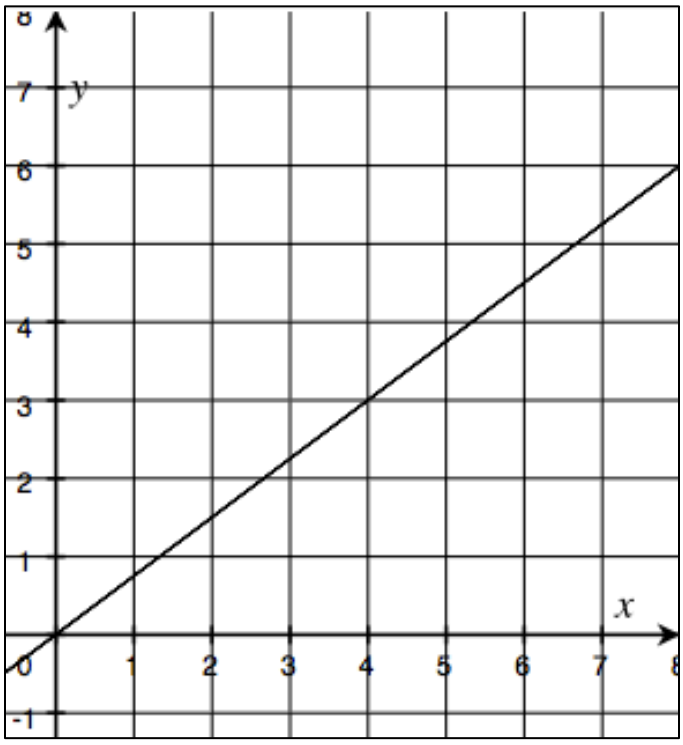
3. Phil and Karl build birdhouses made of lego. Phil can build 3 lego birdhouses in 5 days. Karl builds the same exact kind of lego birdhouse, and his progress is represented by the graph below.



a. Describe both Phil and Karl's rates of building as linear equations in 2 variables.

Phil: Karl:

b. Who can build more birdhouses? How do you know?

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CLOSURE

Give exit ticket for lesson 22 for closure

NOTES

HW is problem set from lesson 22