MATH 6: SEMESTER 1

Unit: Introduction to Math 6

Lesson: The LAD Technique for Divisibility	6.NS.B.2: Students will learn to fluently divide multi-digit numbers using the standard algorithm.
Lesson: Prime and Composite Numbers	Intro for two major number groups. Foundational knowledge that helps set up students for success when finding the GCF in standard 6.NS.B.4
Lesson: Using Exponents	6.EE.A.1: Students will learn to write and evaluate numerical expressions involving whole-number exponents.
Lesson: Finding the GCF and LCM	6.NS.B.4: Students will learn to 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).
Lesson: Distributive Property	6.NS.B.4: ● Students will understand the distributive property. ● Students will be able to 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.

Lesson: E357 Technique Reducing Fractions	Students will be shown a technique to help them simplify fractions by testing some of the most common divisors for numbers. This technique can help students be successful in their future work with rational numbers.

Unit: Integers

Lesson: Integer Basics	Students will review the basic idea of integers; that they represent whole number values as compared to zero (positive and negative)
Lesson: Absolute Value	6.NS.C.7.c: Understand the absolute value of a rational number as its distance from 0 on the number line; interpret absolute value as magnitude for a positive or negative quantity in a real-world situation. (Note: This lesson deals with this subject using integers only)
Lesson: Comparing Integers	6.NS.C.6.c: Find and position integers and other rational numbers on a horizontal or vertical number line diagram
Lesson: Graphing Integers	6.NS.C.6.c: Find and position integers and other rational numbers on a horizontal or vertical number line diagram; find and position pairs of integers and other rational numbers on a coordinate plane.

Unit: Fractions, Decimals, and Percents

Lesson: Multiplying and Dividing Fractions	6.NS.A.1: Students will learn to interpret and compute quotients of fractions, and solve word problems involving division of fractions by fractions, e.g., by using visual fraction models and equations to represent the problem. For example, create a story context for (2/3) ÷ (3/4) and use a visual fraction model to show the quotient; 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. (In general, (a/b) ÷ (c/d) = ad/bc.) How much chocolate will each person get if 3 people share 1/2 lb of chocolate equally? How many 3/4-cup servings are in 2/3 of a cup of yogurt? How wide is a rectangular strip of land with length 3/4 mi and area 1/2 square mi?
Lesson: Adding and Subtracting Fractions	REVIEW 5.NF.A.1: Add and subtract fractions with unlike denominators (including mixed numbers) by replacing given fractions with equivalent fractions in such a way as to produce an equivalent sum or difference of fractions with like denominators.
Lesson: Fractions, Decimals, and Percents	Students will solidify their understanding of rational numbers by being able to fluently convert between equivalent representations of the same number in fraction, decimal, and percent form.
Lesson: Adding and Subtracting Decimals	6.NS.B.3: Students will learn to fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.
Lesson: Long Division	6.NS.B.2: Fluently divide multi-digit numbers using the standard algorithm.

Lesson: Dividing Decimals	6.NS.B.3: Fluently divide multi-digit decimals using the standard algorithm for each operation.
Lesson: Multiplying Decimals	6.NS.B.3: Fluently multiply multi-digit decimals using the standard algorithm for each operation.

MATH 6: SEMESTER 2

Unit: Introduction to Equations

Lesson: Order of Operations PEMDAS	6. EE.A.2.C: Students will evaluate expressions at specific values of their variables. Include expressions that arise from formulas used in real-world problems. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations).
Lesson: Variable Substitution	6.EE.A.2: Students will write, read, and evaluate expressions in which letters stand for numbers.

Lesson: Using Formulas	• 6.G.A.1: Students will learn to 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. • 6.G.A.2: Students will learn to 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. • 6.G.A.3: Students will learn to 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. • 6.G.A.4: Students will learn to 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

Lesson: Equivalent Expressions	• 6.EE.A.2: Students will learn to 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. • 6.EE.A.4: Students will learn to 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.*

Unit: Ratios

Lesson: Simple Ratio	• 6.RP.A.1: Students will understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities.
Lesson: Writing a Unit Rate	• 6.RP.A.2: Students will understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship.

Lesson: Using a Unit Rate to Solve a Problem	• 6.RP.A.1: Students will understand the concept of a ratio and use ratio language to describe a ratio relationship between two quantities. • 6.RP.A.2: Students will understand the concept of a unit rate a/b associated with a ratio a:b with b ≠ 0, and use rate language in the context of a ratio relationship. • 6.RP.A.3: Students will learn to 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. • 6.RP.A.3.A: Students will learn to 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. • 6.RP.A.3.B: Students will learn to solve unit rate problems including those involving unit pricing and constant speed. • 6.RP.A.3.C: Students will learn to 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. • 6.RP.A.3.D: Students will learn to use ratio reasoning to convert measurement units; manipulate and transform units appropriately when multiplying or dividing quantities.

