Lesson Summary

A ratio is an ordered pair of non-negative numbers, which are not both zero.

The ratio is written $A:B$ or $A$ to $B$ to indicate the order of the numbers. The number $A$ is first, and the number $B$ is second.

The order of the numbers is important to the meaning of the ratio. Switching the numbers changes the relationship. The description of the ratio relationship tells us the correct order for the numbers in the ratio.

1. At the 6th grade school dance, there are 132 boys, 89 girls, and 14 adults.
   a. Write the ratio of the number of boys to the number of girls.
   b. Write the same ratio using another form ($A:B$ vs. $A$ to $B$).
   c. Write the ratio of the number of boys to the number of adults.
   d. Write the same ratio using another form.

2. In the cafeteria, 100 milk cartons were put out for breakfast. At the end of breakfast, 27 remained.
   a. What is the ratio of the number of milk cartons taken to total number of milk cartons?
   b. What is the ratio of the number of milk cartons remaining to the number of milk cartons taken?

3. Choose a situation that could be described by the following ratios, and write a sentence to describe the ratio in the context of the situation you chose.
   For example:
   3:2. When making pink paint, the art teacher uses the ratio 3:2. For every 3 cups of white paint she uses in the mixture, she needs to use 2 cups of red paint.
   a. 1 to 2
   b. 29 to 30
   c. 52:12

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 $B$).

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 $B$. 

![Image of floor tiles]
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.

Lesson Summary

Two ratios $A:B$ and $C:D$ are equivalent ratios if there is a positive number, $c$, such that $C = cA$ and $D = cB$.

Ratios are equivalent if there is a positive number that can be multiplied by both quantities in one ratio to equal the corresponding quantities in the second ratio.

1. Write two ratios that are equivalent to 1:1.
2. Write two ratios that are equivalent to 3:11.
3. a. The ratio of the width of the rectangle to the height of the rectangle is ____ to ____.

b. If each square in the grid has a side length of 8 mm, what is the width and height of the rectangle?

4. For a project in their health class, Jasmine and Brenda recorded the amount of milk they drank every day. Jasmine drank 2 pints of milk each day, and Brenda drank 3 pints of milk each day.
   a. Write a ratio of the number of pints of milk Jasmine drank to the number of pints of milk Brenda drank each day.
   b. Represent this scenario with tape diagrams.
   c. If one pint of milk is equivalent to 2 cups of milk, how many cups of milk did Jasmine and Brenda each drink? How do you know?
   d. Write a ratio of the number of cups of milk Jasmine drank to the number of cups of milk Brenda drank.
   e. Are the two ratios you determined equivalent? Explain why or why not.

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Recall the description:

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This description can be used to determine whether two ratios are equivalent.
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1. Write two ratios that are equivalent to 1:1.

2. Write two ratios that are equivalent to 3:11.

3. 
   a. The ratio of the width of the rectangle to the height of the rectangle is _______ to _______.

   ![Rectangle Grid]

   b. If each square in the grid has a side length of 8 mm, what is the width and height of the rectangle?

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This description can be used to determine whether two ratios are equivalent.
1. Use diagrams or the description of equivalent ratios to show that the ratios 2:3, 4:6, and 8:12 are equivalent.

2. Prove that 3:8 is equivalent to 12:32.
   a. Use diagrams to support your answer.
   b. Use the description of equivalent ratios to support your answer.

3. The ratio of Isabella’s money to Shane’s money is 3:11. If Isabella has $33, how much money do Shane and Isabella have together? Use diagrams to illustrate your answer.

Problem Set

1. Last summer, at Camp Okey-Fun-Okey, the ratio of the number of boy campers to the number of girl campers was 8:7. If there were a total of 195 campers, how many boy campers were there? How many girl campers?

2. The student-to-faculty ratio at a small college is 17:3. The total number of students and faculty is 740. How many faculty members are there at the college? How many students?

3. The Speedy Fast Ski Resort has started to keep track of the number of skiers and snowboarders who bought season passes. The ratio of the number of skiers who bought season passes to the number of snowboarders who bought season passes is 1:2. If 1,250 more snowboarders bought season passes than skiers, how many snowboarders and how many skiers bought season passes?

