The Number System **Recognizing the constancy of God's love through the constancy of math.**
Know that there are numbers that are not rational, and approximate them by rational numbers
1. - 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.
2. – 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). For example, for the approximation of 68, show that $\sqrt{68}$ is between 8 and 9 and closer to 8.
Example with infusion: Using significant numbers from our faith and/or the Bible, determine its place in the number system, i.e., real, integer, rational, irrational, whole, natural.
Expressions and Equations **Recognizing God's truth through the beauty of mathematical laws.**
Work with radicals and integer exponents
1. - 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.
2. - 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. For example, estimate the population of the United States as 3×10^8 and the population of the world as 7×10^9, and determine that the world population is more than 20 times larger.
3. – Read and write 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.
Example with infusion: Find population of Catholics in cities, countries, and the world and express them in scientific notation.
Understand the connections between proportional relationships, lines, and linear equations
4. – 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.
5. – 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 and extend to use the slop formula M = y2-y1/x2-x1 when given two coordinate planes(x1,y1 and (x_2,y_2). Generate the equation y=mx for a line through the origin (proportional) and the equation y = mx + b for a line with the slope *m* intercepting the vertical axis at y-intercept b (not proportional when b = (supposed to be not equal 0).
6. Describe the relationship between the proportional relationship expressed in *y = mx* and the non-proportional linear relationship *y = mx + b* as a result of vertical translation. Note: be clear with the students that all linear relationships have a constant rate of change (slope) but only the special case of proportional relationships (line that goes through the origin) continue to have a constant of proportionality.
Example with infusion: Graph the need for Catholic parishes in relation to Catholic populations and compare them to actual populations and parishes.
Analyze and solve linear equations and linear equations
7. – Fluently (efficiently, accurately, and flexibly) solve on-step, two-step, and multi-step linear equations and inequalities in one variable, including situations with the same variable appearing on both sides of the equal sign.
7a. - 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).
7b. - Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.
Example with infusion: Analyze the following Lenten fish fry scenario where x = number of children attended at $2.00/child, y = number of adults attended at $5.00/adult. 2x + 5y = $1,100 and x + y = 250 attendees. How many adults and children attended the fish fry?

Functions **Understand our value of the world is dependent on God's love for us.**
Define, evaluate, and compare functions
1. – Explain 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.
2. – Compare properties of two linear functions represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). For example, given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.
3. – 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.
Example with infusion: Compare and contrast the number of priests, deacons, and Catholic laity over time and show this by graphing.
Use functions to model relationships between quantities
4. – Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models, and in terms of its graph or a table of values.
5. – Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.
Example with infusion: Analyze the rise or decline of Christianity in our world over the past two millennia as a functional relationship.

Geometry **Identify the beauty of God's creation in geometric shapes.**
Geometric measurement: understand concepts of angle and measure angles.
1.—Recognize angles as geometric shapes that are formed wherever two rays share a common endpoint, and understand concepts of angle measurement.
1a. - An angle is measured with reference to a circle with its center at the common endpoint of the rays, by considering the fraction of the circular arc between the points where two rays intersect the circle. An angle that turns through $1/360$ of a circle is called a "one-degree angle," and can be used to measure angles.
1b. - An angle that turns through *n* one-degree angles is said to have an angle measure of *n* degrees.
2. – Measure angles in whole-number degrees using a protractor. Draw angles of specified measure using a protractor and straight edge.
3. –Recognize angle measure as additive. When an angle is decomposed into non-overlapping parts, the angle measure of the whole is the sum of the angle measures of the parts. Solve addition and subtraction problems to find unknown angles on a diagram in real world mathematical problems.
4. – Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and use them to solve simple equations for an unknown angle in a figure.
5. - Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion for similarity of triangles. For example, arrange three copies of the same triangle so that the sum of the three angles appears to form a line, and give an argument in terms of transversals why this is so.
6. - Draw (freehand, with ruler and protractor, and with technology) geometric shapes with given conditions. Focus on drawing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.
Example with infusion: Investigate different angles is your local church.
Understand and apply the Pythagorean Theorem
6. – Explain a proof of the Pythagorean Theorem and its converse.
7. – Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions.
8. – Apply the Pythagorean Theorem to find the distance between two points in a coordinate system.
Example with infusion: Use the Pythagorean Theorem in parish facilities to determine right triangles and/or 90 degree corners.
Solve real-world and mathematical problems involving measurement
9. – Use the formulas or informal reasoning to find the arc length, areas of sectors, surface areas and volumes of pyramids, condes, spheres. *For example, given a circle with 60 degrees central angle, students identify the arc length as 1/6 of the total circumference.*
10. - Investigate the relationship between the formulas of three dimensional geometric shapes: 10a. - Generalize the volume formula for pyramids and cones (V=1/3Bh). 10b. - Generalize surface area formula of pyramids and cones (SA = B + ½ Pl).
11. - Solve real-world and mathematical problems involving arc length, area of two-dimensional shapes including sectors, volume and surface area of three-dimensional objects including pyramids, cones, and spheres.
Example with infusion: Compare volume of church candles and evaluate as to how long they burn, cost savings, etc.

Statistics and Probability ***Develop an understanding of the diversity of God's creation.***
Investigate patterns of association in bivariate data
1. –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.
2. – 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.
3. – Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. *For example, in a linear model for a biology experiment, interpret a slope of 1.5 cm/hr. as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.*
4. – Understand that patterns of association can also be seen in bivariate categorical data by displaying frequencies and relative frequencies in a two-way table. Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible association between the two variables. *For example, collect data from students in your class on whether or not they have a curfew on school nights and whether or not they have assigned chores at home. Is there evidence that those who have a curfew also tend to have chores?*
Example with infusion: Gather data and analyze daily mass attendance over a period of time and model to a linear formula in order to predict future daily mass attendance.