Lesson: Commonly Used Fractions, Decimals, and Percents	• 6.RP.A.3.D: Students will learn to use ratio reasoning to convert measurement units.

Unit: Equations and Inequalities

Lesson: One-Step Equations	• 6.EE.B.7: Solve 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.
Lesson: Writing One-Step Equations	• 6.EE.B.7: Students will be able to to take contextual information and write a one-step equation to represent the situation.
Lesson: Writing an Equation	• 6. EE.B.6: Students will 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. • 6.EE.B.7: Students will learn to 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.

Lesson: Two-Variable Equations	6.EE.C.9: ● Students will understand the relationship between independent and dependent variables. ● Students will be able to fill in tables and plot coordinates from an equation with an independent and dependent variable. ● Students will be able to create equations with an independent and dependent variable based on data from a table or graph.
Lesson: Writing Two-Variable Equations	6.EE.C.9: ● Students will be able to analyze two-variable data and determine if an equation using addition or multiplication would be the most appropriate way to model the relationship. ● Students will be able to analyze two-variable data from tables and graph and write an equation to model the relationship.
Lesson: Writing an Inequality	6.EE.B.8: Students will learn to 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.

Lesson: Solving an Inequality	6.EE.B.5: Students will 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.
Lesson: Graphing Inequalities	6.EE.B.8: Recognize that inequalities of the form $x > c$ or $x <$ c have infinitely many solutions; represent solutions of such inequalities on number line diagrams.

Unit: Graphs

Lesson: Graphing Ordered Pairs	6.NS.C.6.c: Find and position pairs of integers and other rational numbers on a coordinate plane.
Lesson: Finding Distance with Coordinates	6.NS.C.8: Students will use the coordinate grid system along with graphing points on it to find distances between points with the same first or second coordinate.

Unit: Geometry

Lesson: Area of Triangles	6.G.A.1: ● Students will review the formula for the area of a rectangle learned in previous grades. ● Students will use rectangles to visualize the area of a triangle and justify the formula for area of a triangle.

Lesson: Area of Parallelograms	6.G.A.1: ● Students will understand the definition of a parallelogram. ● Students will use rectangles to visualize the area of a parallelogram and justify the formula for area of a parallelogram.
Lesson: Area of Polygons	6.G.A.1: ● Students will understand what a polygon is. ● Students will be able to break down complex polygons into simpler shapes such as rectangles, triangles, and parallelograms in order to find the area of the entire polygon.
Lesson: Graphing Shapes	6.G.A.3: ● Students will graph vertices of polygons and connect them with line segments to form polygons. ● Students will find the distance between vertices of polygons with the same x or y coordinates. ● Students will find the perimeter and area of polygons in the coordinate plane given only the coordinates of the vertices as starting information.

Lesson: Volume with Fractional Edges	6.G.A.2: ● Students will review the concept and formula for volume that they learned in 5th grade. ● Students will understand that the concept of volume applies to rectangular prisms that are smaller than 1 unit cube. ● Students will be able to apply the volume formula to rectangular prisms with fractional edge lengths.
Lesson: Nets of 3-D Figures	6.G.A.4: ● Students will understand the concept of surface area. ● Students will understand what a net of a 3-D figure is. ● Students will be able to draw a net of a 3-D figure. ● Students will be able to use nets to calculate the surface area of 3-D figures.

Unit: Statistics

Lesson: What Is Statistics?	6.SPA.1: ● Students will develop a basic understanding of the purpose of statistics and how they can be used. ● Students will be able to distinguish a statistical question from a non-statistical question. ● Students will understand the difference between numerical and categorical data.

Lesson: Describing Distributions	6.SPA.2: ● Students will understand what a distribution is in terms of statistics. ● Students will understand that distributions can be described by their center, spread, and overall shape. ● Students will be able to identify distributions that are symmetrical (roughly), skewed right, and skewed left.
Lesson: Measures of Center	6.SP.A.3 and 6.SP.B.5.C: ● Students will understand that a measure of center for numerical data is a single value that summarizes the entire distribution. ● Students will be able to calculate the median of a data set. ● Students will be able to calculate the mean of a data set.
Lesson: Measures of Variation	6.SP.A.3 and 6.SP.B.5.C: ● Students will understand that a measure of variation for numerical data is a single value that summarizes how the values vary in the distribution. ● Students will be able to calculate the interquartile range of a data set. ● Students will be able to calculate the mean absolute deviation of a data set.

