Name _____   Date_____

Lesson 1: An Experience in Relationships as Measuring Rate

Exit Ticket

Watch the video clip of Tillman the English bulldog, the Guinness World Record holder for Fastest Dog on a Skateboard.

1. At the conclusion of the video, your classmate takes out his or her calculator and says, "Wow that was amazing! That means the dog went about 5 meters in 1 second!" Is your classmate correct, and how do you know?

2. After seeing this video, another dog owner trained his dog, Lightning, to try to break Tillman's skateboarding record. Lightning's fastest recorded time was on a 75-meter stretch where it took him 15.5 seconds. Based on this data, did Lightning break Tillman's record for fastest dog on a skateboard? Explain how you know.

Name _____   Date_____

Lesson 2: Proportional Relationships

Exit Ticket

Ms. Albero decided to make juice to serve along with the pizza at the Student Government party. The directions said to mix 2 scoops of powdered drink mix with a half gallon of water to make each pitcher of juice. One of Ms. Albero's students said she will mix 8 scoops with 2 gallons of water to make 4 pitchers. How can you use the concept of proportional relationships to decide whether the student is correct?

Name _____   Date_____

Lesson 3: Identifying Proportional and Non-Proportional Relationships in Tables

Exit Ticket

The table below shows the price, in dollars, for the number of roses indicated.

Number of Roses	3	6	9	12	15
Price (Dollars)	9	18	27	36	45

1. Is the price proportional to the number of roses? How do you know?

2. Find the cost of purchasing 30 roses.

Name _____   Date_____

Lesson 4: Identifying Proportional and Non-Proportional Relationships in Tables

Exit Ticket

The table below shows the relationship between the side lengths of a regular octagon and its perimeter.

Side Lengths, s (inches)	Perimeter, P (inches)
1	8
2	16
3	24
4	32
9	
12	

Complete the table.

If Gabby wants to make a regular octagon with a side length of 20 inches using wire, how much wire does she need? Justify your reasoning with an explanation of whether perimeter is proportional to the side length.

Name _____   Date_____

Lesson 5: Identifying Proportional and Non-Proportional Relationships in Graphs

Exit Ticket

1. The following table gives the number of people picking strawberries in a field and the corresponding number of hours that those people worked picking strawberries. Graph the ordered pairs from the table. Does the graph represent two quantities that are proportional to each other? Explain why or why not.

x	y
1	3
7	1
4	2
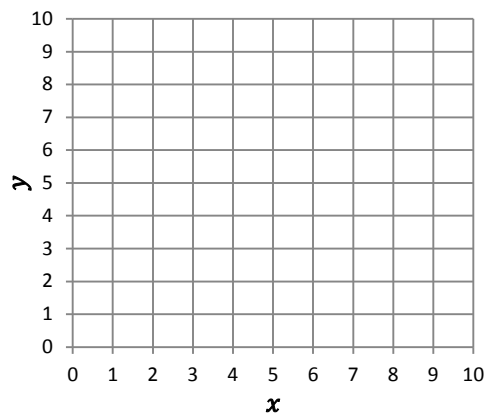
2. Use the given values to complete the table. Create quantities proportional to each other and graph them.

x	y
4	2
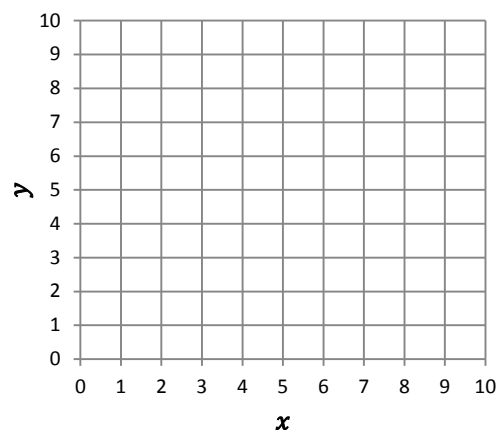
3. a.   What are the differences between the graphs in Problems 1 and 2?

    b.   What are the similarities in the graphs in Problems 1 and 2?

    c.   What makes one graph represent quantities that are proportional to each other and one graph not represent quantities that are proportional to each other in Problems 1 and 2?

