North Penn School District

Elementary Math Parent Letter

Grade 6

Unit 2 – Chapter 4: Ratios and Rates

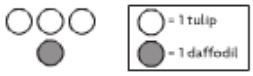
Examples for each lesson:

Lesson 4.1

Model Ratios

Daniel is growing tulips and daffodils in a pot. For every 3 tulips he plants, he plants 1 daffodil. How many daffodils will he plant if he plants 12 tulips?

Step 1 Make a model and write the ratio. The ratio of tulips to daffodils is 3:1.



Step 2 Model the number of daffodils Daniel will plant if he plants 6 tulips.

Step 3 Use the model and ratio to make a table. The table shows that for every 3 tulips, there is 1 daffodil.

Tulips	3	6	9	12
Daffodils	1	2	3	4

Step 4 Find 12 tulips on the table. The number of daffodils is 4.

Step 5 Write the new ratio. The new ratio is 12:4.

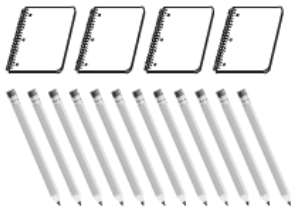
So, if Daniel plants 12 tulips, he will plant 4 daffodils.

Lesson 4.2

Ratios and Rates

A **ratio** is a comparison of two numbers by division.
Ratios can compare parts of a whole or compare one part to the whole.
A **rate** is a ratio that compares two numbers that have different units.

The picture shows a group of school supplies. One part is pencils. The other part is notebooks. Write the ratio of pencils to notebooks. Write the ratio using words, as a fraction, and with a colon.



Write the number of pencils first, and then write the number of notebooks.

12 to 4			$\frac{12}{4}$		12:4	
number of pencils	to	number of notebooks	$\frac{\text{number of pencils}}{\text{number of notebooks}}$	number of pencils	:	number of notebooks

You could also write a ratio comparing part to whole. Write the ratio of notebooks to school supplies, three ways.

4 to 16			$\frac{4}{16}$		4:16	
number of notebooks	to	number of school supplies	$\frac{\text{number of notebooks}}{\text{number of school supplies}}$	number of notebooks	:	number of school supplies

Lesson 4.3

Equivalent Ratios and Multiplication Tables

To find equivalent ratios, you can use a multiplication table or multiply by a form of 1.

Write two ratios equivalent to 10:14. Use a multiplication table.

Step 1 Find 10 and 14 in the same row.

Step 2 Look at the columns for 10 and 14.

Choose a number from each column. Make sure that the numbers you choose are in the same row. 5 and 7 30 and 42

Step 3 Write the new ratios. 5:7 30:42

×	1	2	3	4	5	6	7	8	9
1	1	2	3	4	5	6	7	8	9
2	2	4	6	8	10	12	14	16	18
3	3	6	9	12	15	18	21	24	27
4	4	8	12	16	20	24	28	32	36
5	5	10	15	20	25	30	35	40	45
6	6	12	18	24	30	36	42	48	54
7	7	14	21	28	35	42	49	56	63
8	8	16	24	32	40	48	56	64	72
9	9	18	27	36	45	54	63	72	81

Use multiplication or division.

	Multiply	Divide
Step 1 To multiply or divide by a form of 1, multiply or divide the numerator and denominator by the same number.	$\frac{10 \times 3}{14 \times 3} = \frac{30}{42}$	$\frac{10 \div 2}{14 \div 2} = \frac{5}{7}$
Step 2 Write the new ratios.	$\frac{30}{42}$	$\frac{5}{7}$

More information on this strategy is available on Animated Math Model #15.

Lesson 4.4

Problem Solving • Use Tables to Compare Ratios

Use tables of equivalent ratios to solve the problem.

Kevin's cookie recipe uses a ratio of 4 parts flour to 2 parts sugar. Anna's recipe uses 5 parts flour to 3 parts sugar. Could their recipes make the same cookies?

Read the Problem	Solve the Problem
What do I need to find? I need to find out if the ratio of _____ to _____ in Kevin's recipe is equivalent to the ratio in _____.	Make a table of equivalent ratios for each recipe. **Kevin's Recipe** **Flour** 4 8 12 16 20 **Sugar** 2 4 6 8 10 **Anna's Recipe** **Flour** 5 10 15 20 25 **Sugar** 3 6 9 12 15 Find an amount of flour that is in both tables. _____ Write the ratio for Kevin's recipe. $\frac{20}{\square}$ Write the ratio for Anna's recipe. $\frac{20}{\square}$ Are the ratios the same? _____ So, their recipes _____ make the same cookies.
What information do I need to use? I will use the _____ of _____ to _____.	
How will I use the information? I will make _____ to compare the _____.	

More information on this strategy is available on Animated Math Model #15.

Lesson 4.5

Algebra • Use Equivalent Ratios

You can find equivalent ratios by using a table or by multiplying or dividing the numerator and denominator by the same number.

Kate reads 5 chapters in 2 hours. At this rate, how many chapters will she read in 6 hours?

Step 1 Make a table of equivalent ratios.

		$5 \cdot 2$	$5 \cdot 3$
Chapters read	5	10	15
Time (hours)	2	4	6
		$2 \cdot 2$	$2 \cdot 3$

Step 2 Find 6 hours in the table. Find the number of chapters that goes with 6 hours: 15

Step 3 Write the new ratio: $\frac{15}{6}$

The ratios $\frac{5}{2}$ and $\frac{15}{6}$ are equivalent ratios. So, Kate will read 15 chapters in 6 hours.

Julian runs 10 kilometers in 60 minutes. At this pace, how many kilometers can he run in 30 minutes?

