EUREKA MATH™ TIPS FOR PARENTS

KEY CONCEPT OVERVIEW

Welcome to Grade 7! The first topic of Module 1 focuses on ratios and **proportional relationships.** Students identify equivalent ratios, rates, and **unit rates.** They formally define a proportional relationship and analyze relationships presented in ratio **tables**, **graphs** in the coordinate plane, and word problems.

You can expect to see homework that asks your child to do the following:

- Write equivalent ratios and determine whether given ratios are equivalent.
- Compare rates by calculating the unit rate.
- Construct tables and graphs.
- Analyze tables and graphs to determine whether or not they represent proportional relationships.

SAMPLE PROBLEM *(From Lesson 6)*

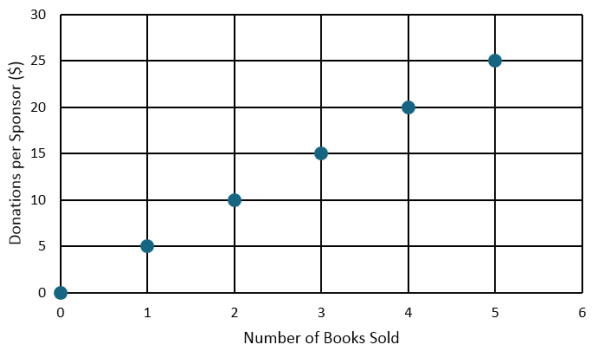
Problem:

The school library receives money for every book sold at the school's book fair. Create a table, and then graph and explain if the quantities are proportional to each other.

Table:

Number of Books Sold	*Donations per Sponsor ($)*
1	5
2	10
3	15
4	20
5	25

Graph:



Proportional or Not? Explanation:

The quantities are proportional to each other because the points appear on a line that goes through the origin. Each book sold brings in $5.00, no matter how many books are sold.

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are just a few tips to help you get started:

- When shopping for groceries or browsing a supermarket ad, have your child calculate the unit prices—for example, the price per gram or per pound—of various items. (If you are in the store, determine whether your child's answer matches the unit price displayed on the shelf.) Ask which product is the best value based on unit price.
- When following a recipe, discuss what would happen if you made more or less of it. Ask your child to calculate how the other ingredient measurements would change if, for example, you increased the amount of sugar from two cups to four cups, or reduced the amount of butter from six tablespoons to two tablespoons.
- To help your child prepare for Topic B, practice dividing whole numbers and calculating unit rates.

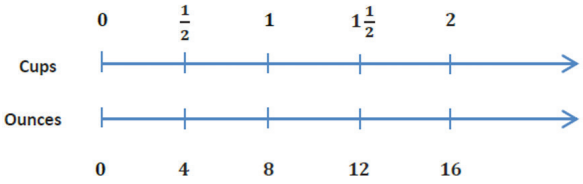
TERMS

Proportional relationships: Relationship in which two quantities—for example, the weight of an item and its price—increase or decrease at the same rate. If one pound of tomatoes sells for four dollars (1:4) and two pounds sell for eight dollars (2:8), the weight and price are proportional; each measure in the second quantity (4 and 8), when divided by its corresponding measure in the first quantity (1 and 2), produces the same number (4), called a constant of proportionality.

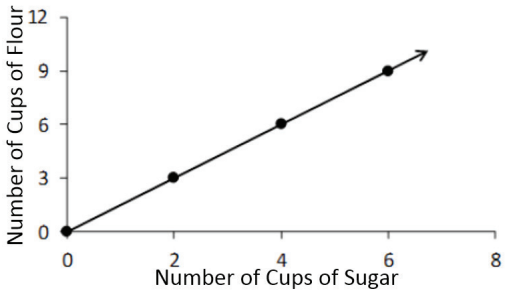
Unit rate: The numerical part of a rate measurement (e.g., in the rate 45 mph, the unit rate is 45).

MODELS

Double Number Lines



Proportional Relationship on a Graph



Proportional Relationship in a Table

x, Weight (ounces)	12.5	10	5	8
	• 0.40	• 0.40	• 0.40	• 0.40
y, Cost ($)	5	4	2	3.20

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KEY CONCEPT OVERVIEW

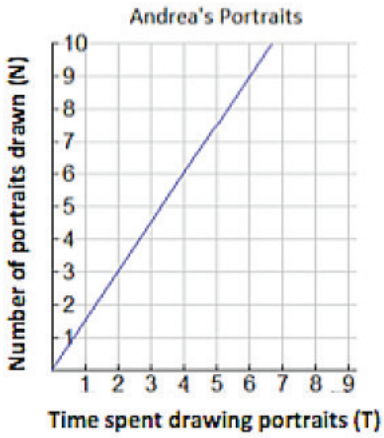
In Topic B, students expand their knowledge of proportional relationships by learning how to calculate the **constant of proportionality.** They will identify this value in tables, graphs, and equations. Students will use the constant of proportionality to write equations and solve real-world problems. Finally, students will use their knowledge of proportional relationships to further analyze graphs.

