Ratios and Proportional Relationships

In seventh grade, students extend their understanding of ratios and develop understanding of proportionality to solve a variety of single- and multi-step ratio and percent problems. A **ratio** is a comparison of two numbers or quantities through division and is typically expressed in simplest fraction form (e.g., the ratio of boys to girls in a class is 10 to 15, which would be expressed as 2 to 3). A **proportion** is an equation setting two ratios equal. Blueprint drawings and the actual structures they represent look alike because they are proportionate to one another (e.g., a scale of $\frac{1}{4}$ inch on the drawing to 1 foot of actual length is expressed as $\frac{1}{4} = 1'0''$). A **proportionality** is a relationship in which the ratio between two quantities does not vary—the ratio remains constant.

At this grade level, students also compute **unit rates**. A *rate* is a ratio that compares two different kinds of quantities—for example, miles per hour or dollars per pound. The rate "miles per hour" gives distance traveled per unit of time, and problems using this type of unit rate can be solved using proportions. Students will graph proportional relationships and understand the unit rate informally as a measure of the steepness of a related line—called *slope*. Students distinguish proportional relationships from other relationships.

Additionally, students use their understanding of ratios and proportionality to solve a variety of percent problems. They will solve problems that include simple interest, taxes, tips, commissions, mark-ups, discounts, and percent increases or decreases.

The Grade 7 Common Core State Standards for Ratios and Proportional Relationships specify that students should–

• Analyze proportional relationships and use them to solve real-world and mathematical problems.

The following hands-on activities will help students explore the concepts of ratios and proportional relationships in a meaningful way. The concrete experiences that the activities provide will strengthen students' ability to recognize and work flexibly with these concepts.