

ACHIEVE THE CORE

Ratios and Rates

6.RP.A Application Mini-Assessment by Student Achievement Partners

OVERVIEW

This mini-assessment is designed to illustrate some of the expectations of cluster 6.RP.A, which sets an expectation for understanding ratio concepts and using ratio reasoning to solve problems. This mini-assessment is designed for teachers to use either in the classroom, for self-learning, or in professional development settings to:

- Evaluate students' understanding of 6.RP.A in order to prepare to teach this material or to check for student ability to demonstrate understanding and application of these concepts;
- Gain knowledge about assessing ratio and rate application problems; and
- Illustrate CCSS-aligned assessment problems.

MAKING THE SHIFTS

This mini-assessment attends to **focus** as it addresses understanding of ratio concepts and using ratio reasoning to solve problems, which is at the heart of the grade 6 standards and a key component of the major work of the grade.¹ It addresses **coherence** by building on elementary understandings of multiplication and division. Work with ratios in grade 6 focuses on ratio and rate language; recognizing, generating, and graphing pairs of equivalent ratios; reasoning about ratio tables and comparing ratios; and solving problems using a variety of methods (see answer key for sample solution methods). In grade 7, students will extend work with ratios to rational numbers (e.g., 1/2 cup sugar for every 1/3 cup oil), proportional relationships, and solving multi-step ratio and percent problems. This mini-assessment targets the *application* aspects of cluster 6.RP.A, and addresses only one of the three elements of **rigor**.

A CLOSER LOOK

At the heart of this mini-assessment is the concept of a ratio: ratios express the relative size of two (or more) quantities and can be expressed in a variety of ways, such as "4 to 3," "4 for every 3," 4:3, or $\frac{4}{3}$ (6.RP.A.1). When two ratios express the same relative size, they are called "equivalent." In grade 6, students use their familiarity with the multiplication table to explore equivalent ratios by making ratio tables (6.RP.A.3a). Students are also first exposed in grade 6 to rates and unit rates, like paying \$5 per hamburger or walking 4 miles per hour (6.RP.A.2).

6.RP.A.
Understand ratio concepts and use ratio reasoning to solve problems.

Primary Standard Targeted

6.RP.A.3.

Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.

The majority of questions align to 6.RP.A.3 making this a mini-assessment that focuses primarily on application; however, some questions also target students' conceptual understanding of ratios and rates. Some questions include decimals to give students practice with a variety of numbers, while responding to authentic real-world application questions.

This mini-assessment is not representative of the entire 6.RP.A cluster and is intended to be used early in the grade-level work of ratio and rate reasoning.

¹ For more on the Major Work of the grade, see achievethecore.org/emphases.

Ratios and Rates Mini-Assessment

Name: _____ Date: _____

1. On a recent visit to the science museum, Cooper counted 24 adults and 30 children. What is the ratio of children to total people at the science museum?

2. A study showed that the ratio of the number of people who get their news from Facebook to the number of people who get their news elsewhere is 3:7.

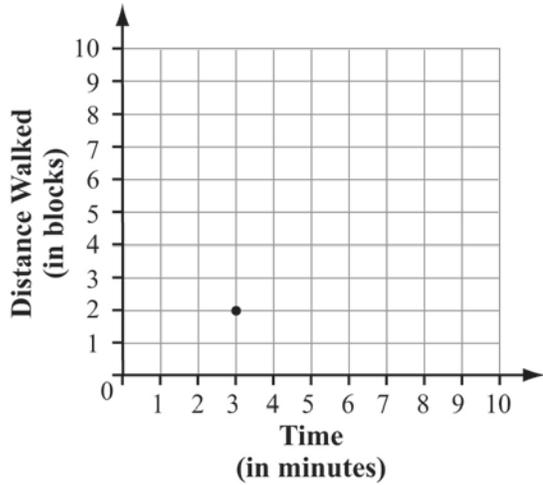
In a town of 900 people, how many people get their news from Facebook?

3. Tickets for a baseball game cost \$60 for a family of 5. Adult and youth tickets cost the same amount. Place a check mark in either the True or False column for each of the statements below.

