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NYC Saturday Math Tutoring Program
Saturday, November 8, 2014
Grade 6

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Lesson #4---Ratios

Objective: Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities (6.RP.1)

Introduction:

Ratios are very common in our daily lives. The easiest example of the use of ratios is would be in cooking. Scaling a recipe up or down depending on the number of guests you have would be a wonderful example. But, there are other more scientific areas where we need ratios. For instance, in order to determine how long someone can work in an area with a lot of radiation, such as the case of the Fukushima Nuclear Power Plant accident in Japan, first we take a measurement of the radiation field. In general, we have an idea how long specific jobs will take. We can use ratios and proportions to scale up or down the time workers are allowed to work in a particular area. Health physics uses a lot of proportions to give an "on the fly" estimation of radiation dosage. Another example would be in the field of medicine. Ratios are used to determine proper medication dosage for a patient if you have to change it for body mass, age, etc. For instance the medication dosage for a baby or child is different that the medication dosage of adult due to the size and weight advantage of the grown up.

Vocabulary:

A **ratio** says how much of one thing there is compared to another thing.

Equivalent ratios are two or more ratios that have the same value (the two ratios do not have to look identical).

Mini-lesson (I Do):

Problem 1:

A Recipe for pancakes, for a serving of 4 people, uses 3 cups of flour and 2 cups of milk. How much flour and milk would be needed to make enough pancakes for 16 people?

Solution:

The ratio of flour to milk in the original recipe is 3: 2—3 cups of flour for every 2 cups of milk. If I needed to make pancakes for a 16 people you need 4 times the quantity of each ingredient. Therefore, I multiply each amount of ingredients by 4.

flour : milk

3×4: 2×4

12: 8

I will need 12 cups of flour and 8 cups of milk to make pancakes for 16 people. Notice that a 12:8 ratio is *equivalent* to a 3:2 ratio of cups of flour and cups of milk.

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Guided Practice (I Do)

Problem 2:

Sonya, Darren, and Luke were on different sports teams last season. The number of wins for each team is listed below.

- Sonya's soccer team won 4 out of 5 games.
- Darren's basketball team won 12 out of 20 games
- Luke's baseball team won 20 out of 25 games

Which teams won the same ratio of their games?

Show your work.

Solution:

Let compare the ratios. But first, let's simplify each ratio if possible.

- the soccer team won 4 out of 5 games, or 4:5 or $\frac{4}{5}$
- the basketball team won 12 out 20 games, or 12:20 or $\frac{12}{20} = \frac{3}{5}$
- the baseball team won, 20 out of 25 games, or 20 out 25 or $\frac{20}{25} = \frac{4}{5}$

Now, we compare the ratios. We can see that Sonya's team and Luke's team won the same ratio of their games, because

$\frac{4}{5}$ and $\frac{20}{25}$ are equivalent to $\frac{4}{5}$. The team with the smaller winning ration is Darren's team with $\frac{3}{5}$

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Independent Practice (You Do):

- 1.** The ratio of the number of bananas to the number of apples at a fruit stand is 3:5. Moe says that the ratio is equivalent to 12:25. In the lines below, used words, numbers, or symbols to show why Moe's statement is incorrect.

- 2.** Carlos burns 75 calories for every 15 minutes he walks. How many calories will Carlos burn if he walks for 45 minutes?

- A** 150
- B** 300
- C** 250
- D** 225

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3. During the Student Government elections, for every vote that Jessica received, Melissa received three votes. Melissa received a total of 198 votes. How many votes did Jessica receive?

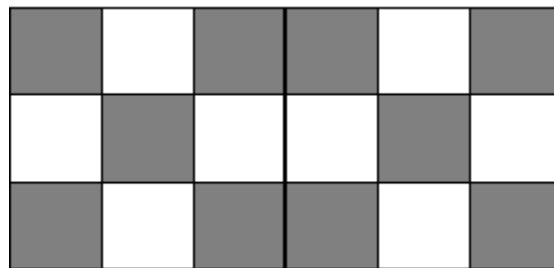
A 33

B 66

C 99

D 49

4. The new floor in the student cafeteria is going to be constructed of square tiles that are either gray or white and in the pattern that appears below:



Part A: What is the ratio of gray tiles to white tiles?

Answer: _____

Part B: What is the ratio of white tiles to the total number of tiles in the pattern?

Answer: _____

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6. Last year the girls' basketball team had 8 fifth-grade students and 7 sixth-grade students. What was the ratio of sixth-grade students to fifth-grade students on the team?

- A 8 : 15
- B 8 : 7
- C 7 : 8
- D 15 : 8

7. Mark was mixing blue paint and yellow paint in the ratio of 2:3 to make green paint. He wants to make 45 liters of green paint. He began to make a table to help him think about the problem, but is unsure of what to do next.



Liters of Blue Paint	Liters of Yellow Paint	Liters of Green Paint
2	3	5
4	6	10

- a. Explain in words how to continue to place values into the table.
- b. Write an explanation in words to Mark about how he can use his table to find how many liters of blue paint and how many liters of yellow paint will he need to make 45 liters of green paint.

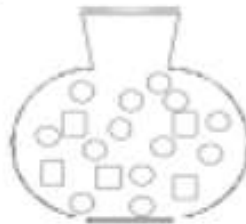
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8.



The candy jar below contains Jolly Ranchers (the rectangles) and Lemonheads (the circles). Answer each of the following questions:



- a. What is the ratio of Jolly Ranchers (the rectangles) to Lemonheads (the circles)?

- b. Suppose you have a larger jar of Jolly Ranchers and Lemonheads in which the ratio of the two candies is equivalent to the ratio in this jar. How many Jolly Ranchers and Lemonheads might be in the jar? Use mathematical reasoning to justify your response.

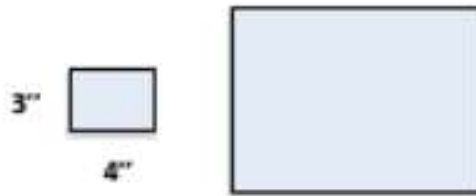
- c. Suppose you have a new candy jar with the same ratio of Jolly Ranchers to Lemonheads as shown above, but it contains 100 Jolly Ranchers. How many Lemonheads are in the jar? Use mathematical reasoning to justify your response.

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9. Katie and Jacob are enlarging pictures for the school yearbook on the photocopier. The ratio of the width to the length of the enlarged photo will be the same as the ratio of the width to the length of the original photo.

One of the photographs that they want to enlarge is a 3" x 4" photo. Katie says that she can enlarge the photo to 9" x 12", but Jacob disagrees. He says it will be 11" x 12". Who is correct? Explain your reasoning in words.



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10. A local store sells oranges at a price of 6 for \$9.00.

- a. Abbey wants to send 24 oranges to her grandmother. How much will Abbey spend if she buys the oranges at the local store? Explain your reasoning in words.



- b. Abbey decides she does not have enough money to buy 24 oranges. She can buy only 15 oranges. How much do 15 oranges cost? Explain your reasoning in words.

In a U-Shape:

1. Re-state the objective to assess if students learn it
2. Elicit from students what they have learned and what they want to learn more about.
3. Tie what they learn to the lesson, and upcoming lessons (Next Saturday, they will learn about proportion, a comparison of two ratios!)