4. The ratio of the number of adults to the number of students at the prom has to be 1:10. Last year there were 477 more students than adults at the prom. If the school is expecting the same attendance this year, how many adults have to attend the prom?

Lesson Summary

When solving problems in which a ratio between two quantities changes, it is helpful to draw a ‘before’ tape diagram and an ‘after’ tape diagram.

1. Shelley compared the number of oak trees to the number of maple trees as part of a study about hardwood trees in a woodlot. She counted 9 maple trees to every 5 oak trees. Later in the year there was a bug problem and many trees died. New trees were planted to make sure there was the same number of trees as before the bug problem. The new ratio of the number of maple trees to the number of oak trees is 3:11. After planting new trees, there were 132 oak trees. How many more maple trees were in the woodlot before the bug problem than after the bug problem? Explain.

2. The school band is comprised of middle school students and high school students, but it always has the same maximum capacity. Last year the ratio of the number of middle school students to the number of high school students was 1:8. However, this year the ratio of the number of middle school students to the number of high school students changed to 2:7. If there are 18 middle school students in the band this year, how many fewer high school students are in the band this year compared to last year? Explain.
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2. Prove that 3:8 is equivalent to 12:32.
   a. Use diagrams to support your answer.
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3. The ratio of Isabella's money to Shane's money is 3:11. If Isabella has $33, how much money do Shane and Isabella have together? Use diagrams to illustrate your answer.

Problem Set

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For a ratio $A: B$, we are often interested in the associated ratio $B: A$. Further, if $A$ and $B$ can both be measured in the same unit, we are often interested in the associated ratios $A: (A + B)$ and $B: (A + B)$.

For example, if Tom caught 3 fish and Kyle caught 5 fish, we can say:

- The ratio of the number of fish Tom caught to the number of fish Kyle caught is 3:5.
- The ratio of the number of fish Kyle caught to the number of fish Tom caught is 5:3.
- The ratio of the number of fish Tom caught to the total number of fish the two boys caught is 3:8.
- The ratio of the number of fish Kyle caught to the total number of fish the two boys caught is 5:8.

For the ratio $A: B$, where $B \neq 0$, the value of the ratio is the quotient $\frac{A}{B}$.

For example: For the ratio 6:8, the value of the ratio is $\frac{3}{4}$.

1. Maritza is baking cookies to bring to school and share with her friends on her birthday. The recipe requires 3 eggs for every 2 cups of sugar. To have enough cookies for all of her friends, Maritza determined she would need 12 eggs. If her mom bought 6 cups of sugar, does Maritza have enough sugar to make the cookies? Why or why not?

2. Hamza bought 8 gallons of brown paint to paint his kitchen and dining room. Unfortunately, when Hamza started painting, he thought the paint was too dark for his house, so he wanted to make it lighter. The store manager would not let Hamza return the paint but did inform him that if he used $\frac{1}{4}$ of a gallon of white paint mixed with 2 gallons of brown paint, he would get the shade of brown he desired. If Hamza decided to take this approach, how many gallons of white paint would Hamza have to buy to lighten the 8 gallons of brown paint?

Lesson Summary

The value of the ratio $A: B$ is the quotient $\frac{A}{B}$.

If two ratios are equivalent, they have the same value.

1. The ratio of the number of shaded sections to the number of unshaded sections is 4 to 2. What is the value of the ratio of the number of shaded pieces to the number of unshaded pieces?

2. Use the value of the ratio to determine which ratio(s) is equivalent to 7:15.
   - a. 21:45
   - b. 14:45
   - c. 3:5
   - d. 63:135

3. Sean was batting practice. He swung 25 times but only hit the ball 15 times.
   - a. Describe and write more than one ratio related to this situation.
   - b. For each ratio you created, use the value of the ratio to express one quantity as a fraction of the other quantity.
   - c. Make up a word problem that a student can solve using one of the ratios and its value.

4. Your middle school has 900 students. $\frac{1}{3}$ of the students bring their lunch instead of buying lunch at school. What is the value of the ratio of the number of students who bring their lunch to the number of students who buy lunch at school?