# Teaching & Learning Standards

# 7th GRADE



Cherokee County School District

## Mathematics

**Year Long Mathematical Practices (MP):**

Display perseverance and patience in problem-solving. Demonstrate skills and strategies needed to succeed in mathematics, including critical thinking, reasoning, and effective collaboration, and expression. Seek help and apply feedback. Set and monitor goals.

**MP.1 –** Make sense of problems and persevere in solving them.

**MP.2 –** Reason abstractly and quantitatively

**MP.3 –** Construct viable arguments and critique reasoning of others.

**MP.4 –** Model with mathematics.

**MP.5 –** Use appropriate tools strategically.

**MP.6 –** Attend to precision.

**MP.7 –** Look for and make use of structure.

**MP.8 –** Look for and express regularity in repeated reasoning.

**Unit 1: Making Relevant Connections within The Number System (5-6 weeks)**

This unit builds upon the understanding of rational numbers developed in 6th grade, transitioning from exploring to ultimately formalizing rules for basic arithmetic operations (addition, subtraction, multiplication, and division) with rational numbers. Using both contextual and numerical problems, students explore arithmetic combinations of negative numbers and positive numbers. Students will explore the results of adding, subtracting, multiplying, and dividing pairs of numbers in context, leading to the generalization of rules. Rational numbers in different forms (integers, percents, fractions, and decimal numbers) should be used in computations and explorations.

**Overarching Standards for Unit 1**

**NR.1:** Solve relevant, mathematical problems, including multi-step problems, involving the four operations with rational numbers and quantities in any form (integers, percentages, fractions, and decimal numbers).

**Standards for Student Mastery for Unit 1**

**NR.1.1:** Show that a number and its opposite have a sum of 0 (are additive inverses). Describe situations in which opposite quantities combine to make 0.

**NR.1.2:** Show and explain $p + q$ as the number located a distance $|q|$ from $p$, in the positive or negative direction, depending on whether $q$ is positive or negative. Interpret sums of rational numbers by describing applicable situations.

**NR.1.3:** Represent addition and subtraction with rational numbers on a horizontal or a vertical number line diagram to solve real-life problems.

**NR.1.4:** Show and explain subtraction of rational numbers as adding the additive inverse, $p – q = p + (– q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference and apply this principle in contextual situations.

**NR.1.5:** Apply properties of operations, including part-whole reasoning, as strategies to add and subtract rational numbers.

**NR.1.6:** Make sense of multiplication of rational numbers using realistic applications.

**NR.1.7:** Show and explain that integers can be divided, assuming the divisor is not zero, and every quotient of integers is a rational number.

**NR.1.8:** Represent the multiplication and division of integers using a variety of strategies and interpret products and quotients of rational numbers by describing them based on the relevant situation.

**NR.1.9:** Apply properties of operations as strategies to solve multiplication and division problems involving rational numbers represented in an applicable scenario.

---

**NR.1.10:** Convert rational numbers between forms to include fractions, decimal numbers and percents, using understanding of the part divided by the whole. Know that the decimal form of a rational number terminates in 0s or eventually repeats.

**NR.1.11:** Solve multi-step contextual problems involving rational numbers, converting between forms as appropriate, and assessing the reasonableness of answers using mental computation and estimation strategies.

**Unit 2: Reasoning with Expressions, Equations, and Inequalities (5-6 weeks)**

Students build on what was learned in previous grades regarding mathematical properties (such as commutative, associative, and distributive properties) and conventions (such as order of operations), use these conventions and properties of operations to rewrite equivalent expressions, and interpret expressions in context. Students extend properties used with whole numbers to rational numbers in multiple formats (fractions and decimals). Students construct and solve equations and inequalities to solve contextual problems, and interpret solutions based on the context.

---

**Overarching Standards for Unit 2**

**PAR.2:** Use properties of operations, generate equivalent expressions and interpret the expressions to explain relevant situations.

