The Number System

Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; Represent addition and subtraction on a horizontal or vertical number line diagram. (7.NS.1)

Describe situations in which opposite quantities combine to make 0.

Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative
   direction depending on whether q is positive or negative.

Find absolute value of numbers and expressions

Show that a number and its opposite have a sum of 0 (are additive inverses).

Interpret sums of rational numbers by describing real-world contexts.

Understand 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 real-world contexts.

Apply properties of operations as strategies to add and subtract rational numbers.

Categorize equations by the following properties: commutative property, associative property,
   inverse property, and identity property for both multiplication and addition

Categorize equations as an example of the distributive property as multiplication
   over addition or subtraction

Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. (7.NS.2)

Understand that multiplication is extended from fractions to rational numbers by requiring
   that operations continue to satisfy the properties of operations, particularly the
   distributive property, leading to products such as $(–1)(–1) = 1$ and the rules for
   multiplying signed numbers.

Interpret products of rational numbers by describing real-world contexts.

Understand that integers can be divided, provided that the divisor is not zero, and every
   quotient of integers (with non-zero divisor) is a rational number. If p and q are integers,
   then $–(p/q) = (–p)/q = p/(–q)$.

Interpret quotients of

Apply properties of operations as strategies to multiply and divide rational numbers.

Convert a rational number to a decimal using long division; know that the decimal form
   of a rational number terminates in 0s or eventually repeats.

Solve real-world and mathematical problems involving the four operations with rational numbers (7.NS.3)

Translate word problems into expressions

Simplify expressions using the order of operations (a 4 step procedure)

Interpret rational number answer s by describing real-world contexts by writing a sentence

Expressions

Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. (7.EE.1)

Define algebraic vocabulary, including: variable, term, constant, coefficient, distributive
      property, like terms, factor, expand
Justify work by writing properties of equalities
Find GCF of rational terms
Factor expressions by finding the GCF
Factor expressions by finding the greatest common factor (including rational factors)
Use distributive property to expand linear expressions

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. (7.EE.2)

Convert between decimals and fractions fluently
Combine like terms
Use properties of numbers to generate equivalent expressions
Interpert the simlified expression in the context of the problem by writing a sentence

Equations

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. (7.EE.3)

Use properties of numbers to generate equivalent expressions and simplify expression
Convert between decimals, mixed numbers, and fractions fluently
Estimate problems to determine if the answers make sense

Use variables to represent quantities in a real-world or mathematical problem, and Construct simple equations and inequalities to solve problems by reasoning about the quantities. (7.EE.4)

Define variables by writing let statements
Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q,
      and r are specific rational numbers.
Solve equations of these forms fluently.
Simplify each side of an equation
Solve equations involving the distributive property and variable terms on both sides
Interpert the solution in the context of the problem by writing a sentence
 Compare an algebraic solution to an arithmetic solution, identifying the sequence of the
      operations used in each approach.
Solve word problems leading to inequalities of the form $px + q > r$ or $p(x + q) < r$, where p, q,
      and r are specific rational numbers.
Graph the solution set of the inequality in the context of the problem.
Interpret the solution set of the inequality in the context of the problem

Ratios and Proportions

Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. (7.RP.1)

Find ratios and rates, include conversions of units

Solve proportions

Calculate unit rate with units and rational numbers

Solve applications by writing a proportion, make sense of answer by writing a sentence

Interpert the solution in the context of the problem by writing a sentence

Recognize and represent proportional relationships between quantities(7.RP.2)

Decide whether two quantities are in a proportional relationship in three ways

    testing for equivalent ratios in a table

    observing whether the graph is a straight line through the origin by graphing on a coordinate plane
    represent proportional relationships by the equation, $y=kx$

Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams,

    and verbal descriptions of proportional relationships

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

Percent Applications

Use proportional relationships to solve multistep ratio and percent problems (7.RP.3)

Calculate amounts using proportions from word problems or ads with real world applications:

    include multiple step problems with the following types of percents:

    simple interest, tax, markups and markdowns, gratuities and commissions, fees,

    percent increase and decrease, percent error.

Interpert the solution in the context of the problem by writing a sentence

Area and Scale Drawings

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 (7.G.1)

Measure to the nearest 1/16 of an inch using a ruler

Measure to the nearest 1/10 of a centimeter using a ruler

Analyze the proportional relationship and

    Calculate actual length of an item when given a scale

    Calculate scale length when given the actual item

    Calculate actual area from a model when a scale

Draw a new model/diagram when given a new scale

Interpert the solution in the context of the problem by writing a sentence

Know the formulas for the area and circumference of a circle and
Use them(formulas) to solve problems;
Give an informal derivation of the relationship between the circumference
and area of a circle. (7.G.4)

Calculate area and circumference of a circle in terms of π or rounded

Calculate area of complex shapes in terms of π or rounded

Statistics and Sampling

Understand that statistics can be used to gain information about a population by examining a sample of the population;
generalizations about a population from a sample are valid only if the sample is representative of that population.
Understand that random sampling tends to produce representative samples and support valid inferences. (7.SP.1)

Define representative as an unbiased/random sample
Identify biased and unbiased samples when given a population and explain your choice

Use data from a random sample to draw inferences about a population with an unknown characteristic of interest.
Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. (7.SP.2)

Interpret results of a survey to make predictions or draw inferences about a population of interest

Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. (7.SP.3)

Interpret dot plots and box-and-whisker plots to compare measures of center and
        variability of the data sets
Make inferences about the data sets
Investigate and make inferences about how the difference in the measures of center

Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations (7.SP.4)

Calculate mean, median, mode, upper quartile, lower quartile, minimum, and maximum values
Construct dot plots and box-and-whisker plots for two data sets
Calculate the mean and mean absolute deviation of a data set
Interpret and compare the means and the mean absolute deviations for two data sets
Know that two data sets with similar variabilities affects the overlap in the data sets

Probability

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 likely, around 1/2 indicates an event that is neither unlikely nor and a probability near 1 indicates a likely event. (7.SP.5)

Describe the probability of an event as never/impossible, unlikely, equally likely, likely,
     or always/certain

Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability (7.SP.6)

Determine experimental probability of an event
Predict future events by using experimental probability

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. (7.SP.7)

Differentiate between experimental probability and theoretical probability
Develop a uniform probability model by assigning equal probability to all outcomes, and use
     the model to determine probabilities of events.
Develop a probability model (which may not be uniform) by observing frequencies in data
     generated from a chance process.
Determine theoretical probability of single events and make predictions

Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. (7.SP.8)

Understand that, just as with simple events, the probability of a compound event is the
     fraction of outcomes in the sample space for which the compound event occurs.
Represent sample spaces for compound events using methods such as organized lists, tables
     and tree diagrams.
 For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes
     in the sample space which compose the event.
Design and use a simulation to generate frequencies for compound events.

Angles

Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure. (7.G.5)

Categorize angles by their relationships: supplementary, complementary, vertical, and
      and adjacent angle

Solve for a variable when given an angle diagram

Solve for an angle when given algebraic expression for angles

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, unique noticing when the conditions determine a triangle, more than one triangle, or no triangle. (7.G.2)

3-Dimensional Figures

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. (7.G.6)

Calculate surface area of prims using area formulas

Calculate volume of prisms using area formulas

Calculate surface and volume of complex figures including prims

Calculate surface area and volume when given applications

Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids. (7.G.3)