

Overview and Connection to the Culminating Project

In this Learning Task, students will focus on measurement and conversion of distances between important places at their tour location. They will estimate the walking time between their tour location, school, and neighborhood, and share the ways that distance and time are used in tour examples from Learning Task 1 and students' lives (google map directions, etc.). Students will learn to show equivalency between ratios in various ways and eventually decide which of those ways works best for them.

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NOTE

The project preparation activities in this Learning Task are brief so that more time can be spent on mini-lessons and curricular connections.

Learning Objectives

Students will be able to

- Represent ratios in a variety of ways (words, fraction, double number line, tape diagram, etc.).
- Demonstrate whether or not ratios are equivalent.
- Use ratios to convert units of measurement.
- Collaborate with peers.
- Explain how their tour participants go to different locations in measured distances that must be converted using the academic language of ratios.

Driving Question

• How can ratios help us create maps and tours of our communities?

Assessment

Check for Understanding • Equivalent Ratios

Timeline

Lesson 1 • Ratios

Lesson 2 • Measurement Conversion

Check for Understanding • Equivalent Ratios

Materials, Supplies, and Technology

- Computer to use Google Maps
- Copies of Check for Understanding Equivalent Ratios (see Assessments and Handouts)

LESSON 1

RATIOS

WARM-UP

Multiplication and Division

• Have students work on the warm-up activity individually. 6 × 4 = **24** 4 × 6 = **24** 24 ÷ 6 = **4** 24 ÷ 4 = 6 Show how you know: How many times bigger is 24 than 6? • 4 times How many times bigger is 24 than 4? 6 times How many times bigger is 30 than 10? • 3 times How many times bigger is 75 than 15? 5 times How many times bigger is 14 than 8? 1.75 times STUDENT EDITION

LESSON 1 • RATIOS

PROJECT ACTIVITY

Getting from Place to Place

- Make sure that students choose a map that has a scale.
- Have students complete the activity in their Student Edition. Tell students that they will have time to finish this activity in the next lesson.

This is an example of a map from <u>Google Maps</u>. You will use <u>Google Maps</u> to find distances in your tour.

Choose three of the important places that you chose in the previous Learning Task to answer the questions below.

Place A	Place B	Place C
Answers will vary.		

1. Complete the table below. First, convert miles to feet (you can use the "measure distance" tool in <u>Google</u> <u>Maps</u> to do this). Then use Google Maps to find the distances between Places A, B, and C in feet and miles.

Miles	Feet	
1	5,280	
2	10,560	
4	21,120	
10	52,800	
12.5	66,000	
(distance from Place A to Place B)	Answers will vary.	
distance from Place B to Place C)	Answers will vary.	
(distance from Place C to Place A)	Answers will vary.	

STUDENT EDITION

LESSON 1 • RATIOS

- 2. What connection(s) or patterns do you notice in the table? Answers will vary.
- 3. How can you figure out how many feet are in *any* number of miles? *Multiply the number of miles by 5,280.*
- 4. Some tours provide distances using the metric system. Complete the table below. Use the distances in feet that you found in question 1.

Feet	Meters
1	0.3048
2	0.6096
4	1.2192
10	3.048
12.5	3.81
(distance from Place A to Place B)	Answers will vary.
(distance from Place B to Place C)	
distance from Place C to Place A)	

5. Create a double number line to show the ratio connection between feet and meters.



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LESSON 1 • RATIOS

- 6. Represent the ratio connection between feet and meters using a different method (for example, a picture, coordinate plane, words, or something else). Answers will vary. Here is one example. feet meters 1 0.3048 2 0.6096 4 1.2192 10 3.048 12.5 3.81 7. Which way(s) of representing the ratio connection between feet and miles did you find most useful? Why? Is this representation also the most useful for comparing feet and meters? Why or why not? Answers will vary. STUDENT EDITION
 - As students work through the activity or discuss their answers, make sure that you explicitly discuss the concept of *equivalency* and *equivalent ratios*. These terms are used in the Check for Understanding at the end of the Learning Task.

Math Curricular Connections

California DOE 2016 Mathematics Framework:

Khan Academy: Intro to ratios

Engage NY: Module 1, Topics A and B

Learnzillion: Applying ratio reasoning to convert measurement units



LESSON 2

MEASUREMENT CONVERSION

WARM-UP

Ratios

• Have students work on the warm-up activity individually.

The ratio of cats to dogs in Mr. Malamut's house is 3 : 1.

Answer the following questions. Show how you know.

1. If Mr. Malamut has 9 cats, how many dogs does he have?

3: 1 = 9: 3 Mr. Malamut will have 3 dogs if he has 9 cats.

2. If Mr. Malamut has 9 dogs, how many cats does he have?

3 : 1 = 27 : 9 Mr. Malamut will have 27 cats if he has 9 dogs.

If Mr. Malamut has 40 pets, how many cats does he have?
Mr. Malamut will have 30 cats and 10 dogs if he has 40 pets.

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PROJECT ACTIVITY

Getting from Place to Place

• Have students continue to work on the Getting from Place to Place activity to be used with Ways of Representing Ratios Reference Sheet.

Continue working on the Getting from Place to Place activity from Learning Task 2, Lesson 1.

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Math Curricular Connections

Mathsnacks: Bad Date (ratios video) Mathsnacks: Ratio Rumble game Lure of the Labyrinth: Employee Cafeteria game Engage NY: Module 1, Topic A Engage NY: Ratios Khan Academy: Intro to ratios Learnzillion: Reason with ratios

LESSON 2 • MEASUREMENT CONVERSION

CHECK FOR UNDERSTANDING

Equivalent Ratios

• Distribute the Learning Task 2 assessment—Check for Understanding • Equivalent Ratios.

Determine whether each set of ratios below are equivalent or not. Show how you know.

1. Number of words typed to minutes

Words Typed	85	170	240	340
Minutes	1	2	3	4

The ratio of words to minutes is 85 to 1. At 3 minutes, the number of words should be 255. So all these ratios are not equivalent.

2. Cups of flour to cakes



The ratio of cups of flour to number of cakes is 6 : 1. For each number of cakes, the cups of flour is 6 times, so the ratios are equivalent.

- 3. Miles traveled to hours
 - 2 hours 1 mile
 - 5 hours 4 miles
 - 8 hours 7 miles
 - 11 hours 10 miles

If the ratio of hours to miles is 2 to 1, then in 5 hours the miles traveled should be 2.5 miles; in 8 hours the miles traveled should be 4 miles; and in 11 hours the miles traveled should be 5.5 miles — thus the ratios are not equivalent.

HANDOUTS AND ASSESSMENTS