Name _____   Date_____

Lesson 6: Identifying Proportional and Non-Proportional Relationships in Graphs

Exit Ticket

1. Which graphs in the gallery walk represented proportional relationships and which did not? List the group number.

      Proportional Relationship   Non-Proportional Relationship

2. What are the characteristics of the graphs that represent proportional relationships?

3. For the graphs representing proportional relationships, what does (0,0) mean in the context of the given situation?

Ratios for Exploratory Challenge

Cut and place in labeled envelopes prior to instructional time.

Group 1	Group 2	Group 3	Group 4
A local frozen yogurt shop is known for its monster sundaes to be shared by a group. The ratios represent the number of toppings to the total cost of the toppings. Create a table, and then graph and explain if the quantities are proportional to each other.	The school library receives money for every book sold at the school's book fair. The ratios represent the number of books sold to the amount of money the library receives. Create a table, and then graph and explain if the quantities are proportional to each other.	Your uncle just bought a hybrid car and wants to take you and your siblings camping. The ratios represent the number of gallons of gas remaining to the number of hours of driving. Create a table, and then graph and explain if the quantities are proportional to each other.	For a science project, Eli decided to study colonies of mold. He observed a piece of bread that was molding. The ratios represent the number of days passed to the number of colonies of mold on the bread. Create a table, and then graph and explain if the quantities are proportional to each other.
4 to 0	1 to 5	8 to 0	1 to 1
6 : 3	2 to 10	After 1 hour of driving, there are 6 gallons of gas left in the tank.	2 to 4
8 : 6	The library received $15 for selling 3 books.	4 : 4	3 : 9
The total cost of a 10-topping sundae is $9.	4 : 20	2 to 7	4 : 16
12 to 12	5 : 25	0 : 8	Twenty-five colonies were found on the 5th day.

engage^ny

Group 5	Group 6	Group 7	Group 8
For a science project, Eli decided to study colonies of mold. He observed a piece of bread that was molding. The ratios represent the number of days passed to the number of colonies of mold on the bread. Create a table, and then graph and explain if the quantities are proportional to each other.	Your uncle just bought a hybrid car and wants to take you and your siblings camping. The ratios represent the number of gallons of gas remaining to the number of hours of driving. Create a table, and then graph and explain if the quantities are proportional to each other.	The school library receives money for every book sold at the school's book fair. The ratios represent the number of books sold to the amount of money the library receives. Create a table, and then graph and explain if the quantities are proportional to each other.	A local frozen yogurt shop is known for its monster sundaes to be shared by a group. The ratios represent the number of toppings to the total cost of the toppings. Create a table, and then graph and explain if the quantities are proportional to each other.
1 to 1	8 to 0	1 to 5	4 to 0
2 to 4	After 1 hour of driving, there are 6 gallons of gas left in the tank.	2 to 10	6 : 3
3 : 9	4 : 4	The library received $15 for selling 3 books.	8 : 6
4 : 16	2 to 7	4 : 20	The total cost of a 10-topping sundae is $9.
Twenty-five colonies were found on the 5th day.	0 : 8	5 : 25	12 to 12

Name _____   Date_____

Lesson 7: Unit Rate as the Constant of Proportionality

Exit Ticket

Susan and John are buying cold drinks for a neighborhood picnic. Each person is expected to drink one can of soda. Susan says that if you multiply the unit price for a can of soda by the number of people attending the picnic, you will be able to determine the total cost of the soda. John says that if you divide the cost of a 12-pack of soda by the number of sodas, you will determine the total cost of the sodas. Who is right and why?
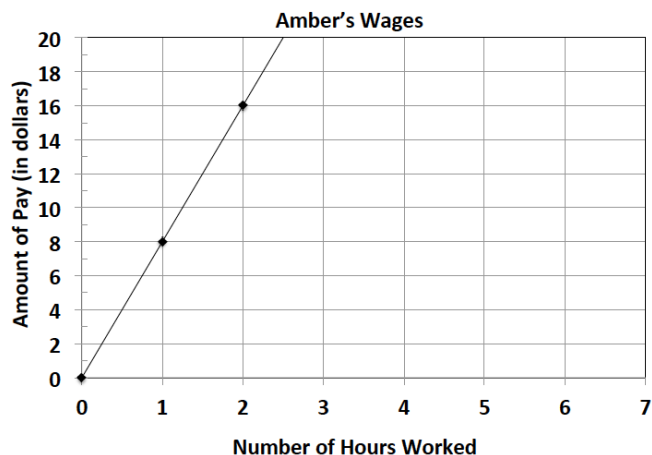
Name _____   Date_____

Lesson 8: Representing Proportional Relationships with Equations

Exit Ticket

John and Amber work at an ice cream shop. The hours worked and wages earned are given for each person.