**PAR.3:** Represent authentic situations using equations and inequalities with variables; solve equations and inequalities symbolically, using the properties of equality.

---

**Standards for Student Mastery for Unit 2**

**PAR.2.1:** Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

**PAR.2.2:** Rewrite an expression in different forms from a contextual problem to clarify the problem and show how the quantities in it are related.

---

**PAR.3.1:** Construct algebraic equations to solve practical problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where $p$, $q$, and $r$ are specific rational numbers. Interpret the solution based on the situation.

**PAR.3.2:** Construct algebraic inequalities to solve problems, leading to inequalities of the form $px \pm q > r$, $px \pm q < r$, $px \pm q \leq r$, or $px \pm q \geq r$, where $p$, $q$, and $r$ are specific rational numbers. Graph and interpret the solution based on the realistic situation that the inequalities represent.

**Unit 3A: Exploring Ratios and Proportional Relationships (3-4 weeks)**

Building on knowledge and understanding of rate and unit concepts, students use graphs, tables, equations, and diagrams to recognize, represent, explain, and solve proportional relationships. Mathematics should be represented in as many ways as possible in this unit by using graphs, tables, pictures, symbols, and words.

**Overarching Standards for Unit 3**

**PAR.4:** Recognize proportional relationships in relevant, mathematical problems; represent, solve, and explain these relationships with tables, graphs, and equations.

**Standards for Student Mastery for Unit 3**

**PAR.4.1:** Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units presented in realistic problems.

**PAR.4.2:** Determine the unit rate (constant of proportionality) in tables, graphs (1, $r$), equations, diagrams, and verbal descriptions of proportional relationships to solve realistic problems.

**PAR.4.3:** Determine whether two quantities presented in authentic problems are in a proportional relationship.

**PAR.4.4:** Identify, represent, and use proportional relationships.

**PAR.4.5:** Use context to explain what a point ($x$, $y$) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0, 0) and (1, $r$) where $r$ is the unit rate.

**PAR.4.6:** Solve everyday 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.

**PAR.4.7:** Use similar triangles to explain why the slope, $m$, is the same between any two distinct points on a non-vertical line in the coordinate plane.

**PAR.4.8:** Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.

**Semester 2 (January – May)**

**Unit 3B: Exploring Ratios and Proportional Relationships (4-5 weeks)**

Students will develop a deep understanding of the characteristics of a proportional relationship, including the exploration of similarity informally when learning about scale drawings of geometric figures and to explain why the slope of a non-vertical line is constant. Further, students should demonstrate a conceptual understanding of the relationship between the slope of a line and unit rate. Mathematics should be represented in multiple ways, including graphs, tables, pictures, symbols, and words.

**Overarching Standards for Unit 3**

**PAR.4:** Recognize proportional relationships in relevant, mathematical problems; represent, solve, and explain these relationships with tables, graphs, and equations.

**Standards for Student Mastery for Unit 3**

**PAR.4.9:** Use proportional relationships to solve multi-step ratio and percent problems presented in applicable situations.

**PAR.4.10:** Predict characteristics of a population by examining the characteristics of a representative sample. Recognize the potential limitations and scope of the sample to the population.

**PAR.4.11:** Analyze sampling methods and conclude that random sampling produces and supports valid inferences.

**PAR.4.12:** Use data from repeated random samples to evaluate how much a sample mean is expected to vary from a population mean. Simulate multiple samples of the same size.

**Unit 4: Investigating Probability (4-5 weeks)**

In Unit 4, students will begin an exploration of probability and chance processes. Students will develop probability models to find the likelihood of simple events and make predictions using simulations' information. Students will compare theoretical and experimental probabilities of events and explain discrepancies.

**Overarching Standards for Unit 4**

**PR.6:** Using mathematical reasoning, investigate chance processes and develop, evaluate, and use probability models to find probabilities of simple events presented in authentic situations.

