Essential Skill: **Understand ratio concepts and use ratio reasoning to solve problems.**

What it looks like:

1. Understand the concept of a ratio, as a relationship between two quantities and apply reasoning to real-world mathematical problems. *For example, "The ratio of wings to beaks in the bird house at the zoo was 2:1, because for every 2 wings there was 1 beak."*

Example

Essential Skill: **Compute fluently with multi-digit numbers and find common factors and multiples.**

What it looks like:

1. Fluently add, subtract, multiply, and divide multi-digit numbers, including decimals. Find the greatest common factor of two whole numbers, less than or equal to 100, and the least common multiple of two whole numbers less than or equal to 12. Use the distributive property to express a sum of two whole numbers 1–100 with a common factor as a multiple of a sum of two whole numbers with no common factor. *For example, express 36 + 8 as 4 (9 + 2).*

Example

Essential Skill: **Apply and extend previous understandings of numbers to the system of rational numbers.**

What it looks like:

1. Understand that positive and negative numbers (including repeating and terminating decimals) are used together to describe quantities having opposite directions or values (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge).
2. Understand a rational number as a point on the number line.
3. Understand ordering and absolute value of rational numbers. *For example, interpret –3 > –7 as a statement that –3 is located to the right of –7 on a number line oriented from left to right or recognize that an account balance less than –30 dollars represents a debt greater than 30 dollars.*

Example

Essential Skill: **Apply and extend previous understandings of multiplication and division to divide fractions by fractions.**

What it looks like:

1. Interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions. *For example, use the relationship between multiplication and division to explain that (2/3) ÷ (3/4) = 8/9 because 3/4 of 8/9 is 2/3.*

Example

Essential Skill: **Reason about and solve one-variable equations and inequalities.**

What it looks like:

1. Understand solving an equation or inequality as a process of answering a question: which values from a specified set, if any, make the equation or inequality true? Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
2. Use variables to represent numbers and write expressions when solving a real-world or mathematical problem; understand that a variable can represent an unknown number, or, depending on the purpose at hand, any number in a specified set.
3. Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q and x are all nonnegative rational numbers.
4. Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem. Recognize that inequalities of the form $x > c$ or $x < c$ have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Example

Essential Skill: **Apply and extend previous understandings of arithmetic to algebraic expressions.**

What it looks like:

1. Write and evaluate numerical expressions involving whole-number exponents.
2. Write, read, and evaluate expressions in which letters stand for numbers.
3. Apply the properties of operations to generate equivalent expressions. *For example, apply the distributive property to the expression 3 (2 + x) to produce the equivalent expression 6 + 3x; apply the distributive property to the expression 24x + 18y to produce the equivalent expression 6 (4x + 3y); apply properties of operations to y + y + y to produce the equivalent expression 3y.*
4. Identify when two expressions are equivalent (i.e., when the two expressions name the same number regardless of which value is substituted into them). *For example, the expressions y + y + y and 3y are equivalent because they name the same number regardless of which number y stands for.*

Example

Essential Skill: **Represent and analyze quantitative relationships between dependent and independent variables.**

What it looks like:

1. Use variables to represent two quantities in a real-world problem that change in relationship to one another; write an equation to express one quantity, thought of as the dependent variable, in terms of the other quantity, thought of as the independent variable. Analyze the relationship between the dependent and independent variables using graphs and tables, and relate these to the equation. *For example, in a problem involving motion at constant speed, list and graph ordered pairs of distances and times, and write the equation d = 65t to represent the relationship between distance and time.*

Example

Essential Skill: **Develop understanding of statistical variability.**

What it looks like:

1. Recognize a statistical question as one that anticipates variability in the data related to the question and accounts for it in the answers. *For example, "How old am I?" is not a statistical question, but "How old are the students in my school?" is a statistical question because one anticipates variability in students' ages.*
2. Understand that a set of data collected to answer a statistical question has a distribution which can be described by its center, spread, and overall shape.
3. Recognize that a measure of center for a numerical data set summarizes all of its values with a single number, while a measure of variation describes how its values vary with a single number.

Example

Essential Skill: **Summarize and describe distributions.**

What it looks like:

1. Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
2. Summarize numerical data sets in relation to their context, such as by: a. Reporting the number of observations, b. Describing the nature of the attribute under investigation, including how it was measured and its units of measurement, c. Giving quantitative measures of center (median and/or mean) and variability (interquartile range and/or mean absolute deviation), as well as describing any overall pattern and any striking deviations from the overall pattern with reference to the context in which the data were
3. Gathered, and d. Relating the choice of measures of center and variability to the shape of the data distribution and the context in which the data were gathered.

Example

Essential Skill: **Solve real-world and mathematical problems involving area, surface area, and volume.**

What it looks like:

1. Find the area of right triangles, other triangles, special quadrilaterals, and polygons by composing into rectangles or decomposing into triangles and other shapes; apply these techniques in the context of solving real-world and mathematical problems.
2. Find the volume of a right rectangular prism with fractional edge lengths by packing it with unit cubes of the appropriate unit fraction edge lengths, and show that the volume is the same as would be found by multiplying the edge lengths of the prism. Apply the formulas $V = l\ w\ h$ and $V = b\ h$ to find volumes of right rectangular prisms with fractional edge lengths in the context of solving real-world and mathematical problems.
3. Draw polygons in the coordinate plane given coordinates for the vertices; use coordinates to find the length of a side joining points with the same first coordinate or the same second coordinate. Apply these techniques in the context of solving real-world and mathematical problems.
4. Represent three-dimensional figures using nets made up of rectangles and triangles, and use the nets to find the surface area of these figures. Apply these techniques in the context of solving real-world and mathematical problems.
5. Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
6. Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

Example