John's Wages	
Time (in hours)	Wages (in dollars)
2	18
3	27
4	36

Amber's Wages

1. Determine if John's wages are proportional to time. If they are, determine the unit rate of $\frac{y}{x}$. If not, explain why they are not.

2. Determine if Amber's wages are proportional to time. If they are, determine the unit rate of $\frac{y}{x}$. If not, explain why they are not.

3. Write an equation for both John and Amber that models the relationship between their wage and the time they worked. Identify the constant of proportionality for each. Explain what it means in the context of the situation.

4. How much would each worker make after working 10 hours? Who will earn more money?

5. How long will it take each worker to earn $50?

Name _____   Date_____

Lesson 9: Representing Proportional Relationships with Equations

Exit Ticket

Oscar and Maria each wrote an equation that they felt represented the proportional relationship between distance in kilometers and distance in miles. One entry in the table paired 152 km with 95 miles. If k represents the number of kilometers and m represents the number of miles, who wrote the correct equation that would relate miles to kilometers? Explain why.

Oscar wrote the equation $k = 1.6m$, and he said that the rate $\frac{1.6}{1}$ represents kilometers per mile.

Maria wrote the equation $k = 0.625m$ as her equation, and she said that 0.625 represents kilometers per mile.

Name _____   Date_____

Lesson 10: Interpreting Graphs of Proportional Relationships

Exit Ticket

Great Rapids White Water Rafting Company rents rafts for $125 per hour. Explain why the point $(0,0)$ and $(1,125)$ are on the graph of the relationship, and what these points mean in the context of the problem.

Name _____   Date _____

1. Josiah and Tillery have new jobs at YumYum's Ice Cream Parlor. Josiah is Tillery's manager. In their first year, Josiah will be paid $14 per hour and Tillery will be paid $7 per hour. They have been told that after every year with the company, they will each be given a raise of $2 per hour. Is the relationship between Josiah's pay and Tillery's pay rate proportional? Explain your reasoning using a table.

2. A recent study claimed that in any given month, for every 5 text messages a boy sent or received, a girl sent or received 7 text messages. Is the relationship between number of text messages sent or received by boys proportional to the number of text messages sent or received by girls? Explain your reasoning using a graph on the coordinate plane.

3. When a song is sold by an online music store, the store takes some of the money and the singer gets the rest. The graph below shows how much money a pop singer makes given the total amount of money brought in by one popular online music store from sales of the song.
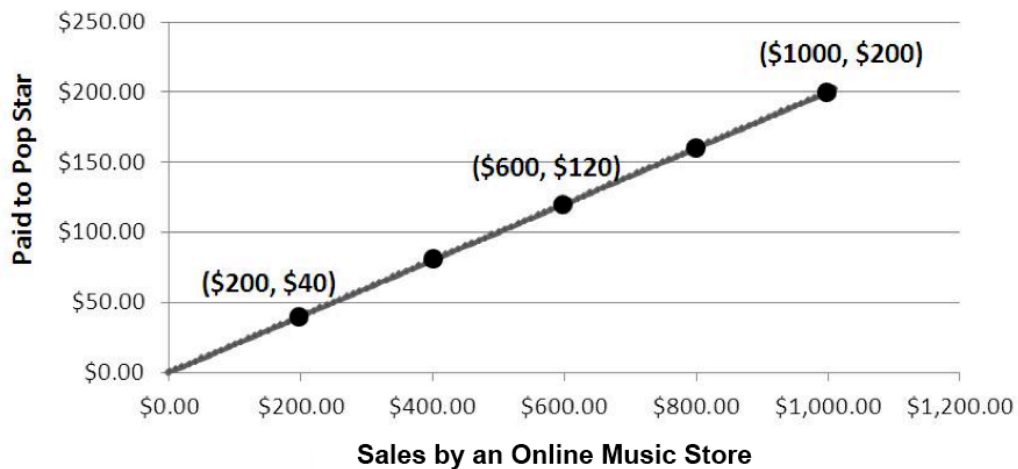
a. Identify the constant of proportionality between dollars earned by the pop singer and dollars brought in by sales of the song.

