Investigation 2

Comparing Ratios, Percents, and Fractions

You used ratios, fractions, percents, and differences to compare quantities in Investigation 1. Now, you will develop strategies for choosing and using an appropriate comparison strategy. As you work through the problems, you will make sense of the statements in the *Did You Know?*

Did You Know?

- In 2001, 20.8% of all radio stations in the United States had country music as their primary format, while only 4.5% had a Top-40 format.
- For the first 60 miles of depth, the temperature of Earth increases 1°F for every 100 to 200 feet.
- In 2000, cancer accounted for about $\frac{1}{5}$ of all deaths in the United States.
- In 2001, silver compact cars and silver sports cars outsold black cars by a ratio of 5 to 3.

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2.1 Mixing Juice

Julia and Mariah attend summer camp. Everyone at the camp helps with the cooking and cleanup at meal times.

One morning, Julia and Mariah make orange juice for all the campers. They plan to make the juice by mixing water and frozen orange-juice concentrate. To find the mix that tastes best, they decide to test some mixes.

Mix A	
2 cups concentrate	3 cups cold water

Mix B	
5 cups concentrate	9 cups cold water

Mix C	
1 cup concentrate	2 cups cold water

Mix D	
3 cups concentrate	5 cups cold water

Problem 2.1 Developing Comparison Strategies

A. Which mix will make juice that is the most "orangey"? Explain.

B. Which mix will make juice that is the least "orangey"? Explain.

C. Which comparison statement is correct? Explain.

$\frac{5}{9}$ of Mix B is concentrate. $\frac{5}{14}$ of Mix B is concentrate.

D. Assume that each camper will get $\frac{1}{2}$ cup of juice.

1. For each mix, how many batches are needed to make juice for 240 campers?

2. For each mix, how much concentrate and how much water are needed to make juice for 240 campers?

E. For each mix, how much concentrate and how much water are needed to make 1 cup of juice?

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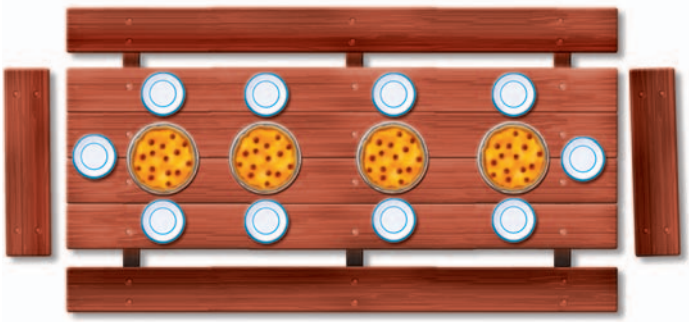
2.2 Sharing Pizza

The camp dining room has two kinds of tables. A large table seats ten people. A small table seats eight people. On pizza night, the students serving dinner put four pizzas on each large table and three pizzas on each small table.



Problem 2.2 More Comparison Strategies

A. Suppose the pizzas are shared equally by everyone at the table. Does a person sitting at a small table get the same amount as a person sitting at a large table? Explain your reasoning.

B. Which table relates to $\frac{3}{8}$? What do the 3 and the 8 mean? Is $\frac{3}{8}$ a part-to-whole comparison or a part-to-part comparison?

C. Selena thinks she can decide at which table a person gets the most pizza. She uses the following reasoning:

$10 - 4 = 6$ and $8 - 3 = 5$ so the large table is better.

1. What does the 6 mean and what does the 5 mean in Selena's method of reasoning?

2. Do you agree or disagree with Selena's method?

3. Suppose you put nine pizzas on the large table. What answer does Selena's method give? Does this answer make sense?

4. What can you now say about Selena's method?

D. 1. The ratio of large tables to small tables in the dining room is 8 to 5. There are exactly enough seats for the 240 campers. How many tables of each kind are there?

2. What fraction of the campers sit at small tables?

3. What percent of the campers sit at large tables?

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2.3 Finding Equivalent Ratios

It is often helpful, when forming ratios, to replace the actual numbers being compared with simpler numbers that have the same relationship to each other.

- People prefer Bolda Cola over Cola Nola by a ratio of 17,139 to 11,426, or 3 to 2.
- Students prefer television to radio by a ratio of 100 to 50, or 2 to 1.
- Monthly sales of *Reader's Digest* magazine exceed those of *National Geographic* by 11,044,694 to 6,602,650, or about 3 to 2.

Getting Ready for Problem 2.3

Suppose all classes at your grade level took the cola taste test. The result was 100 to 80 in favor of Bolda Cola.

- How do you scale down this ratio to make it easier to understand?
- What are some other ratios equivalent to this ratio in which the numbers are greater? Finding greater numbers is scaling *up* the ratio.
- How is scaling ratios like finding equivalent fractions for $\frac{100}{80}$? How is it different?

Problem 2.3 Scaling Ratios

One of Ming's tasks at the county zoo's primate house is to mix food for the chimpanzees. The combination of high-fiber nuggets and high-protein nuggets changes as the chimps grow from babies to adults.

Ming has formulas for mixing high-fiber and high-protein nuggets for the chimps.

- Baby chimps: 2 cups high-fiber nuggets and 3 cups high-protein nuggets per serving
- Young adult chimps: 6 cups high-fiber nuggets and 4 cups high-protein nuggets per serving
- Older chimps: 4 cups high-fiber nuggets and 2 cups high-protein nuggets per serving

A. 1. What amounts of high-fiber and high-protein nuggets will Ming need when she has to feed 2 baby chimps? 3 baby chimps? 4 baby chimps?

Copy and complete the table below.

Dietary Needs of Baby Chimps

Number of Baby Chimps	1	2	3	4	5	10
Cups of High-Fiber Nuggets						
Cups of High-Protein Nuggets						

2. What patterns do you see in your table?

3. Ming puts 48 cups of high-protein nuggets into the baby chimp mix. How many cups of high-fiber nuggets does she put into the mix? Explain.

4. Ming has a total of 125 cups of mix for baby chimps. How many cups of high-fiber nuggets are in the mix? Explain.

B. 1. What is the ratio of high-fiber to high-protein nuggets for young adult chimps?

2. Scale this ratio up to show the ratio of high-fiber to high-protein nuggets that will feed 21 young adult chimps.

3. To feed 18 young adults, you need 108 cups of high-fiber nuggets and 72 cups of high-protein nuggets. Show how to scale down this ratio to feed 3 young adult chimps.

C. 1. Darla wants to compare the amount of high-fiber nuggets to the total amount of food mix for young adult chimps. She makes this claim:

"High-fiber nuggets are $\frac{3}{2}$ of the total."

Lamar says Darla is wrong. He makes this claim:

"High-fiber nuggets are $\frac{3}{5}$ of the total."

Who is correct? Explain.

2. What fraction of the total amount of food mix for older chimps is high-fiber nuggets?

3. Suppose the ratio of male chimps to female chimps in a zoo is 5 to 4. What fraction of the chimps are male?

4. Suppose $\frac{2}{3}$ of the chimps in a zoo are female. Find the ratio of female chimps to male chimps in that zoo.

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