	True	False
2 tickets cost \$24.		
For \$40, you can buy 4 tickets.		
The cost is \$12 per ticket.		
The cost for 10 tickets is \$65.		

Ratios and Rates Mini-Assessment

4. It takes Mildred about 3 minutes to walk 2 blocks. A point has been plotted in the coordinate plane below showing this. Plot another point that expresses an equivalent ratio and explain what it means.



5. Alice and Brian have cookies in a ratio of 4:3. Brian and Cori have cookies in a ratio of 6:4. What is the ratio of Alice's cookies to Cori's cookies?
6. A store has two different sizes of ice cream on sale this week. The smaller container costs \$3.87 for 48 ounces. The larger container costs \$6.42 for 128 ounces. Which ice cream costs less per ounce? Show or explain how you found your answer.

Ratios and Rates Mini-Assessment

7. Penelope likes to drink flavored water by adding liquid water enhancer. She likes it best when she mixes 0.5 teaspoon of flavor for every 8 fluid ounces of water. Below are several flavored water mixtures made by Penelope's friends.

- a. Circle all of Penelope's friends who like the same ratio of water to flavor enhancer as Penelope.

	Harry	Isabella	Jefferson	Klara	Leo	Marty
Flavor (tsp.)	8	6	5	1	4	2
Water (fl. oz.)	128	72	80	16	64	24

- b. Choose one of the answers you circled and show how you know the water has the same flavor intensity.

8. Alain is making banana bread with a recipe that uses bananas, flour, and sugar in a ratio of 6:3:2.

- a. Alain uses 3 cups of mashed bananas to make 1 loaf. How many cups of flour will he use? Show or explain how you found your answer.

- b. Erik uses Alain's recipe to make banana bread. Erik uses 6 cups of sugar in total. How many loaves does Erik make?

Ratios and Rates Mini-Assessment

9. Jenna's family is going to visit relatives for the holidays.
- After driving 72 miles, they used 3.2 gallons of gas.
 - Her family has 850 miles remaining on their road trip.
 - The gas tank in their car can hold 15 gallons.

They filled the gas tank at the start of the road trip, and plan to only stop to fill up when their gas tank nears empty. There are plenty of gas stations along the route they have chosen to drive.

How many additional stops for gas will Jenna's family need to make in order to get to their destination? Show your work or describe your approach.

6.RP.A Application Mini-Assessment – Ratios and Rates
Answer Key and Sample Solution Methods

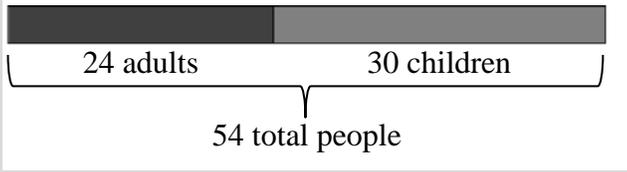
Name: _____ Date: _____

1. On a recent visit to the science museum, Cooper counted 24 adults and 30 children. What is the ratio of children to total people at the science museum? **30:54 OR equivalent ratio**

Alignment:
6.RP.A.1

Note: no work is required for full credit on this problem.

*Sample solution method using **tape diagram**:*



30 children: 54 total people

2. A study showed that the ratio of the number of people who get their news from Facebook to the number of people who get their news elsewhere is 3:7.

Alignment:
6.RP.A.3

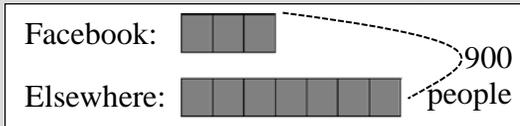
In a town of 900 people, how many people get their news from Facebook? **270**

Note: no work is required for full credit on this problem.

*Sample solution method using **tables of equivalent ratios**:*

News from Facebook	3	6	30	270
News from elsewhere	7	14	70	630
Total	10	20	100	900

*Sample solution method using **tape diagrams**:*



10 parts → 900 people

1 part → $900 \div 10 = 90$ people

3 parts → $90 \times 3 = 270$ people

3. Tickets for a baseball game cost \$60 for a family of 5. Adult and youth tickets cost the same amount. Place a check mark in either the True or False column for each of the statements below.

