STANDARDS ALGEBRA

PURPOSE:

Students will demonstrate number sense by applying properties and performing computational procedures on algebraic expressions. Students will apply properties of geometric shapes and measurement formulas to solve real world problems. Students will be able to manipulate, solve, and graph linear equations and systems of linear equations. Students will use Trigonometry to find missing sides and angles of right triangles and work with special triangles.

BENCHMARKS AND INDICATORS:

Number Sense

1.2 Uses properties

- ***S12K3a-e names, uses, and describes these properties with the real number system and demonstrates their meaning including the use of concrete objects**
  - **a. commutative (a + b = b + a and ab = ba), associative [a = (b + c) = (a + b) + c and a(bc) = (ab)c], distributive [a (b + c) = ab + ac], and substitution properties (if a = 2, then 3a = 3 x 2 = 6);**
  - **b. identity properties for addition and multiplication and inverse properties of addition and multiplication (additive identity: a + 0 = a, multiplicative identity: a • 1 = a, additive inverse: $^{+}5 + ^{-}5 = 0$, multiplicative inverse: 8 x 1/8 = 1);**
  - c. symmetric property of equality (if a = b, then b = a);
  - d. addition and multiplication properties of equality (if a = b, then a + c = b + c and if a = b, then ac = bc) and inequalities (if a > b, then a + c > b + c and if a > b, and c > 0 then ac > bc);
  - e. zero product property (if ab = 0, then a = 0 and/or b = 0)

1.3 Uses estimation

- ***S13A1 adjusts original rational number estimate of a real-world problem based on additional information (a frame of reference) (must be able to set up a proportion to solve these problems)**

1.4 Solves application problems

- ***S14A1abd generates and/or solves multi-step real-world problems with real numbers and algebraic expressions using computational procedures (addition, subtraction, multiplication, division, roots, and powers excluding logarithms), and mathematical concepts with $:**
  - **a. applications from business, chemistry, and physics that involve addition, subtraction, multiplication, division, squares, and square roots when the formulae are given as part of the problem and variables are defined**
  - **b. volume and surface area given the measurement formulas of rectangular solids and cylinders**
  - **d. application of percents including compound interest given to formula**
- S14K2a computes using order of operations
- S14K2b solves percent problems
- S14K2c manipulates variable quantities in an equation or inequality

Algebra

2.2 Solves equations and inequalities

- **N*S22K3c solves systems of linear equations with two unknowns using integer coefficients and constants**
- **N*S22A2a represents and/or solves real-world problems with linear equations and inequalities both analytically and graphically**

2.3 Graphs linear equations and relates graph to the real-world

- S23K1 explains the use of variables as parameters such as y = mx + b where m and b are the parameters for the line
- NS23K3a solves linear equations and inequalities both analytically and graphically
- ***S23K6 recognizes how changes in the constant and/or slope within a linear function changes the appearance of a graph**
- ***S23A2 interprets the meaning of the x- and y- intercepts, slope, and/or points on and off the line on a graph in the context of a real-world situation**

Geometry

3.1 Uses the Pythagorean Theorem and special triangles

- S31K6b recognizes the relationship of the ratio of the sides of a 45/45 and 30/60 degree triangle
- S31A2 uses the relationship of a the ratio of the sides of a 45/45 and 30/60 degree triangle to find missing sides
- ***S31A1b solves real-world problems by applying the Pythagorean Theorem**

3.2 Uses estimation, measurement, and geometric formulas

- S32K3 converts between customary and metric systems given the conversion ratios
- S32K4 uses appropriate formula to find perimeter and area of squares, rectangles, triangles, circles and volume of rectangular solids
- S32K5 given the formula finds the surface area and volume of regular three dimensional figures
- S32K7 uses ratios and proportions to solve problems

3.3 Finds the effect of transformations on geometric shapes

- ***S33A1 analyzes the impact of transformations on the perimeter and area of circles, rectangles, and triangles and volume of rectangular prisms and cylinders**

3.4 Compares slopes of lines and changes the form of the equation of the lines

- S34K3 calculates the slope of a line given two points
- S34K2 determines if a point is on a line without graphing
- ***S34K4 finds and explains the relationship between the slopes of parallel and perpendicular lines**
- ***S34K6 recognizes the equation of a line and transforms the equation into slope-intercept form in order to identify the slope and y-intercept and uses this information to graph the line**

3.4 Uses Trigonometry to find missing sides and angles of right triangles.

- S35K1 identifies opposite and adjacent legs and hypotenuse of right triangles
- S35K2 identifies sine as the ratio of opposite/hypotenuse
- S35K3 uses the calculator to find the sine of an angle and find the angle given the ratio (sin ^-1)
- S35K4 solves equations involving sine
- S35A1 uses sine to find missing sides and angles of right triangles

Data

4.1 Compares odds and probability

- ***S41K3 explains the relationship between probability and odds and computes one given the other**

4.2 Compares graphs using data analysis

- ***S42K4 explains the effects of outliers on the measures of central tendency (mean, median, mode) and range and interquartile range of a real number data set**
- ***S42K5 approximates a line of best fit given a scatter plot and makes predictions using the equation of that line**
- ***S42A1a-h uses data analysis (mean, median, mode, range, quartile, interquartile range) in real-world problems with rational number data sets to compare and contrast two sets of data, to make accurate inferences and predictions, to analyze decisions, and to develop convincing arguments from these data displays :**
  - **a. frequency tables**
  - **b. bar, line, and circle graphs**
  - **c. Venn diagrams or other pictorial displays**
  - **d. charts and tables**
  - **e. stem-and-leaf plots (single and double)**
  - **f. scatter plots**
  - **g. box-and-whiskers plots**
  - h. **histograms**