You can expect to see homework that asks your child to do the following:

- Calculate the constant of proportionality and use this value to write equations.
- Use the constant of proportionality, the unit rate, or an equation to answer questions.
- Identify the constant of proportionality on a table or graph, and/or in an equation.
- Given a context, explain the meaning of different points on a graph.

SAMPLE PROBLEM *(From Lesson 8)*

Andrea is a street artist in New Orleans. She draws caricatures (cartoon-like portraits) of tourists. People have their portraits drawn and come back later to pick them up from her. The graph below shows the relationship between the number of portraits she draws and the amount of time in hours she needs to draw the portraits.



a. Write several ordered pairs from the graph, and explain what each ordered pair means in the context of this graph.

The ordered pair **(4, 6)** ***means that in*** **4** ***hours, she can draw*** **6** ***portraits.***

The ordered pair **(2, 3)** ***means that in*** **2** ***hours, she can draw*** **3** ***portraits.***

The ordered pair $(1, 1\frac{1}{2})$ ***means that in*** **1** ***hour, she can draw*** $1\frac{1}{2}$ ***portraits.***

SAMPLE PROBLEM *(continued)*

b. Write several equations that would relate the number of portraits drawn to the time spent drawing the portraits.

Let T represent the time in hours, and N represent the number of portraits drawn.

$N = \frac{3}{2}T$

$N = \frac{6}{4}T$

c. Determine the constant of proportionality, and explain what it means in this situation.

The constant of proportionality is $\frac{3}{2}$, which means that Andrea can draw 3 portraits in 2 hours or can complete $1\frac{1}{2}$ portraits in 1 hour.

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are just a few tips to help you get started:

- Your child can continue to find the unit prices of various items. Encourage your child to also explain the connection between unit rate and constant of proportionality. For example, if the price is three dollars per pound, the unit rate is three. Therefore, the constant of proportionaity is also three because $3 \times (\textit{number of pounds}) = \textit{price}$.
- Write an equation in the form of $y = kx$, where you replace k with any whole number; for example, $y = 7x$. Ask your child to create a table that represents a proportional relationship in which the constant of proportionality is smaller than the one in your equation. For example, if your equation was $y = 7x$, the constant of proportionality on the table could be any number smaller than seven. Then have your child create a graph that represents a proportional relationship in which the constant of proportionality is larger than the one in the equation; i.e., any number larger than 7.
- In preparation for Topic C, encourage your child to practice dividing fractions, using the standard algorithm. For example: $1\frac{2}{3} \div \frac{3}{4} = \frac{5}{3} \div \frac{3}{4} = \frac{5}{3} \times \frac{4}{3} = \frac{20}{9} = 2\frac{2}{9}$ and $\frac{\frac{3}{5}}{\frac{1}{6}} = \frac{3}{5} \div \frac{1}{6} = \frac{3}{5} \times \frac{6}{1} = \frac{18}{5} = 3\frac{3}{5}$.

  There are many online practice sites. Please ask your child's teacher for links.

TERMS

Constant of proportionality: When two quantities (such as weight and price) are proportional, you always multiply the first quantity (weight) by the same number to get the second quantity (price). This number is called the constant of proportionality.

EUREKA MATH™ TIPS FOR PARENTS

KEY CONCEPT OVERVIEW

In Topic C, students apply their growing knowledge of ratios and rates to problems involving fractions. In this topic, students are expected to divide fractions in order to answer questions. Students will also solve multi-step problems that may require using models such as **tape diagrams,** ratio tables, equations, and graphs.

You can expect to see homework that asks your child to do the following:

- Divide fractions and calculate unit rates for quantities given in fractions.
- Create tables and graphs to represent proportional relationships**.**
- Write equations to represent proportional relationships.
- Solve multi-step problems, for which students may be encouraged to use a tape diagram.

SAMPLE PROBLEM *(From Lesson 12)*

Which car can travel farther on one gallon of gas?

Blue Car: travels $18\frac{2}{5}$ miles using 0.8 gallons of gas

Red Car: travels $17\frac{2}{5}$ miles using 0.75 gallons of gas

Find the unit rate:

Blue Car: $\dfrac{18\frac{2}{5}}{\frac{4}{5}} = \dfrac{\frac{92}{5}}{\frac{4}{5}} = 23$

Red Car: $\dfrac{17\frac{2}{5}}{\frac{3}{4}} = \dfrac{\frac{87}{5}}{\frac{3}{4}} = 23\frac{1}{5}$

Rate:

23 miles per gallon

$23\frac{1}{5}$ ***miles per gallon***

The red car traveled $\frac{1}{5}$ ***mile farther on one gallon of gas.***

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

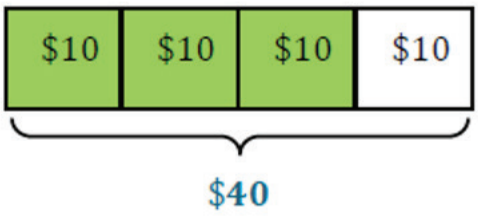
HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are just a few tips to help you get started:

