

Student Guide

Ratios, Recipes, and Proportions
(SG pp. 519–523)

Questions 1–25

1. A.* $\frac{1c}{2c}$
B.* 1 cup peanuts : 2 cups sugar
2. A. $\frac{2c}{1c}$
B. 2 cups sugar : 1 cup peanuts
3. 8 cups sugar; There is always twice as much sugar as peanuts.
4. 12 cups sugar; There is always three times as much sugar as peanuts.
5. 2 cups; $\frac{1c}{3c} = \frac{2c}{6c}$
- 6.* 10 cups sugar; $\frac{1c}{2c} = \frac{5c}{10c}$
7. A.* 5 c orange juice : 2 c lime soda
B.* $\frac{5c \text{ orange juice}}{2c \text{ lime soda}}$
- 8.* Answers may vary. Possible responses include:
As you double the number of cups of lime soda, you double the orange juice. The numbers of cups of lime soda are all multiples of 2 and the numbers of cups of orange juice are all multiples of 5.
9. A. 10 cups; $\frac{J}{S} = \frac{5c}{2c} = \frac{10c}{4c}$
B. 8 cups; $\frac{J}{S} = \frac{5c}{2c} = \frac{20c}{8c}$
- 10.* Shannon should use a point graph. See Figure 3 in the lesson.
- 11.* The graph is a straight line that goes up as we read from left to right and it meets the vertical axis at the point (0, 0).

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1. Write the ratio of peanuts to sugar in the recipe for Peanut Brittle Number Two.
 - A. Write this ratio as a fraction.
 - B. Write this ratio with a colon.
2. Write the ratio of sugar to peanuts in the recipe for Peanut Brittle Number Two.
 - A. Write this ratio as a fraction.
 - B. Write this ratio with a colon.
3. David and Edward will make Peanut Brittle Number Two for the whole class. They will use 4 cups of peanuts. How much sugar do they need? Explain how you solved this problem.
4. Felicia and Arti will make Peanut Brittle Number One. They will use 4 cups of peanuts. How much sugar do they need? Explain how you solved this problem.

Mr. Moreno asks the students to show their solutions using equivalent ratios.

Felicia writes: $\frac{1 \text{ cup of peanuts}}{3 \text{ cups of sugar}} = \frac{4 \text{ cup of peanuts}}{12 \text{ cups of sugar}}$

Arti writes: $\frac{P}{S} = \frac{1 \text{ cup}}{3 \text{ cups}} = \frac{4 \text{ cups}}{3 \text{ cups}}$

A **proportion** is a statement that two ratios are equivalent. So, Felicia's and Arti's number sentences are proportions.

5. If Felicia and Arti use 6 cups of sugar to make Peanut Brittle Number One, how many cups of peanuts do they need? Show your solution using a proportion:

$$\frac{1 \text{ cup of peanuts}}{3 \text{ cups of sugar}} = \frac{? \text{ cup of peanuts}}{6 \text{ cups of sugar}}$$
6. If David and Edward use 5 cups of peanuts to make Peanut Brittle Number Two, how much sugar do they need? Show your solution using a proportion:

$$\frac{1 \text{ cup of peanuts}}{2 \text{ cups of sugar}} = \frac{5 \text{ cups of peanuts}}{? \text{ cups of sugar}}$$

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Orange Punch

Shannon plans to make punch using a family recipe. She mixes 5 parts orange juice with 2 parts lime soda. For example, if she uses 5 cups of orange juice, she uses 2 cups of lime soda. Shannon makes a chart so that the other members of the class can help her make different amounts of punch.

Orange Punch	
S Lime Soda (in cups)	J Orange Juice (in cups)
2	5
4	10
8	20

7. A. Write the ratio of orange juice to lime soda with a colon.
B. Write this ratio as a fraction.
8. Describe any patterns you see in the table.
9. A. If Shannon uses 4 cups of lime soda, how many cups of orange juice does she use? Write your solution as a proportion:

$$\frac{5 \text{ cups of juice}}{2 \text{ cups of soda}} = \frac{? \text{ cups of juice}}{4 \text{ cups of soda}}$$
- B. If Shannon uses 20 cups of orange juice, how many cups of lime soda does she use? Write your solution as a proportion.
10. Shannon can also use a graph to help her make different amounts of punch. Make a graph of the data in the table.
 - Plot the amount of lime soda on the horizontal axis. Scale the horizontal axis from 0 to at least 30.
 - Plot the amount of orange juice on the vertical axis. Scale the vertical axis from 0 to at least 40.
 - Decide whether Shannon should use a point graph or a bar graph.
 - If you graph points that form a line, use your ruler to fit a line to the points. Extend your line in both directions.
11. Describe your graph. (Where does it meet the vertical axis? Is it a straight line or a curve? Does it go up or down as you read from left to right?)