b. Write an equation relating dollars earned by the pop singer, y, to dollars brought in by sales of the song, x.

engage^{ny}

c.   According to the proportional relationship, how much money did the song bring in from sales in the first week if the pop star earned $800 that week?

d.   Describe what the point (0,0) on the graph represents in terms of the situation being described by the graph.

e.   Which point on the graph represents the amount of money the pop singer gets for $1 in money brought in from sales of the song by the store?

Name _____   Date_____

Lesson 11: Ratios of Fractions and Their Unit Rate

Exit Ticket

Which is the better buy? Show your work and explain your reasoning.

$3\frac{1}{3}$ lb. of turkey for $10.50 $2\frac{1}{2}$ lb. of turkey for $6.25

Name _____   Date_____

Lesson 12: Ratios of Fractions and Their Unit Rates

Exit Ticket

If $3\frac{3}{4}$ lb. of candy cost \$20.25, how much would 1 lb. of candy cost?

Name _____   Date_____

Lesson 13: Finding Equivalent Ratios Given the Total Quantity

Exit Ticket

The table below shows the combination of a dry prepackaged mix and water to make concrete. The mix says for every 1 gallon of water stir 60 pounds of dry mix. We know that 1 gallon of water is equal to 8 pounds of water. Using the information provided in the table, complete the remaining parts of the table.

Dry Mix (pounds)	Water (pounds)	Total (pounds)
	8	
75	10	
		$14\frac{1}{6}$
$4\frac{1}{2}$		

Name _____   Date_____

Lesson 14: Multi-Step Ratio Problems

Exit Ticket

1. A bicycle shop advertised all mountain bikes priced at a $\frac{1}{3}$ discount.

    a.   What is the amount of the discount if the bicycle originally costs $327?

    b.   What is the discount price of the bicycle?

    c.   Explain how you found your solution to part (b).

2. A hand-held digital music player was marked down by $\frac{1}{4}$ of the original price.

    a.   If the sales price is $128.00, what is the original price?

    b.   If the item was marked up by $\frac{1}{2}$ before it was placed on the sales floor, what was the price that the store paid for the digital player?

    c.   What is the difference between the discount price and the price that the store paid for the digital player?

Name _____   Date_____

Lesson 15: Equations of Graphs of Proportional Relationships Involving Fractions

Exit Ticket

Using the graph and its title:

1. Describe the relationship that the graph depicts.

Rising Flood Water

(Number of Inches vs. Number of Days)

2. Identify two points on the line and explain what they mean in the context of the problem.

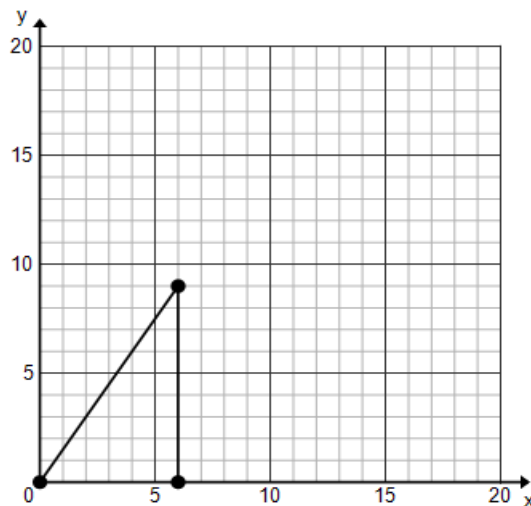3. What is the unit rate?

