Grade 7

Concepts and Procedures

Ratios and Proportional Relationships

RANGE PLD Target A: Analyze proportional relationships and use them to solve real-world and mathematical problems.	Level 1 students should be able to identify proportional relationships presented in graphical, tabular, or verbal formats in familiar contexts.	Level 2 students should be able to find whole number constant of proportionality in relationships presented in graphical, tabular, or verbal formats in familiar contexts. They should be able to identify proportional relationships presented in a one-step equation format.	Level 3 students should be able to identify, represent, and analyze proportional relationships in various formats; find constant of proportionality (unit rate) associated with ratios of fractions; and use unit rates to solve problems involving rational numbers. They should be able to analyze a graph of a proportional relationship to explain what the points (x, y) and (1, r) represent, where r is the unit rate, and use this information to solve problems. Students should be able to use proportional relationships to solve multistep percent problems.	Level 4 students should be able to solve real-world and mathematical problems involving proportional relationships represented verbally, in tables, in equations, or graphically, and identify connections between representations.

The Number System

RANGE PLD Target B: Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.	Level 1 students should be able to add, subtract, multiply, and divide rational numbers with a number line or other manipulative.	Level 2 students should be able to solve real-world and mathematical problems by applying and extending previous understandings and properties of addition and subtraction to add and subtract with rational numbers; identify the absolute value of a rational number and show that a number and its opposite have a sum of 0; and convert between familiar fractions and decimals.	Level 3 students should be able to apply properties of operations to solve real-world and mathematical problems involving rational numbers using the four operations and to convert from a fraction to a decimal. They should be able to extend previous understandings of subtraction to realize it is the same as adding the additive inverse. They should be able to understand $p + q$ as a number located $\|q\|$ units from p on a number line in either direction depending on the sign of q. They should know, understand, and use the rules for multiplying and dividing signed numbers.	No Descriptor

Expressions and Equations

RANGE PLD Target C: Use properties of operations to generate equivalent expressions.	Level 1 students should be able to apply properties of operations as strategies to add and subtract linear expressions with integer coefficients.	Level 2 students should be able to apply properties of operations as strategies to factor and expand linear expressions with integer coefficients. They should be able to add and subtract linear expressions with rational coefficients.	Level 3 students should be able to apply properties of operations as strategies to factor and expand linear expressions with rational coefficients. They should be able to rewrite an expression to show how quantities are related in a problem-solving context.	No Descriptor
RANGE PLD Target D: Solve real-life and mathematical problems using numerical and algebraic expressions and equations.	Level 1 students should be able to solve multistep problems with integers or common fractions with denominators of 2 through 10, 25, 50, or 100 and decimals to the hundredths place; solve equations in the form of $px + q = r$, where p, q, and r are integers; and distinguish between inequalities and equations with integer coefficients with or without real-world context.	Level 2 students should be able to solve multistep problems with rational numbers and solve equations in the form of $px + q = r$ or $p(x + q) = r$, where p, q, and r are rational numbers. They should be able to use variables to represent quantities in real-world and mathematical situations. They should be able to create one-variable equations and inequalities to solve problems.	Level 3 students should be able to solve and graph solution sets to inequalities with one variable. They should be able to construct equations with more than one variable to solve multistep, real world, and mathematical problems.	Level 4 students should be able to construct inequalities with more than one variable to solve real world and mathematical problems.

Geometry

RANGE PLD Target E: Draw, construct, and describe geometrical figures and describe the relationships between them.	Level 1 students should be able to identify and describe geometric shapes with given conditions.	Level 2 students should be able to determine whether a set of any three given angle or side-length measures can result in a unique triangle, more than one triangle, or no triangle at all. They should be able to describe the relationship between a geometric figure and its scale drawing by finding the scale factor between them.	Level 3 students should be able to compute actual lengths and areas from a scale drawing and reproduce a scale drawing using a different scale. They should be able to describe the two-dimensional figures that result from slicing prisms and pyramids with planes that are parallel to a face.	Level 4 students should be able to describe the two-dimensional figures that result from slicing cones, spheres, cylinders, or other three-dimensional figures with planes that are not parallel to a given face.
RANGE PLD Target F: Solve real-life and mathematical problems involving angle measure, area, surface area, and volume.	Level 1 students should be able to identify appropriate formulas for the area and circumference of a circle; calculate the area of triangles and rectangles and the volume of cubes; classify pairs of angles as supplementary, complementary, vertical, or adjacent; and measure angles with appropriate tools.	Level 2 students should be able to use supplementary, complementary, vertical, or adjacent angles to solve real-world and mathematical one-step problems with angles expressed as numerical measurements in degrees; calculate the circumference of a circle; and calculate the area of circles, quadrilaterals, and polygons and the volume of right rectangular prisms.	Level 3 students should be able to use supplementary, complementary, vertical, and adjacent angles to solve real-world and mathematical multiple step problems involving angle measures expressed as variables in degrees. Students should be able to use formulas to explore the relationship between area and circumference of a circle and to solve problems. They should be able to solve problems involving the area of polygons and the surface area and volume of three-dimensional objects (composed of triangles, quadrilaterals, cubes, and right prisms.)	Level 4 students should be able to solve real-world and mathematical problems involving surface area and volume of three-dimensional figures with polygonal faces. They should be able to use supplementary, complementary, vertical, and adjacent angles to solve multistep problems with angle measures expressed as variables in degrees.

Statistics and Probability

RANGE PLD Target G: Use random sampling to draw inferences about a population.	Level 1 students should be able to describe what a representative sample entails and identify valid samples of a population.	Level 2 students should be able to determine whether a sample is random and show that random samples of an appropriate population are representative samples that support valid results. They should be able to use data from a random sample to draw obvious inferences about a population.	Level 3 students should be able to use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Students should be able to recognize multiple samples (or simulated samples) of the same size and gauge the variation to estimate or make predictions.	No Descriptor
RANGE PLD Target H: Draw informal comparative inferences about two populations.	Level 1 students should be able to use the mean to compare and draw inferences about two different populations.	Level 2 students should be able to use range to draw comparisons about two different populations. They should be able to informally compare the visual overlap of two numerical data distributions with similar variability, measuring the difference between the centers in any context.	Level 3 students should be able to use measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.	No Descriptor
RANGE PLD Target I: Investigate chance processes and develop, use, and evaluate probability models.	Level 1 students should be able to determine the probability of a simple event; understand that probabilities are numbers between 0 (impossible) and 1 (always); and that a probability around 1/2 indicates an event that is neither unlikely nor likely.	Level 2 students should be able to approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency. They should be able to predict the approximate relative frequency given the probability.	Level 3 students should be able to find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. They should be able to develop a probability model (which may not be uniform) and use it to compare probabilities of an event.	Level 4 students should be able to design, describe, and construct a simulation experiment to generate frequencies for compound events. They should be able to explain what might account for differences between theoretical and experimental results and evaluate the associated probability model.