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*Answers and/or discussion are included in the lesson.

12. A. Use your graph to find the number of cups of orange juice to mix with 6 cups of lime soda.
 B. Use your graph to find the number of cups of lime soda to mix with 35 cups of orange juice.



Using the graph to find an amount of soda or juice that lies between two data points you plotted on the graph is called **interpolation**. "Inter" means between points.

Using the graph to find an amount of soda or juice that lies beyond the points you plotted is called **extrapolation**. "Extra" means beyond or outside.

13. A. Did you use interpolation or extrapolation to answer Question 12A?
 B. Did you use interpolation or extrapolation to answer Question 12B?
14. A. Choose a point on the line and circle it. Use this point to write a ratio of the amount of orange juice to the amount of lime soda.
 B. Circle two more points on the line and use them to write ratios of the amount of orange juice to the amount of lime soda.
 C. Are the three ratios equal? How do you know?
15. A. Find the number of cups of lime soda to mix with 25 cups of orange juice. How did you solve this problem?
 B. One way to solve this problem is to use a proportion.

$$\frac{5 \text{ cups of juice}}{2 \text{ cups of soda}} = \frac{25 \text{ cups of juice}}{? \text{ cups of soda}}$$

 C. Show how to solve 16A with the graph you made in Question 10.
16. A. Use a proportion to find the number of cups of orange juice to mix with 18 cups of lime soda.
 B. Use a proportion to find the number of cups of lime soda to mix with 55 cups of orange juice.
 C. Show how to solve 16A with the graph you made in Question 10.

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12. A.* 15 cups; See Figure 3 in the lesson.
 B.* 14 cups; See Figure 3 in the lesson.
13. A.* Interpolation
 B.* Extrapolation
14. A–B.* See Figure 3 in the lesson.
 C.* Yes; The three ratios are all equal since they all reduce to $\frac{5c}{2c}$.
15. A.* 10 cups; Students can use the graph, the patterns in the table, or equal ratios.
 B.* $\frac{J}{S} = \frac{5c}{2c} = \frac{25c}{10c}$
16. A. 45 cups; $\frac{J}{S} = \frac{5c}{2c} = \frac{?}{18c}; ? = 45c$
 B. 22 cups; $\frac{J}{S} = \frac{5c}{2c} = \frac{55c}{?}; ? = 22c$
 C.* See Figure 3 in Lesson.
- 17.* Strategies will vary. $2\frac{1}{2}$ cups; $5 \div 2 = 2\frac{1}{2}$
18. Strategies will vary. $7\frac{1}{2}$ cups soda; $\frac{5}{2} = \frac{15}{6} = \frac{7.5}{3}$

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Strategies for Shannon

17. Help Shannon find the number of cups of orange juice to mix with 1 cup of lime soda.

Shannon: If I use 5 cups of orange juice with 2 cups of lime soda, how much orange juice will I need for 1 cup of lime soda?

Michael: Since 1 cup is $\frac{1}{2}$ of 2 cups, you can halve the orange too. $\frac{1}{2}$ of 5 is 2.5.

Irma: You could use a ratio to figure this out.

$$\begin{array}{ccc} & +2 & \\ \frac{5 \text{ cups of orange juice}}{2 \text{ cups of soda}} & = & \frac{? \text{ orange juice}}{1 \text{ cups of soda}} \\ & +2 & \end{array}$$

Use the **Finding Equivalent Fractions and Ratios Menu** in the Reference section.

18. Help Shannon find the number of cups of orange juice to mix with 3 cups of lime soda. Show how you solved this problem.