Step 1 Write equivalent ratios with a missing value. $\frac{10}{60} = \frac{\blacksquare}{30}$

Step 2 Divide the numerator and denominator by 2 to write the ratios using a common denominator. $\frac{10 \div 2}{60 \div 2} = \frac{\blacksquare}{30}$

The denominators are the same, so the numerators are equal to each other. $\frac{5}{30} = \frac{\blacksquare}{30} \rightarrow \blacksquare = 5$

So, Julian can run 5 kilometers in 30 minutes.

Lesson 4.6

Find Unit Rates

When comparing prices of items, the better buy is the item with a lower unit price.

Determine the better buy by comparing unit rates.

A 12-ounce box of Wheat-Os costs $4.08, and a 15-ounce box of Bran-Brans costs $5.40. Which brand is the better buy?

Step 1 Write a rate for each.

Wheat-Os $\frac{\$4.08}{12\text{ oz}}$ ← Since you are looking for the lower cost per ounce, write cost over ounce. → $\frac{\$5.40}{15\text{ oz}}$ **Bran-Brans**

Step 2 Write each rate as a unit rate.

$\frac{\$4.08 \div 12}{12\text{ oz} \div 12} = \frac{\$0.34}{1\text{ oz}}$ Divide the numerator and denominator by the number in the denominator. $\frac{\$5.40 \div 15}{15\text{ oz} \div 15} = \frac{\$0.36}{1\text{ oz}}$

Step 3 Choose the brand that costs less.

$\frac{\$0.34}{1\text{ oz}}$ $\$0.34$ is less than $\$0.36$. $\frac{\$0.36}{1\text{ oz}}$

So, Wheat-Os are the better buy.

More information on this strategy is available on Animated Math Model #15.

Lesson 4.7

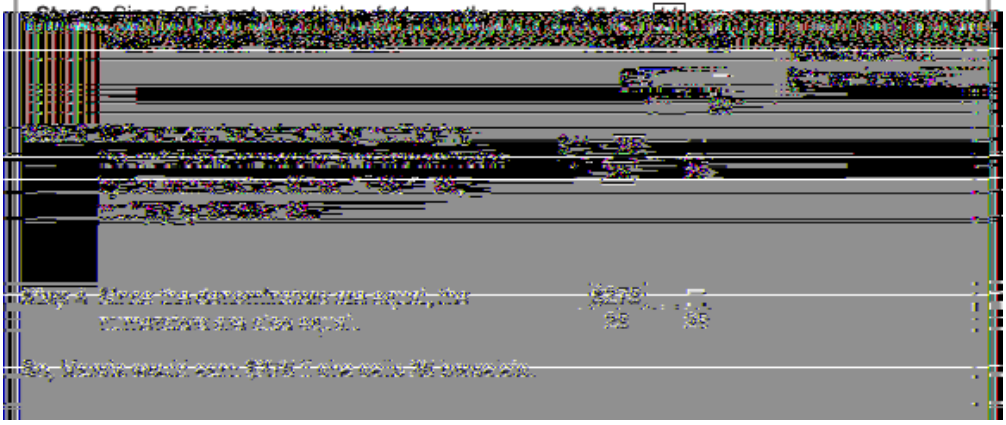
Algebra • Use Unit Rates

You can find equivalent ratios by first finding a unit rate.

Marcia makes bracelets to sell at craft fairs. She sold 14 bracelets for $154. How much could she expect to earn if she sells 25 bracelets?

Step 1 Write equivalent ratios.

$$\frac{\text{money} \rightarrow}{\text{bracelets} \rightarrow} \quad \frac{\$154}{14} = \frac{\blacksquare}{25} \quad \frac{\leftarrow \text{money}}{\leftarrow \text{bracelets}}$$



More information on this strategy is available on Animated Math Model #15.

Lesson 4.8

Algebra • Equivalent Ratios and Graphs

Jake collects 12 new coins each year. Use equivalent ratios to graph the growth of his coin collection over time.

Step 1 Write an ordered pair for the first year.
Let the *x*-coordinate represent the number of years: 1.
Let the *y*-coordinate represent the number of coins: 12.

Ordered pair: (1, 12)

Step 2 Make a table of equivalent ratios.

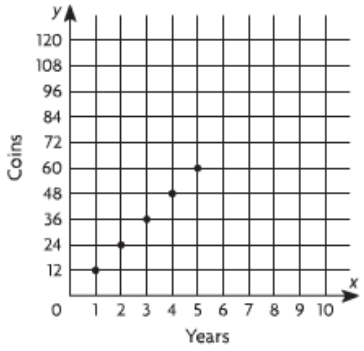
Coins	12	24	36	48	60
Year	1	2	3	4	5

Step 3 Write ordered pairs for the values in the table.

(1, 12), (2, 24), (3, 36), (4, 48), (5, 60)

Step 4 Label the *x*-axis and *y*-axis.

Step 5 Graph the ordered pairs as points.



The point (1, 12) represents the year Jake started his collection. It shows that he had 12 coins after 1 year.

Vocabulary

Equivalent ratios – ratios that name the same comparison

Rate – a ratio that compares two quantities measured in different units

Ratio – a comparison of two quantities using division

Unit rate – a rate in which the second quantity in the comparison is one unit

Coordinate plane – a plane formed by a horizontal line called the x-axis and a vertical line called the y-axis

Equivalent fractions – two or more fractions that name the same amount

Ordered pair – a pair of numbers that can be used to locate a point on the coordinate plane

x-coordinate – the first number in an ordered pair, which tells the distance to move right or left from (0, 0)

y-coordinate – the second number in an ordered pair, which tells the distance to move up or down from (0, 0)