Alignment:
6.RP.A.2,
6.RP.A.3

	True	False
2 tickets cost \$24.	✓	
For \$40, you can buy 4 tickets.		✓
The cost is \$12 per ticket.	✓	
The cost for 10 tickets is \$65.		✓

6.RP.A Application Mini-Assessment – Ratios and Rates
Answer Key and Sample Solution Methods

7. Penelope likes to drink flavored water by adding liquid water enhancer. She likes it best when she mixes 0.5 teaspoon of flavor for every 8 fluid ounces of water. Below are several flavored water mixtures made by Penelope’s friends.

Alignment:
6.RP.A.2,
6.RP.A.3

- a. Circle the flavored water mixtures that Penelope would like best.

	Harry	Isabella	Jefferson	Klara	Leo	Marty	Penelope
Flavor (tsp.)	8	6	5	1	4	2	0.5
Water (fl. oz.)	128	72	80	16	64	24	8

Note: students will likely use the given table to look for equivalent ratios, starting from Penelope’s ratio of 0.5:8 and creating a unit rate of 1 teaspoon per 16 fluid ounces (see rightmost column).

- b. Choose one of the answers you circled and show how you know the water has the same flavor intensity.

Sample explanation:

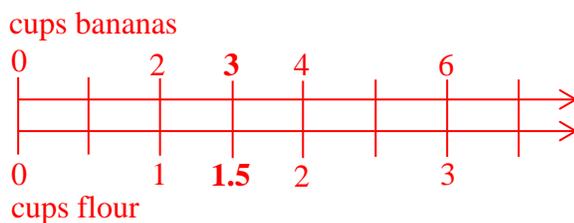
I know that Leo’s flavored water has the same intensity as Penelope’s because I can multiply the amount of flavor used ($0.5 \times 8 = 4$) and the amount of water used ($8 \times 8 = 64$) by the same factor (8).

8. Alain is making banana bread with a recipe that uses bananas, flour, and sugar in a ratio of 6:3:2.

Alignment:
6.RP.A.3

- a. Alain uses 3 cups of mashed bananas to make 1 loaf. How many cups of flour will he use? Show or explain how you found your answer. **1.5 cups of flour for 1 loaf**

Sample solution using a double number line diagram:



- b. Erik uses Alain’s recipe to make banana bread. Erik uses 6 cups of sugar in total. How many loaves does Erik make?

Since I know Alain’s recipe uses 3 cups of mashed bananas per loaf, and the ratio of bananas to sugar is 6:2, I know Alain’s recipe will use 1 cup of sugar per loaf. So, if Erik uses 6 cups of sugar total, he will make 6 loaves.

6.RP.A Application Mini-Assessment – Ratios and Rates
Answer Key and Sample Solution Methods

9. Jenna's family is going to visit relatives for the holidays.

Alignment:
6.RP.A.3

- After driving 72 miles, they used 3.2 gallons of gas.
- Her family has 850 miles remaining on their road trip.
- The gas tank in their car can hold 15 gallons.

They filled the gas tank at the start of the road trip, and plan to only stop to fill up when their gas tank nears empty. There are plenty of gas stations along the route they have chosen to drive.

How many additional stops for gas will Jenna's family need to make in order to get to their destination? Show your work or describe your approach.

Sample solution using estimation:

- Since the family used about 3 gallons of gas to drive about 75 miles, they can drive about 100 miles on 4 gallons of gas.
- So, to drive another 850 miles, they need another 34 gallons of gas.
- In total, this would mean 37-38 gallons of gas would be used, requiring 2 additional stops for gas.

Sample solution using precise calculation:

- For the first 72 miles, their fuel economy was $72 \div 3.2$, or 22.5, miles per gallon.
- With 850 miles remaining, they will use an additional $850 \div 22.5$, or $37.\bar{7}$, gallons of gas.
- In total, they will have used $37.\bar{7} + 3.2$, or $40.9\bar{2}$ gallons of gas.
- Since they started with 15 gallons, they need an additional $25.9\bar{2}$ gallons, so they will need to make 2 additional stops for gas.