- Encourage your child to practice dividing fractions; for example, $1\frac{2}{3} \div \frac{3}{4} = \frac{5}{3} \div \frac{3}{4} = \frac{5}{3} \times \frac{4}{3} = \frac{20}{9} = 2\frac{2}{9}$ and $\frac{\frac{3}{5}}{\frac{1}{6}} = \frac{3}{5} \div \frac{1}{6} = \frac{3}{5} \times \frac{6}{1} = \frac{18}{5} = 3\frac{3}{5}$. Your child can use math sites online to practice. Ask your child's teacher for the links. You might also challenge your child to a race. Write several fraction division problems on notecards, one problem per card. Lay the cards face down and flip them over one at a time, racing your child to see who can solve the problem first.
- Discuss the meaning of markdowns (discounts or sale prices), markups (the difference between the wholesale price and retail price of an item), and commissions (a percentage of an item's price, earned by the salesperson for selling the item).
- Examine sales from a local store ad. Encourage your child to calculate and compare the unit price of each item when on sale and at its regular price.

MODELS

Tape Diagram



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KEY CONCEPT OVERVIEW

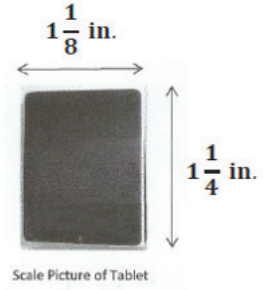
In the final topic of the module, students extend their knowledge of proportional relationships into geometry, analyzing **scale drawings** to determine whether they represent a reduction or an enlargement of the original figure or picture. In this topic, students are introduced to **scale factor,** connecting it to the now-familiar concepts of unit rate and constant of proportionality. The topic concludes with students applying their knowledge to create their own scale drawings of the top view (view from above) of their bedrooms.

You can expect to see homework that asks your child to do the following:

- Determine whether a scale drawing is an enlargement or a reduction of the original figure.
- Calculate the dimensions of a scale drawing.
- Calculate the dimensions of the original figure.
- Use knowledge of unit rate to calculate the scale factor.
- Use knowledge of scale factor to efficiently calculate the area of a scale drawing.
- Create a scale drawing of the top view of student's bedroom.

SAMPLE PROBLEM *(From Lesson 18)*

A graphic designer is creating an advertisement for a tablet. She needs to enlarge the picture given here so that 0.25 inches on the scale picture corresponds to 1 inch in the actual advertisement. What will be the length and width of the tablet in the advertisement?



Scale Picture of Tablet

Using a table:

	Scale	*Length*	*Width*
Picture, x	0.25 in.	$1\frac{1}{4}$ in.	$1\frac{1}{8}$ in.
Actual Advertisement, y	1 in.	5 in.	$4\frac{1}{2}$ in.

Using an equation:

Find the constant of proportionality, k: $k = 4$ ***(scale factor since units of measure are the same; it is an enlargement)***

To find actual length: $y = 4x$ ***(where x represents the picture measurement and y represents the actual advertisement measurement)***

$$y = 4\left(1\frac{1}{4}\right)$$
$$y = 5$$

SAMPLE PROBLEM *(continued)*

To find actual width:

$$y = 4x$$

$$y = 4\left(1\frac{1}{8}\right)$$

$$y = 4\frac{1}{2}$$

The tablet will be 5 inches by $4\frac{1}{2}$ inches in the actual advertisement.

Additional sample problems with detailed answer steps are found in the *Eureka Math Homework Helpers* books. Learn more at GreatMinds.org.

HOW YOU CAN HELP AT HOME

You can help at home in many ways. Here are just a few tips to help you get started:

- Use a store ad to find pictures of actual items you have in your home (e.g., a refrigerator or a television set). Encourage your child to measure both the picture and the actual item with a ruler or other measuring device. Using these measurements, he can determine whether the picture is a scale image of the actual item. If the picture is a scale image, challenge him to calculate the scale factor.
- Write a journal entry, poem, or rap lyrics with your child to explain the connection between rates, unit rates, proportional relationships, constants of proportionality, scale drawings, and scale factors.
- In preparation for Module 2, challenge your child to write positive and negative numbers in order on a number line. You might also write a variety of positive and negative numbers on index cards (one number per card) and encourage her to order the numbers from least to greatest. Remember to include zero, positive fractions, and negative fractions as options.

TERMS

Scale drawing: A reduction or an enlargement of an original object or picture in which the dimensions in the drawing are proportional to the corresponding dimensions in the original object or picture.

Scale factor: In a scale drawing, the constant of proportionality is called the scale factor. It can be calculated from the ratio of any length in the scale drawing to the corresponding length in the original. Multiply any dimension in the original by the scale factor to determine its size in the scale drawing. A scale factor greater than one makes the drawing an enlargement; a scale factor smaller than one makes the drawing a reduction.