8th Grade - IC - I Cans...

The Number System 8.NS	The Number System 8.NS
Know that there are numbers that are not rational, and approximate them by rational numbers.	**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. **(8.NS.1.)**	I can determine if a number is rational or irrational. I can convert a fraction to a repeating decimal. I can convert a repeating decimal to a fraction.
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, by truncating the decimal expansion of √2, show that √2 is between 1 and 2, then between 1.4 and 1.5, and explain how to continue on to get better approximations.* ***(8.NS.2.)***	I can place rational and irrational numbers on a number line. I can estimate square root values, without a calculator.

Expressions and Equations 8.EE	Expressions and Equations 8.EE
Work with radicals and integer exponents.	**Work with radicals and integer exponents.**
1. Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. **(8.EE.1.)**	I can find equivalent expressions by: • Adding exponents • Subtracting exponents • Multiplying exponents • Dividing exponents
2. 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 √2 is irrational. **(8.EE.2.)**	I can evaluate square roots and cube roots I can identify small perfect square roots and small perfect cubes roots
3. 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.* **(8.EE.3.)**	I can estimate and compare the value of numbers expressed in scientific notation

8th Grade - IC - I Cans...

4. 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. **(8.EE.4.)**	I can solve problems where decimals and scientific notation are used using technology. I can determine the units of appropriate size of measurements for a given situation.
Understand the connections between proportional relationships, lines, and linear equations.	**Understand the connections between proportional relationships, lines, and linear equations.**
5. 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.* **(8.EE.5.)**	From a given situation, I can: • Identify/define variables • Construct a table • Construct a graph I can describe the relationship between two quantities by analyzing the graph
6. 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.6.)**	From a given situation, I can: • Write an expression • Write an equation (y=mx) • Write an equation (y=mx + b)
Analyze and solve linear equations and pairs of simultaneous linear equations. 7. Solve linear equations in one variable.	**Analyze and solve linear equations and pairs of simultaneous linear equations.** I can solve one-step equations and two-step equations, with correct work.
a. 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).	I can determine if an equation has one solution, infinitely many solutions or no solutions
b. Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **(8.EE.7.)**	I can solve equations: • By combining like terms • By using the distributive property • By using the distributive property and combining like terms • With variables on both sides

8th Grade - IC - I Cans...

8. Analyze and solve pairs of simultaneous linear equations.	
a. 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.	I can solve systems of equations by using the: • Graphing method • Substitution method • Elimination method • Simple cases by inspection
b. 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.*	
c. 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.* **(8.EE.8.)**	I can solve real-world problems by writing a system of equations This includes: • defining variables • writing two linear equations • algebraically solving a system of equations
Functions 8.F	**Functions 8.F**
Define, evaluate, and compare functions.	**Define, evaluate, and compare functions.**
1. 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.[1] (8.F.1.)	I can determine the output value of a function, if the input is given. Example: Find the value of y, when given x. Find the value of x, when given y.
2. Compare properties of two functions each 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.* **(8.F.2.)**	I can compare properties of two functions represented in a different way: • Equation and graph • Equation and table • Equation and verbal description • Graph and table • Graph and verbal description • Table and verbal description
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.* **(8.F.3.)**	From a given situation, I can: • Write an expression • Write an equation (y=mx) • Write an equation (y=mx + b) I can determine if an equation is linear
Use functions to model relationships between quantities.	**Use functions to model relationships between quantities.**

8th Grade - IC - I Cans...