Jacob: Shannon could use what she found: 2.5 cups of orange juice to 1 cup of soda.

$$\begin{array}{ccc} & \times 3 & \\ \frac{2.5 \text{ cups of orange juice}}{1 \text{ cups of soda}} & = & \frac{? \text{ cups of orange juice}}{3 \text{ cups of soda}} \\ & \times 3 & \end{array}$$

Jackie: Shannon could use the original recipe to set up a proportion.

$$\begin{array}{ccc} \frac{5 \text{ cups of orange juice}}{2 \text{ cups of soda}} & = & \frac{? \text{ cups of orange juice}}{3 \text{ cups of soda}} \\ & +2 & \\ \frac{5}{2} & = & \frac{15}{6} = 2.5 \\ & +2 & \end{array}$$

7.5 cups of orange juice to 3 cups of soda.

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*Answers and/or discussion are included in the lesson.

19. A.* The ratio, $\frac{J}{S} = \frac{4\text{ c}}{10\text{ c}}$, is not equal to $\frac{5\text{ c}}{2\text{ c}}$. Since Shannon's sister did not use the ingredients in the same proportion as Shannon, the punch will not taste the same. She was supposed to use 25 cups of orange juice with 10 cups of lime soda for the usual recipe.

B.* The point does not lie on the line. See Figure 3 in Lesson.

20. A.* 7 cups

B.* $\frac{\text{amount of orange juice}}{\text{total amount of punch}} = \frac{5\text{ c}}{7\text{ c}}$

21. A. 9 ounces of flour : 4 ounces of butter

B. $\frac{9\text{ ounces}}{4\text{ ounces}}$

22. 8 ounces; $\frac{F}{B} = \frac{9\text{ ounces}}{4\text{ ounces}} = \frac{18\text{ ounces}}{?}$; ? = 8 ounces

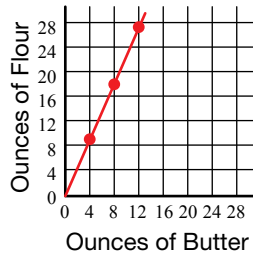
23. 27 ounces;
 $\frac{F}{B} = \frac{9\text{ ounces}}{4\text{ ounces}} = \frac{?}{12\text{ ounces}}$; ? = 27 ounces

24.*

Peanut Cake Flour to Butter

Flour	Butter
9 ounces	4 ounces
18 ounces	8 ounces
27 ounces	12 ounces

Peanut Cake Flour to Butter



25. A. Problem-solving strategies will vary.

Possible response: $9 \div 2 = 4\frac{1}{2}$ and $4 \div 2 = 2$

- B. 4.5 ounces of flour : 2 ounces of butter

19. Shannon's little sister mixed 4 cups of orange juice with 10 cups of lime soda. When Shannon drank the punch, she thought it tasted funny.
 A. Why did the punch taste different from the usual recipe?
 B. Plot a point for 10 cups of lime soda and 4 cups of orange juice on your graph. Does the point lie on the line?
20. A. If Shannon follows the recipe and uses 5 cups of orange juice, how many total cups of punch will she make?
 B. Write a ratio comparing the number of cups of orange juice to the total number of cups of punch.

Peanut Cake

✓ **Check-In: Questions 21-25**

Jessie and Jacob will make peanut cakes for the whole class:

No. 30, Peanut Cake Number Two

- 9 ounces flour 1 teaspoon vanilla
 4 ounces butter $\frac{1}{2}$ teaspoon salt
 4 eggs 1 teaspoon baking powder
 1 cup sugar 4 ounces of chopped peanuts

Sift flour, salt, and baking powder together. Cream the butter and sugar. Add the vanilla, chopped nuts, and yolks of eggs, well beaten. Add flour, then whipped whites, and beat well. Bake in a shallow pan in medium oven.

21. A. Write the ratio of the amount of flour in the peanut cake to the amount of butter using a colon.
 B. Write the ratio of the amount of flour to the amount of butter as a fraction.
22. If they use 18 ounces of flour, how many ounces of butter should they use? Write a proportion to help you solve this problem.
23. If they use 12 ounces of butter, how much flour should they use? Write a proportion to help you solve this problem.
24. Jessie and Jacob can also make a table and graph to help them find the ratios of flour to butter for different amounts of peanut cakes. Use *Centimeter Grid Paper* to make a table and graph using the data points of flour to butter given in Questions 21, 22, and 23. Draw a best-fit line.
25. If Jessie and Jacob cut the peanut cake recipe in half, how much flour and how much butter will they use?
 A. Describe your strategy for solving this problem.
 B. Write your solution as a ratio.

