Unit 6 - Ratios, Proportions, Percents, and Probability

Content Area: **Mathematics**
Course(s): **Pre-Algebra 6**
Time Period: **February**
Length: **4 weeks**
Status: **Published**

Transfer

Big Idea: Ratios, Proportions, Probability, and Percents

Enduring Understandings

Proportions can be use to solve problems involving scale drawings.

The likelihood of the occurrence of an event can be expressed by a number between 0 and 1.

Proportional relationships can be determined using a variety of strategies

Computing theoretical probability can predict the frequencies of an event

Essential Questions

How can proportions be used to solve scale drawings?

How can the likelihood of the occurrence of an event be expressed?

Can the theoretical probability of an event be compared to the experimental probability using a simulation?

Critical Knowledge and Skills

Vocabulary

Vocabulary

Ratio

Proportion

Cross product

Similar figures

Corresponding parts

Scale model

Outcomes

Event

Probability

Odds against

Tree diagram

Multiplication principle

Experimental probability

Learning Objectives

Find ratios and unit rates

Convert rates from one system of measurement to another.

Write and solve proportions

Solve proportions using cross products

Prepare for solving problems that involve basic geometry concepts

Identify similar and congruent figures.

Find unknown side lengths of similar figures.

Use proportions with scale drawings.

Find probabilities and determine whether a game is fair.

Use the multiplication and addition principle to find probabilities.

Use a fraction to find the percent of a number

Use proportions and decimals to solve percent problems

Resources

Prior Knowledge

*Solved equations using multiplication or division

*Written fractions in simplest form

*Solved equations with rational numbers

Standards

MA.6.RP.A	Understand ratio concepts and use ratio reasoning to solve problems.
MA.7.RP.A	Analyze proportional relationships and use them to solve real-world and mathematical

	problems.
MA.7.RP.A.1	Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units.
MA.6.RP.A.1	Understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
MA.K-12.3	Construct viable arguments and critique the reasoning of others.
MA.6.RP.A.2	Understand the concept of a unit rate a/b associated with a ratio $a:b$ with $b \neq 0$, and use rate language in the context of a ratio relationship.
MA.7.RP.A.2	Recognize and represent proportional relationships between quantities.
	Mathematically proficient students understand and use stated assumptions, definitions, and previously established results in constructing arguments. They make conjectures and build a logical progression of statements to explore the truth of their conjectures. They are able to analyze situations by breaking them into cases, and can recognize and use counterexamples. They justify their conclusions, communicate them to others, and respond to the arguments of others. They reason inductively about data, making plausible arguments that take into account the context from which the data arose. Mathematically proficient students are also able to compare the effectiveness of two plausible arguments, distinguish correct logic or reasoning from that which is flawed, and—if there is a flaw in an argument—explain what it is. Elementary students can construct arguments using concrete referents such as objects, drawings, diagrams, and actions. Such arguments can make sense and be correct, even though they are not generalized or made formal until later grades. Later, students learn to determine domains to which an argument applies. Students at all grades can listen or read the arguments of others, decide whether they make sense, and ask useful questions to clarify or improve the arguments.
MA.6.RP.A.3	Use ratio and rate reasoning to solve real-world and mathematical problems, e.g., by reasoning about tables of equivalent ratios, tape diagrams, double number line diagrams, or equations.
MA.6.RP.A.3a	Make tables of equivalent ratios relating quantities with whole number measurements, find missing values in the tables, and plot the pairs of values on the coordinate plane. Use tables to compare ratios.
MA.6.RP.A.3b	Solve unit rate problems including those involving unit pricing and constant speed.
MA.7.RP.A.3	Use proportional relationships to solve multistep ratio and percent problems.
MA.6.RP.A.3c	Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percent.
MA.K-12.7	Look for and make use of structure.
	Mathematically proficient students look closely to discern a pattern or structure. Young students, for example, might notice that three and seven more is the same amount as seven and three more, or they may sort a collection of shapes according to how many sides the shapes have. Later, students will see 7 × 8 equals the well remembered 7 × 5 + 7 × 3, in preparation for learning about the distributive property. In the expression $x^2 + 9x + 14$, older students can see the 14 as 2 × 7 and the 9 as 2 + 7. They recognize the significance of an existing line in a geometric figure and can use the strategy of drawing an auxiliary line for solving problems. They also can step back for an overview and shift perspective. They can see complicated things, such as some algebraic expressions, as single objects or as being composed of several objects. For example, they can see $5 - 3(x - y)^2$ as 5 minus a positive number times a square and use that to realize that its value cannot be more than 5 for any real numbers x and y.
MA.7.EE.A	Use properties of operations to generate equivalent expressions.
MA.7.EE.A.2	Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related.

MA.7.EE.B	Solve real-life and mathematical problems using numerical and algebraic expressions and equations.
MA.7.EE.B.3	Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies.
MA.7.G.A	Draw, construct, and describe geometrical figures and describe the relationships between them.
MA.7.G.A.1	Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.
MA.7.G.A.3	Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
MA.7.G.B	Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.
MA.7.G.B.6	Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.
MA.7.SP.C	Investigate chance processes and develop, use, and evaluate probability models.
MA.7.SP.C.5	Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. A probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.
MA.7.SP.C.7	Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
MA.6.SP.A	Develop understanding of statistical variability.
MA.6.SP.A.1	Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers.
MA.7.SP.C.8	Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
MA.6.SP.B	Summarize and describe distributions.
MA.6.SP.B.5a	Reporting the number of observations.