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. **(8.F.4.)**	I can determine the slope and y-intercept: • From a table • From a graph • From an equation • From a situation • From two points
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. **(8.F.5.)**	I can describe the relationship between two quantities by analyzing the graph I can create a graphical representation given the description of the relationship between two quantities
Geometry 8.G	**Geometry 8.G**
Understand congruence and similarity using physical models, transparencies, or geometry software.	**Understand congruence and similarity using physical models, transparencies, or geometry software.**
1. Verify experimentally the properties of rotations, reflections, and translations: a. Lines are taken to lines, and line segments to line segments of the same length. b. Angles are taken to angles of the same measure. c. Parallel lines are taken to parallel lines. **(8.G.1.)**	I can identify rotation symmetry in a given figure I can identify the angle of the rotation in a shape with rotation symmetry I can rotate a shape around a point I can identify shapes with reflection symmetry I can identify all lines of symmetry in a shape I can reflect a shape over a line I can determine if a shape has translation symmetry I can identify the distance and the direction the shape was translated I can translate a shape
2. Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections, and translations; given two congruent figures, describe a sequence that exhibits the congruence between them. **(8.G.2.)**	I can compare congruent shapes I can find the values of corresponding parts, lines and angles, when given the line of symmetry

8th Grade - IC - I Cans...

3. Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **(8.G.3.)**

I can dilate, translate, rotate, and reflect two-dimensional figures on the coordinate plane.
I can describe the effects of dilations, translations, rotations, and reflections using coordinate notation.
Given an image and its transformed image, I can use coordinate notation to describe the transformation.

4. Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations, and dilations; given two similar two-dimensional figures, describe a sequence that exhibits the similarity between them. **(8.G.4.)**

I can use transformations to demonstrate the meaning of similarity of two figures.
Given two similar two-dimensional figures, I can describe the sequence of transformations that shows the similarity between them.

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.* **(8.G.5.)**

I can use informal arguments to establish facts about:
• The angle sum of triangles
• The exterior angle of triangles
I can determine the relationship between corresponding angles, alternate interior angles, alternate exterior angles, vertical pairs, and supplementary pairs when parallel lines are cut by a transversal.
I can recognize that if two triangles have two congruent angles, then they are similar triangles (angle-angle)

Understand and apply the Pythagorean Theorem.

6. Explain a proof of the Pythagorean Theorem and its converse. **(8.G.6.)**

Understand and apply the Pythagorean Theorem.

I can explain a proof of the Pythagorean Theorem
I can determine if 3 given lengths can form a right triangle

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.G.7.)**

I can apply the Pythagorean Theorem to problems involving right triangles including:
• Find the length of the hypotenuse of a right triangle
In two dimensions
In three dimensions
• Find the lengths of the legs of a right triangle
In two dimensions
In three dimensions
• Real-world problems
In two dimensions
In three dimensions

8th Grade - IC - I Cans...

8. Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **(8.G.8.)**	I can apply the Pythagorean Theorem to problems involving right triangles to find the shortest distance between two points on a coordinate grid (helicopter)
Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres. 9. Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **(8.G.9.)**	**Solve real-world and mathematical problems involving volume of cylinders, cones, and spheres.** Using formulas, I can find the volume of: • Cones • Cylinders • Spheres I can use the volume formulas to solve real world problems involving: • Cones • Cylinders • Spheres I can use the volume formulas to solve mathematical problems involving: • Cones • Cylinders • Spheres
Statistics and Probability 8.SP	**Statistics and Probability 8.SP**
Investigate patterns of association in bivariate data.	**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. **(8.SP.1.)**	I can construct scatter plots for bivariate measurement data I can interpret scatter plots by describing: • Clustering • Outliers • Positive or negative association • Linear or non-linear 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. **(8.SP.2.)**	I can determine the line of best fit for a scatterplot I can use the line of best fit to: • Make predictions about the data • Determine the closeness of the data • Find the slope • Find the y-intercept

8th Grade - IC - I Cans...

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.* **(8.SP.3.)**	I can use two points to find the equation of the line of best fit (modeling line) I can interpret the slope I can interpret the y-intercept I can use the equation of the modeling line to make predictions.
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?* **(8.SP.4.)**	I can construct a two-way table I can interpret a two-way table I can use relative frequencies to interpret and describe possible association between two variables

[1] Function notation is not required in Grade 8.