**Standards for Student Mastery for Unit 4**

**PR.6.1:** Represent the probability of a chance event as a number between 0 and 1 that expresses the likelihood of the event occurring. Describe that a probability near 0 indicates an unlikely event, a probability around $\frac{1}{2}$ indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event.

**PR.6.2:** Approximate the probability of a chance event by collecting data on an event and observing its long-run relative frequency will approach the theoretical probability.

**PR.6.3:** Develop a probability model and use it to find probabilities of simple events. Compare experimental and theoretical probabilities of events. If the probabilities are not close, explain possible sources of the discrepancy.

**PR.6.4:** Develop a uniform probability model by assigning equal probability to all outcomes and use the model to determine probabilities of events.

**PR.6.5:** Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.

**PR.6.6:** Use appropriate graphical displays and numerical summaries from data distributions with categorical or quantitative (numerical) variables as probability models to draw informal inferences about two samples or populations.

**Unit 5: Making Relevant Connection with Geometry (4-5 weeks)**

Students will write and solve equations using facts involving measures of angles. Students will study circles and use proportional reasoning to understand the relationship between the diameter and circumference, deriving formulas for circumference and area to solve problems. Students will solve problems involving surface area and volume of right prisms and cylinders and explore two-dimensional cross sections of three-dimensional solids.

**Overarching Standards for Unit 5**

**GSR.5:** Solve practical problems involving angle measurement, circles, area of circles, surface area of prisms and cylinders, and volume of cylinders and prisms composed of cubes and right prisms.

**Standards for Student Mastery for Unit 5**

**GSR.5.1:** Measure angles in whole non-standard units.

**GSR.5.2:** Measure angles in whole number degrees using a protractor.

**GSR.5.3:** Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve equations for an unknown angle in a figure.

**GSR.5.4:** Explore and describe the relationship between pi, radius, diameter, circumference, and area of a circle to derive the formulas for the circumference and area of a circle.

**GSR.5.5:** Given the formula for the area and circumference of a circle, solve problems that exist in everyday life.

**GSR.5.6:** Solve realistic problems involving surface area of right prisms and cylinders.

**GSR.5.7:** Describe the two-dimensional figures (cross sections) that result from slicing three-dimensional figures, as in the plane sections of right rectangular prisms, right rectangular pyramids, cones, cylinders, and spheres.

**GSR.5.8:** Explore volume as a measurable attribute of cylinders and right prisms. Find the volume of these geometric figures using concrete problems.

**Unit 6 - Culminating Capstone Unit (1-2 weeks)**

The capstone unit applies content that has already been learned in previous interdisciplinary PBLs and units throughout the school year. The capstone unit is an interdisciplinary unit that allows students to create a presentation, report, or demonstration that could include their models used to answer an overarching driving question. (e.g., Students can present their solution(s), findings, project, or answer to the driving question to a larger audience during the culminating capstone unit.)

---

**Overarching Standards for Unit 6**

**NR.1:** Solve relevant, mathematical problems, including multi-step problems, involving the four operations with rational numbers and quantities in any form (integers, percentages, fractions, and decimal numbers).

**PAR.2:** Use properties of operations, generate equivalent expressions and interpret the expressions to explain relevant situations.

**PAR.3:** Represent authentic situations using equations and inequalities with variables; solve equations and inequalities symbolically, using the properties of equality.

**PAR.4:** Recognize proportional relationships in relevant, mathematical problems; represent, solve, and explain these relationships with tables, graphs, and equations.

**GSR.5:** Solve practical problems involving angle measurement, circles, area of circles, surface area of prisms and cylinders, and volume of cylinders and prisms composed of cubes and right prisms.

**PR.6:** Using mathematical reasoning, investigate chance processes and develop, evaluate, and use probability models to find probabilities of simple events presented in authentic situations.

---

**Standards for Student Mastery for Unit 6**

ALL associated learning objectives.