Lesson: Display Numerical Data	6.SP.B.4: ● Students will understand that displaying numerical data always involves the number line. ● Students will be able to create a dot plot from numerical data. ● Students will be able to create a box plot from numerical data. ● Students will be able to create a histogram from numerical data.

MATH 7: SEMESTER 1

Unit: Numbers and Operations

Lesson: Reviewing Properties of Integers	Students work through a comprehensive review of the properties of integers which consists of the following topics: ○ Number sets ○ Formal properties ○ Vocabulary associated with addition, subtraction, multiplication, and division ○ Basic operations (add, subtract, multiply and divide) with two or more integers ○ The use of visual aids (number line, pictures, etc.) to perform addition and subtraction with negative integers ○ Absolute value definition and application ○ Order of operations

Lesson: Adding and Subtracting Rational Numbers	• 7.NS.A.1: Students will 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.A.1.C: Students will 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. • 7.NS.A.1.D: Students will apply properties of operations as strategies to add and subtract rational numbers. • 7.NS.A.1.B: Students will 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. 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.

Lesson Multiplying and Dividing Rational Numbers	• 7.NS.A.2: Students will apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers. • 7.NS.A.2.A: Students will 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. • 7.NS.A.2.B: Students will 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 rational numbers by describing real-world contexts. • 7.NS.A.2.C: Students will apply properties of operations as strategies to multiply and divide rational numbers. • 7.NS.A.2.D: Students will learn to 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.

Lesson: Rational Numbers	7.NS.A.3: Students will learn to solve real-world and mathematical problems involving the four operations with rational numbers.
Lesson: Number Comparisons	Review of 6.NS.C.7.b: Students will practice ordering rational numbers in fraction and decimal form.
Lesson: Exponents	Review of 6.EE.A.1: Write and evaluate numerical expressions involving whole-number exponents.
Lesson: Absolute Values	Review of 6.NS.C.7.c: Understand the absolute value of a rational number as its distance from 0 on the number line.

Unit: Algebraic Reasoning

Lesson: Order of Operations	• 7.EE.A.1: Students will apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients. • 7.EE.A.2: Students will 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.B.3: Students will 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.
Lesson: Equivalent Expressions	7.EE.A.2: • Students will understand that there are many ways to write the same expression. • Students will understand that rewriting expressions can sometimes shed more light on the context of the problem. ○ Students will understand this objective specifically as it relates to problems involving percentages.

Lesson: Solving Equations	• 7.EE.B.4.A: Students will learn to 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. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. • 7.EE.B.4.B: Students will learn to solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.
Lesson: Solving Inequalities	7.EE.B.4: Students will learn to 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.

Lesson: Proportional Relationships	• 7.RP.A.1: Students will learn to compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units. • 7.RP.A.2.A: Students will decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin. • 7.RP.A.2: Students will learn to recognize and represent proportional relationships between quantities. • 7.Rp.A.2.B: Students will learn to identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships. • 7.RP.A.2.C: Students will learn to represent proportional relationships by equations. • 7.RP.A.2.D: Students will learn 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. • 7.RP.A.3: Students will learn to use proportional relationships to solve multistep ratio and percent problems ◦ Examples: simple interest, tax, markups and markdowns, gratuities and

Lesson: Unit Rates with Rational Numbers	7.RP.A.1: Students will be able to compute unit rates associated with ratios of fractions measured in like or different units.
Lesson: Proportional Relationship Applications	7.RP.A.3: Students will use proportional relationships to solve real-world problems.

MATH 7: SEMESTER 2

Unit: Geometry and Measurement

Lesson: Circles	7.G.B.4: Students will 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.
Lesson: Theorems About Lines and Angles	7.G.B.5: Students will 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.
Lesson: Scale Drawings of Geometric Figures	7.G.A.1: Students will learn to 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.
Lesson: Constructions	7.G.A.2: Students will learn to 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.
Lesson: Trapezoids and Composite Shapes	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.

Lesson: Cross Sections of 3D Shapes	7.G.A.3: Students will describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.
Lesson: Volumes and Surface Areas	7.G.B.6: Students will learn to 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.
Lesson: Similar Shapes	8.G.A.4: Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a dilation. ○ Determine if two figures are similar by comparing the ratio of their corresponding sides. ○ Perform a dilation on figure on the coordinate plane.
Lesson: Transformations	8.G.A.3: Describe the effect of translations and reflections on two-dimensional figures using coordinates.