4. What point represents the unit rate?
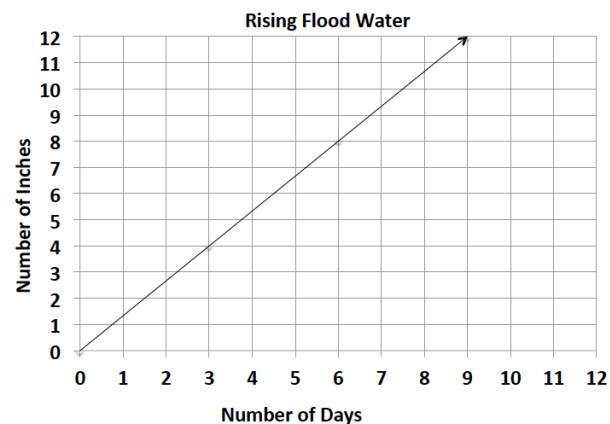
Name _____   Date_____

Lesson 16: Relating Scale Drawings to Ratios and Rates

Exit Ticket

Use the following figure on the graph for Problems 1 and 2.

1. a.   If the original lengths are multiplied by 2, what are the new coordinates?

    b.   Use the table to organize lengths (the vertical and horizontal legs).

	WIDTH	HEIGHT
Actual Picture (in units)		
New Picture (in units)		

    c.   Is the new picture a reduction or an enlargement?

    d.   What is the constant of proportionality?

2. a. If the original lengths are multiplied by $\frac{1}{3}$, what are the new coordinates?

b. Use the table to organize lengths (the vertical and horizontal legs).

	WIDTH	HEIGHT
Actual Picture (in units)		
New Picture (in units)		

c. Is the new picture a reduction or an enlargement?

d. What is the constant of proportionality?

Opening Exercise

Can you guess the image? In each problem, the first image is from the student materials and the second image is the actual picture.

1.

2.

Name _____ Date_____

Lesson 17: The Unit Rate as the Scale Factor

Exit Ticket

A rectangular pool in your friend's yard is 150 ft. × 400 ft. Create a scale drawing with a scale factor of $\frac{1}{600}$. Use a table or an equation to show how you computed the scale drawing lengths.

Name _____   Date_____

Lesson 18: Computing Actual Lengths from a Scale Drawing

Exit Ticket

A drawing of a surfboard in a catalog shows its length as $8\frac{4}{9}$ inches. Find the actual length of the surfboard if $\frac{1}{2}$ inch length on the drawing corresponds to $\frac{3}{8}$ foot of actual length.

Name _____   Date_____

Lesson 19: Computing Actual Areas from a Scale Drawing

Exit Ticket

A 1-inch length in the scale drawing below corresponds to a length of 12 feet in the actual room.
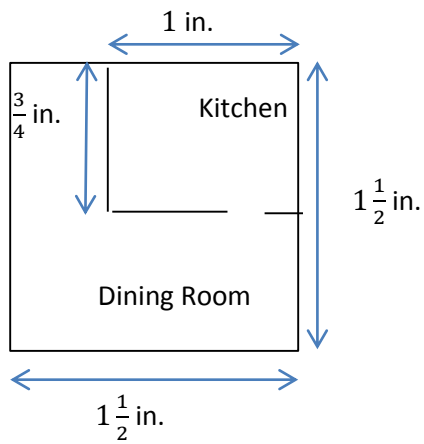
1. Describe how the scale or the scale factor can be used to determine the area of the actual dining room.

2. Find the actual area of the dining room.

3. Can a rectangular table that is 7 ft. long and 4 ft. wide fit into the narrower section of the dining room? Explain your answer.

Name _____   Date_____

Lesson 20: An Exercise in Creating a Scale Drawing

Exit Ticket

1. Your sister has just moved into a loft style apartment in Manhattan and has asked you to be her designer. Indicate the placement of the following objects on the floorplan using the appropriate scale: queen-size bed (60 in. by 80 in.), sofa (36 in. by 64 in.), and dining table (48 in. by 48 in.). In the following scale drawing, 1 cm represents 2 ft. Each square on the grid is 1 cm².
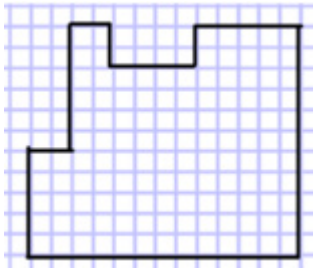
2. Choose one object and explain the procedure to find the scale lengths.

Name _____   Date_____

Lesson 22: An Exercise in Changing Scales

Exit Ticket

The school is building a new wheelchair ramp for one of the remodeled bathrooms. The original drawing was created by the contractor, but the principal drew another scale drawing to see the size of the ramp relative to the walkways surrounding it. Find the missing values on the table.

