Lesson 2: Ratios

Student Outcomes

- Students reinforce their understanding that a ratio is an ordered pair of non-negative numbers, which are not both zero. Students continue to learn and use the precise language and notation of ratios (e.g., $3\colon 2$, 3 to 2). Students demonstrate their understanding that the order of the pair of numbers in a ratio matters.
- Students create multiple ratios from a context in which more than two quantities are given. Students conceive of real-world contextual situations to match a given ratio.

Classwork

Exercise 1 (5 minutes)

Allow students time to complete the exercise. Students can work in small groups or in partners for the exercise.

Exercise 1

Come up with two examples of ratio relationships that are interesting to you.

1. *My brother watches twice as much television as I do. The ratio of number of hours he watches in a day to number of hours I watch in a day is usually $2\colon 1$.*
2. *For every 2 chores my mom gives my brother, she gives 3 to me. The ratio is $2\colon 3$.*

Allow students to share by writing the examples on the board, being careful to include some of the verbal clues that indicate a ratio relationship: *to, for each, for every.*

- What are the verbal cues that tell us someone is talking about a ratio relationship?

Exploratory Challenge (30 minutes)

Have students read and study the description of the data in the chart provided in their student materials. Ask students to explain what the chart is about (if possible, without looking back at the description). This strategy encourages students to really internalize the information given as opposed to jumping right into the problem without knowing the pertinent information.

MP.6

- Based on the survey, should the company order more pink fabric or more orange fabric?
- What is the ratio of the number of bolts of pink fabric to number of bolts of orange fabric you think the company should order?
- Someone said 5 to 3, and another person said (or my friend said) it would be 3 to 5. Are those the same? Is a ratio of 3 to 5 the same as a ratio of 5 to 3?
- Write a statement that describes the ratio relationship of this 3 to 5 ratio that we have been talking about.

Review the statements written by the students, checking and reinforcing their understanding that the ordering of the words in the description of the ratio relationship is what determines the order of the numbers in the ratio.

Allow students to work individually or in pairs to complete Exercises 2 and 3 for this Exploratory Challenge.

Exploratory Challenge

A t-shirt manufacturing company surveyed teen-aged girls on their favorite t-shirt color to guide the company's decisions about how many of each color t-shirt they should design and manufacture. The results of the survey are shown here.

Favorite T-Shirt Colors of Teen-Aged Girls Surveyed

			X			
			X			
			X	X		
X			X	X		X
X			X	X	X	X
X		X	X	X	X	X
X	X	X	X	X	X	X
Red	Blue	Green	White	Pink	Orange	Yellow

Exercises for Exploratory Challenge

1. Describe a ratio relationship, in the context of this survey, for which the ratio is $3:5$.

    The number of girls who answered orange to the number of girls who answered pink.

2. For each ratio relationship given, fill in the ratio it is describing.

Description of the Ratio Relationship (Underline or highlight the words or phrases that indicate the description is a ratio.)	Ratio
For every 7 white t-shirts they manufacture, they should manufacture 4 yellow t-shirts. The ratio of the number of white t-shirts to the number of yellow t-shirts should be…	$7:4$
For every 4 yellow t-shirts they manufacture, they should manufacture 7 white t-shirts. The ratio of the number of yellow t-shirts to the number of white t-shirts should be…	$4:7$
The ratio of the number of girls who liked a white t-shirt best to the number of girls who liked a colored t-shirt best was…	$7:19$
For each red t-shirt they manufacture, they should manufacture 4 blue t-shirts. The ratio of the number of red t-shirts to the number of blue t-shirts should be…	$1:4$
They should purchase 4 bolts of yellow fabric for every 3 bolts of orange fabric. The ratio of the number of bolts of yellow fabric to the number of bolts of orange fabric should be…	$4:3$
The ratio of the number of girls who chose blue or green as their favorite to the number of girls who chose pink or red as their favorite was …	$6:6$ *or* $1:1$
Three out of every 26 t-shirts they manufacture should be orange. The ratio of the number of orange t-shirts to the total number of t-shirts should be…	$3:26$

3. For each ratio given, fill in a description of the ratio relationship it could describe, using the context of the survey.

Description of the Ratio Relationship (Underline or highlight the words or phrases that indicate your example is a ratio.)	Ratio
They should make 4 yellow t-shirts <u>for every</u> 3 orange t-shirts. The ratio of the number of yellow t-shirts <u>to</u> the number of orange t-shirts should be…	4 to 3
They should make 3 orange t-shirts <u>for every</u> 4 blue t-shirts. The ratio of the number of orange t-shirts <u>to</u> the number of blue t-shirts should be…	$3:4$
<u>For every</u> 19 colored t-shirts, there should be 7 white t-shirts. The ratio of the number of colored t-shirts <u>to</u> the number of white t-shirts should be…	$19:7$
7 <u>out of</u> 26 t-shirts should be white. The ratio of the number of white t-shirts <u>to</u> the number of total t-shirts should be…	7 to 26

If time permits, allow students to share some of their descriptions for the ratios in Exercise 3.

Closing (5 minutes)

▪ Are the ratios $2:5$ and $5:2$ the same? Why or why not?

Lesson Summary

- ▪ Ratios can be written in two ways: A to B or $A:B$.

- ▪ We describe ratio relationships with words, such as *to*, *for each*, *for every*.

- ▪ The ratio $A:B$ is not the same as the ratio $B:A$ (unless A is equal to B).

Exit Ticket (5 minutes)

Name _____   Date_____

Lesson 2: Ratios

Exit Ticket

Give two different ratios with a description of the ratio relationship using the following information:

There are 15 male teachers in the school. There are 35 female teachers in the school.

Exit Ticket Sample Solutions

Give two different ratios with a description of the ratio relationship using the following information:

> There are 15 male teachers in the school. There are 35 female teachers in the school.

Possible solutions:

- *The ratio of the number of male teachers to the number of female teachers is* $15:35$.

- *The ratio of the number of female teachers to the number of male teachers is* $35:15$.

- *The ratio of the number of female teachers to the total number of teachers at the school is* $35:50$.

- *The ratio of the number of male teachers to the total number of teachers at the school is* $15:50$.

*Please note that some students may write other equivalent ratios as answers. For example, $3:7$ *is equivalent to* $15:35$.

Problem Set Sample Solutions

1. **Using the floor tiles design shown below, create** 4 **different ratios related to the image. Describe the ratio relationship and write the ratio in the form** $A:B$ **or the form** A **to** B.
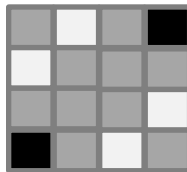
   For every 16 *tiles, there are* 4 *white tiles.*

   The ratio of the number of black tiles to the number of white tiles is 2 *to* 4.

   (Answers will vary.)

2. **Billy wanted to write a ratio of the number of apples to the number of peppers in his refrigerator. He wrote** $1:3$.
   Did Billy write the ratio correctly? Explain your answer.

   Billy is incorrect. There are 3 *apples and* 1 *pepper in the picture. The ratio of the number of apples to the number of peppers is* $3:1$.