Unit: Data and Probability

Lesson: Simple Experiments	• 7.SP.A.1: 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. • 7.SP.B.4: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.
Lesson: Pie Charts and Histograms	Review 6.SP.B.4: Display numerical data in plots on a number line, including dot plots, histograms, and box plots. ○ Create and interpret pie charts as a way of visually representing data and drawing conclusions from it.
Lesson: Dot Plots, Histograms, and Box Plots	Review 6.SP.B.4: Display numerical data in plots on a number line, including dot plots, histograms, and box plots.
Lesson: Probability	7.SP.C.5: Students will learn to 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.

Lesson: Probabilities, Subsets, and Complements	7.SP.C.6: Students will learn 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, and predict the approximate relative frequency given the probability.
Lesson: Compound Events and Probabilities and Simulations	• 7.SP.C.7: Students will learn to 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.C.7.A: Students will learn to develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. • 7.SP.C.7.B: Students will learn to develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. • 7.SP.C.7.C: Students will learn to design and use a simulation to generate frequencies for compound events.

Lesson: Random Sampling	• 7.SP.A.1: Students will 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.A.2: Students will 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.B.3: Students will learn to 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.B.4: Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations.

Lesson: Evaluating Reports Based on Data and Making Valid Inferences	• 7.SP.C.8: Students will learn to find probabilities of compound events using organized lists, tables, tree diagrams, and simulation. • 7.SP.C.8: Students will 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 • 7.SP.C.8.B: Students will learn to 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.

MATH 8: SEMESTER 1

Unit: Introduction to Pre-Algebra

Lesson: Exponents	8.EE.A.1: Students will know and apply the properties of integer exponents to generate equivalent numerical expressions.
Lesson: Scientific Notation	• 8.EE.A.3: Students will learn to use numbers expressed in the form of a single digit times an integer power of 10 to estimate very large or very small quantities, and to express how many times as much one is than the other. • 8.EE.A.4: Students will learn to perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology
Lesson: Squares and Square Roots	8.EE.A.2: Students will learn to use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of small perfect squares and cube roots of small perfect cubes. Know that $\sqrt{2}$ is irrational.

Lesson: Comparing Numbers	8.NS.A.2: Use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram ○ Students will compare numbers with exponents on a number line. ○ Students will review how to use a number line to represent and perform addition and subtraction problems.
Lesson: The Number System	• 8.NS.A.1: Students will know that numbers that are not rational are called irrational. Understand informally that every number has a decimal expansion; for rational numbers show that the decimal expansion repeats eventually, and convert a decimal expansion which repeats eventually into a rational number. • 8.NS.A.2: Students will learn to use rational approximations of irrational numbers to compare the size of irrational numbers, locate them approximately on a number line diagram, and estimate the value of expressions (e.g., π^2).

Unit: Algebraic Reasoning

Lesson: Evaluating Expressions	Review 6.EE.A.2.c: Evaluate expressions at specific values of their variables. Perform arithmetic operations, including those involving whole-number exponents, in the conventional order when there are no parentheses to specify a particular order (Order of Operations). ○ Students will review basic number properties (commutative, associative, and distributive)
Lesson: Solving Equations	• 8.EE.C.7: Students will learn to solve linear equations in one variable. • 8.EE.C.7.A: Students will give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms, until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).

Lesson: Inequalities	• Review 7.EE.B.4: 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. • Review 7.EE.B.4.b: Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers. Graph the solution set of the inequality and interpret it in the context of the problem.

Unit: Linear Functions

Lesson: What Are Functions?	8.F.A.1: • Students will know the definition of a function. • Students will understand how functions and their graphs are related (inputs and outputs). • Students will be able to distinguish between functions and non-functions based on their graphs.
Lesson: Linear Functions	8.EE.B.5: Students will learn to graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways. For example, compare a distance-time graph to a distance-time equation to determine which of two moving objects has greater speed.

Lesson: Slope and Intercept	• 8.EE.B.6: Students will learn to 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; derive the equation y = mx for a line through the origin and the equation *y = mx + b* for a line intercepting the vertical axis at *b*. • 8.EE.C.8: Students will understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs, because points of intersection satisfy both equations simultaneously. • 8.EE.C.8.B: Students will learn to solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations. Solve simple cases by inspection. *For example, 3x + 2y = 5 and 3x + 2y = 6 have no solution because 3x + 2y cannot simultaneously be 5 and 6*. • 8.EE.C.8.C: Students will learn to solve real-world and mathematical problems leading to two linear equations in two variables. *For example, given coordinates for two pairs of points, determine whether the line through the first pair of points intersects the line through the second pair*.