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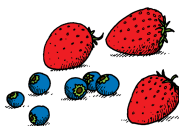
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Homework

Fruit Salad

Brandon has a fruit salad recipe.

Fruit Salad	Serves 20
2 cups strawberries	
3 cups blueberries	
5 cups watermelon	



- Write a ratio comparing the amount of strawberries to the amount of blueberries in the fruit salad using words.
- Write a ratio comparing the amount of blueberries to the amount of watermelon in the fruit salad using a colon.
- Write a ratio comparing the amount of strawberries to the amount of watermelon in the fruit salad using a fraction.
- Write a ratio using a fraction that compares the amount of strawberries to the total amount of fruit salad. (Hint: How many cups of fruit salad will this recipe make?)
- How much of each ingredient will Brandon need for each situation?
 - Serve 40 members of the Sport Club.
 - Serve 5 of his friends.
 - He only has 1 cup of strawberries.
- Write a proportion for each situation.
 - The amount of watermelon used to serve 40 members of the Sport Club.
 - The number of people he can serve with one cup of strawberries.
 - The number of cups of salad he can make with $\frac{1}{2}$ cup of blueberries.

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Homework Questions 1–8

- The ratio of the amount of strawberries to the amount of blueberries is 2 cups to 3 cups.
- 3 cups of blueberries : 5 cups of watermelon
- 2 cups of strawberries : 5 cups of watermelon
- $\frac{2 \text{ cups of strawberries}}{10 \text{ cups of fruit salad}}$
-

Fruit Salad Recipe Table

	Total Amount	People Served	Blueberries	Strawberries	Watermelon
	10 cups	20	3 cups	2 cups	5 cups
A.	20 cups	40	6 cups	4 cups	10 cups
B.	$2\frac{1}{2}$ cups	5	$\frac{3}{4}$ cups	$\frac{1}{2}$ cup	$1\frac{1}{4}$ cups
C.	5 cups	10	$1\frac{1}{2}$ cups	1 cup	$2\frac{1}{2}$ cups

- $\frac{5 \text{ cups of watermelon}}{20 \text{ people served}} = \frac{10 \text{ cups of watermelon}}{40 \text{ people served}}$
 - $\frac{2 \text{ cups of strawberries}}{20 \text{ people served}} = \frac{1 \text{ cup of strawberries}}{10 \text{ people served}}$
 - $\frac{3 \text{ cups of blueberries}}{10 \text{ cups of fruit salad}} = \frac{\frac{3}{4} \text{ cups of blueberries}}{2\frac{1}{2} \text{ cups of fruit salad}}$
- A. **Grilled Cheese Bits Recipe**

Cheese Slices	Crescent Roll Dough Pieces
.5	1
2.5	5
5	10
7.5	15
10	20
12.5	25

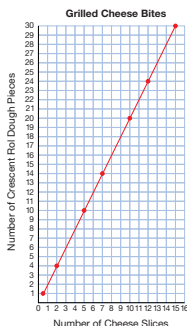
- 21 rolls and 10.5 cheese slices
 - 24 rolls and 12 cheese slices
- Answers will vary.

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- Ana made grilled cheese bites and tomato soup for lunch.

Grilled Cheese Bites
8 crescent roll dough pieces
4 square cheese slices
Place half a piece of cheese on each piece of dough. Fold and bake.

- Ana made a graph to compare the number of grilled cheese bites to the number of cheese slices needed. Make a table from the graph.
 - Ana is making grilled cheese bites for her brother's birthday party. She wants each person to have about 3 cheese bites and 7 people are coming. How many rolls and how many cheese slices will Ana need?
 - There are 8 people in Ana's family and she is going to triple her recipe to make a movie-night snack. How many rolls and how many cheese slices will Ana need?
- Choose one of your family's recipes. Make a table showing the ingredients and how many it serves. Double the recipe. Cut the recipe in half.



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