Original Scale Drawing
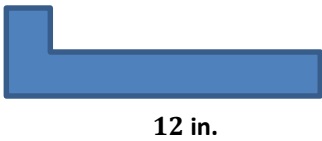
Principal's Scale Drawing

New Scale Factor of $SD2$ to the actual ramp: $\frac{1}{700}$

12 in.   **3 in.**

|	Actual Ramp	Original Scale Drawing	Principal's Scale Drawing
Actual Ramp	1		
Original Scale Drawing		1	4
Principals' Scale Drawing			

Name _____   Date _____

1. It is a Saturday morning and Jeremy has discovered he has a leak coming from the water heater in his attic. Since plumbers charge extra to come out on weekends, Jeremy is planning to use buckets to catch the dripping water. He places a bucket under the drip and steps outside to walk the dog. In half an hour, the bucket is $\frac{1}{5}$ of the way full.

    a. What is the rate at which the water is leaking per hour?

    b. Write an equation that represents the relationship between the number of buckets filled, y, in x hours.

   c. What is the longest that Jeremy can be away from the house before the bucket will overflow?

2. Farmers often plant crops in circular areas because one of the most efficient watering systems for crops provides water in a circular area. Passengers in airplanes often notice the distinct circular patterns as they fly over land used for farming. A photographer takes an aerial photo of a field on which a circular crop area has been planted. He prints the photo out and notes that 2 centimeters of length in the photo corresponds to 100 meters in actual length.
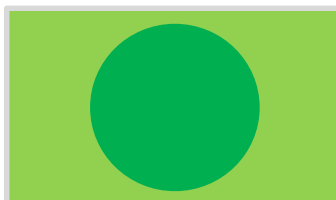
a. What is the scale factor of the actual farm to the photo?

b. If the dimensions of the entire photo are 25 cm by 20 cm, what are the actual dimensions of the rectangular land area in meters captured by the photo?

c. If the area of the rectangular photo is 5 cm², what is the actual area of the rectangular area in square meters?

3. A store is having a sale to celebrate President's Day. Every item in the store is advertised as one fifth off the original price. If an item is marked with a sale price of $140, what was its original price? Show your work.

4. Over the break, your uncle and aunt ask you to help them cement the foundation of their newly purchased land and give you a top-view blueprint of the area and proposed layout. A small legend on the corner states that 4 inches of the length corresponds to an actual length of 52 feet.
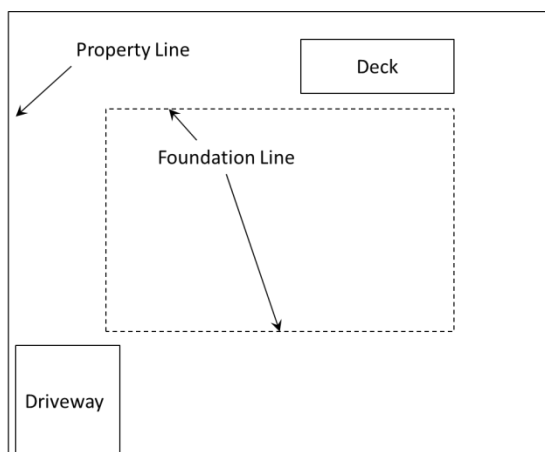
a. What is the scale factor of the actual foundation to the blueprint?

b.   If the dimensions of the foundation on the blueprint are 11 inches by 13 inches, what are the actual dimensions in feet?

c.   You are asked to go buy bags of dry cement and know that one bag covers 350 square feet. How many bags do you need to buy to finish this project?

d.   After the first 15 minutes of laying down the cement, you had used $\frac{1}{5}$ of the bag. What is the rate you are laying cement in bags per hour? What is the unit rate?

e.   Write an equation that represents the relationship between the number of bags used, y, in x hours.

f.   Your uncle is able to work faster than you. He uses 3 bags for every 2 bags you use. Is the relationship proportional? Explain your reasoning using a graph on a coordinate plane.

g.   What does (0,0) represent in terms of the situation being described by the graph created in part (f)?

h.   Using a graph, show how many bags you would have used if your uncle used 18 bags.