Lesson: Using Linear Functions	• 8.EE.C.7.B: Students will learn to solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. • 8.F.A.1: Students will understand that a function is a rule that assigns to each input exactly one output. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. • 8.F.A.2: Students will learn to compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). • 8.F.A.3: Students will learn to interpret the equation $y = mx + b$ as defining a linear function, whose graph is a straight line; give examples of functions that are not linear. *For example, the function $A = s^2$ giving the area of a square as a function of its side length is not linear because its graph contains the points (1,1), (2,4) and (3,9), which are not on a straight line*.

Unit: Analyzing Functions

Lesson: Comparing Functions	8.F.A.2 and 8.F.B.4: ● Students will be able to make comparisons between functions represented in different formats (i.e., graphs, equations, tables, or words). ● Students will be able to identify key features of a function based on its graph. ● Students will be able to create a linear function (graph, table, or equation) based on a written description of the relationship between two quantities.
Lesson: Describing Graphs	8.F.B.5: Students will be able to identify certain characteristics from graphs (linearity, continuity, intervals of increase/decrease, and max/min points).
Lesson: Graphs from Context	8.F.B.5: Students will be able to create and interpret graphs based on a contextual story with qualitative descriptions of the graph in it.

MATH 8: SEMESTER 2

Unit: Transformations

Lesson: Introduction to Transformations	Students will get a brief introduction and overview of transformations and the topics that will be covered in greater detail in the coming lessons of this unit.
Lesson: Transformations - Translations	8.G.A.3: ● Students will understand how to translate figures on a plane. ● Students will understand the notation associated with translations on a plane.
Lesson: Transformations - Reflections	8.G.A.3: ● Students will understand how to reflect figures about the *x*-axis on a plane. ● Students will understand how to reflect figures about the *y*-axis on a plane. ● Students will understand how to reflect figures about the line $y = x$ on a plane.
Lesson: Transformations - Rotations	8.G.A.3: Students will understand how to rotate a figure 90°, 180°, and 270° around the origin.

Lesson: Dilation	8.G.A.3: ● Students will understand what a dilation does to an image and that dilations require a center of dilation and a scale factor. ● Students will be able to use a given pre-image and scale factor to calculate measurements on an image. ● Students will be able to identify the scale factor of a dilation based on an image and its pre-image.
Lesson: Performing a Dilation on the Coordinate Plane	8.G.A.3: Students will know how to dilate a pre-image given a scale factor and the center of dilation at the origin on the coordinate plane.

Unit: Congruence and Similarity

Lesson: Congruence	8.G.A.2: ● Students will understand the definition of congruence in terms of rigid transformations. ● Students will be able to describe a sequence of rigid transformations that exhibit congruence between two figures.
Lesson: Similarity	8.G.A.4: ● Students will understand the formal definition of similarity in terms of transformations. ● Students will be able to give a series of transformations to show that two figures are similar.

Lesson: Angles with Parallel Lines	8.G.A.5: Students will build on their experiment with cut out angles by learning the names and characteristics of angles formed when two parallel lines are cut by a transversal.
Lesson: Angle-Angle SImilarity	8.G.A.5: Students will build on their triangle similarity activity to solidify their understanding of the AA similarity postulate.

Unit: Geometry and Measurement

Lesson: The Pythagorean Theorem	• 8.G.B.6: Students will explain a proof of the Pythagorean Theorem and its converse. • 8.G.B.7: Students will learn to apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. • 8.G.B.8: Students will learn to apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Lesson: 2D and 3D Shapes	Review 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. ○ These concepts help students transition to working with volume in the next lesson.

Lesson: Volume	8.G.C.9: Students will know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems.

Unit: Data and Probability

Lesson: Central Tendency	8.SP.A.1: Students will learn to construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative association, linear association, and nonlinear association.
Lesson: Scatterplots	8.SP.A.2: Students will know that straight lines are widely used to model relationships between two quantitative variables. For scatter plots that suggest a linear association, informally fit a straight line, and informally assess the model fit by judging the closeness of the data points to the line.
Lesson: Two-Way Tables	8.SP.A.4: ● Students will know the parts of two-way tables and how to calculate the marginal values. ● Students will understand how to read and interpret bivariate categorical data from a two-way frequency table. ● Students will be able to convert a two-way frequency table into a two-way relative frequency table. ● Students will be able to identify patterns of association in categorical data from two-way tables.

Lesson: Sampling	7.SP.A.1: Students will 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.
Lesson: Probability	7.SP.C.5: Students will 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. 7.SP.C.6: Students will learn 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, and predict the approximate relative frequency given the probability. 7.SP.C.7: Students will 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.C.8: Students will 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.