

Dear Family,

The next unit in your child's mathematics class this year is ***Comparing and Scaling: Ratio, Proportion, and Percent***. Students look at problems involving many situations and learn to make comparisons using ratios, fractions, percents, and rates.

UNIT GOALS

One goal of this unit is to develop students' abilities to make useful comparisons of quantitative information using ratios, fractions, decimals, rates, unit rates, and percents. A second goal is to have students learn to use quantitative comparison information to make larger or smaller scale models.

Students should also learn different ways to reason in proportional situations and to recognize when such reasoning is appropriate.

HELPING WITH HOMEWORK

As your child studies this unit you can help with homework, and at the same time, encourage sound mathematical habits by asking questions such as:

- When quantities have different measurements, how can they be compared?
- When can a comparison be made by subtraction? When can division be used?
- Why is a ratio a good means of comparison? How can it be scaled up or down?
- Where can ratios be used in daily life to find unknown quantities or inaccessible measurements?
- How can we use proportions for solving problems?

In your child's notebook, you can find worked-out examples from problems done in class, notes on the mathematics of the unit, and descriptions of the vocabulary words.

HAVING CONVERSATIONS ABOUT THE MATHEMATICS IN *COMPARING AND SCALING*

You can help your child in several ways:

- Ratios, proportions, and percents are found all around us. When you notice such a use in a newspaper or magazine, point it out to your child and discuss with your child what the numbers are telling them about the situation.
- Have your child share his or her mathematics notebook with you, showing you what has been recorded about ratios. Ask your child to explain why these ideas are important.
- Have your child pick a question that was interesting to him or her and explain it to you.

A few important mathematical ideas that your child will learn in *Comparing and Scaling* are given on the back. As always, if you have any questions or concerns about this unit or your child's progress in the class, please feel free to call.

Sincerely,

Important Concepts	Examples
<p>Ratio A comparison of two quantities.</p>	<p><i>For every 2 cups of mix, you use 3 cups of water.</i> Ratios are written in several forms: 2 to 3, or 2:3, or $\frac{2 \text{ cups mix}}{3 \text{ cups water}}$.</p>
<p>Ratios in Fraction Form Ratios are often written in fraction form but do not represent fractions. Fractions have part-to-whole comparisons. Some ratios are part-to-part comparisons.</p>	<p>The statement “the ratio of boys to girls in a class is 15 girls to 9 boys” can be written as a fraction, $\frac{15}{9}$, but it does not mean that the fraction of students in the class that are girls is $\frac{15}{9}$. The total number of students in the class is needed. The sum of the numbers of boys and girls is 24. The part-to-whole comparison is $\frac{15}{24}$. So the fraction of the class that is girls is $\frac{15}{24}$.</p>
<p>Ratios as Percents When the ratio can be thought of as part of a whole you can write a percent comparison statement.</p>	<p><i>The ratio of concentrate to water in a mix is 3 cups concentrate to 16 cups water. First, find the total cups the recipe makes, 19 cups.</i> Then, write the fraction of the mix that is concentrate, $\frac{3}{19}$. To find the percent, we divide the concentrate by the total mix, $3 \div 19 = 0.15789\dots$ or about 15.8% concentrate.</p>
<p>Rate A statement that compares two different variables.</p>	<p>miles to gallons, sandwiches to people, dollars to hours</p>
<p>Unit Rate You have two options when you divide two numbers. The units help you think through the situations so that you can use either set of unit rates to compare the quantities</p>	<p><i>Sascha goes 6 miles in 20 minutes on leg 1 of his bike ride. On leg 2 he goes 8 miles in 24 minutes. On which leg is he faster?</i></p> <p>$\frac{6 \text{ miles}}{20 \text{ minutes}} = 0.3 \text{ miles per minute}$ and $\frac{8 \text{ miles}}{24 \text{ minutes}} = 0.333 \text{ miles per minute}$</p> <p>Now the comparison is clear. The times are the same, 1 minute, and the distances can be directly compared. 8 miles in 24 minutes is faster.</p> <p>But, we could divide the other way:</p> <p>$\frac{20 \text{ minutes}}{6 \text{ miles}} = 3.333 \text{ minutes per mile}$ and $\frac{24 \text{ minutes}}{8 \text{ miles}} = 3 \text{ minutes per mile}$</p> <p>We see that the smaller number tells the correct answer, 8 miles in 24 minutes.</p>
<p>Scaling Ratios (and Rates) Write the ratios as fractions to help the thinking needed for scaling the ratios up (or down). However, we must recognize the difference between dealing with a fraction and dealing with a ratio written as a fraction.</p>	<p><i>Which is less expensive, 3 roses for \$5 or 7 roses for \$9?</i></p> <p>If we want to scale the costs to be the same, we can use the same thinking as that for finding a common denominator. We would look for a common multiple of 5 and 9. $\frac{3}{5} = \frac{3 \times 9}{5 \times 9} = \frac{27 \text{ roses}}{\\$45}$ and $\frac{7}{9} = \frac{7 \times 5}{9 \times 5} = \frac{35 \text{ roses}}{\\$45}$. The second option gives more for the same amount of money.</p>
<p>Proportions A proportion is a statement of equality between two ratios. If one part is unknown, we can use scaling or equivalent fractions to find the missing part of a proportion.</p>	<p><i>It takes Glenda 70 steps on the elliptical machine to go 0.1 of a mile. When her workout is done, she has gone 3 miles. How many steps has she made on the machine?</i></p> <p>$\frac{70 \text{ steps}}{0.1 \text{ miles}} = \frac{x \text{ steps}}{3 \text{ miles}} = \frac{70 \times 30 \text{ steps}}{0.1 \times 30 \text{ miles}} = \frac{2,100 \text{ steps}}{3 \text{ miles}}$</p> <p>Glenda took 2,100 steps to go 3 miles.</p>

On the **CMP Parent Web Site**, you can learn more about the mathematical goals of each unit, see an illustrated vocabulary list, and examine solutions of selected ACE problems. <http://PHSchool.com/cmp2parents>