## Math Assessed Benchmarks and Look Fors

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INTEGRATED MATH 6
Assessed Benchmarks and “Look Fors”

1st Quarter

Standard #1 Number Sense ~ Prime Time & Fluency Workbook Ch1
  o 1.3a Identify and use the concepts of factor, multiple, prime, composite, and square numbers.
    - Recognize situations in which problems can be solved by finding factors and multiples
    - Develop strategies for finding LCM and GCF
  o 1.3b Describe numbers by characteristics
    - Describe even, odd, composite, square, divisible by, and prime numbers

Standard #2 Algebra ~ Navigating Through Algebra & Fluency Workbook Ch 6
  o 2.1a Represent, describe and analyze numeric or geometric patterns involving common positive rational numbers or integers using tables, graphs, rules, or symbols
    - Analyze patterns in order to make meaning
  o 2.2a Solve problems by representing and analyzing patterns using tables, words, concrete objects, or pictures
    - Describe a pattern represented in a table, written situation, or picture
    - Use a pattern to solve a problem

2nd Quarter

Standard #1 Number Sense ~ Bits & Pieces I & Fluency Workbook Ch 2, 3
  o 1.1b Use physical materials or pictures to demonstrate the meaning and equivalence of commonly used fractions, decimals and percents.
    - Using physical models to demonstrate the meaning of fractions, decimals, and percents.
    - Use physical models to find equivalent fractions, decimals and percents.
    - Move flexibly between fractions, decimals, and percents. (equivalence)
  o 1.2a Read, write, order, and compare common fractions, decimals, and percents in a variety of forms.
    - Relate fraction benchmarks to decimal benchmarks
    - Use 0, ½, 1, 1 ½, as benchmarks to estimate size of a number

Standard #3 Statistics and Probability ~ Data About Us & Fluency Workbook Ch 8
  o 3.1a Organize and construct a line graph, bar graph, and frequency table from a given set of data.
    - Determine appropriate labels and scale based on the data set
    - Organize and construct tables, line plots, and bar graphs to display data
3.1b Read, interpret and draw conclusions from a line graph, bar graph, circle graph, and frequency table
- Interpret tables, line plots, and bar graphs
- Use measures of center to describe what is typical about the data

3.2a Find and use measures of central tendency including mean, median, and mode
- Compare data sets by using measures of center (mean, median, mode, range)

3rd Quarter

Standard #6 Computation ~ **Bits II (CMP1)** or **BitsII & III (CMP2)**
- 6.2a Demonstrate conceptual meaning of addition and subtraction of fractions and decimals in problem-solving situations.
  - Use fractions, decimals, and percents to estimate and compute problems
  - Represent addition and subtraction of fractions and decimals with models.
- 6.2b Use and explain strategies to add/subtract decimals and fractions in problem-solving situations.
  - Use appropriate algorithm, to solve problems involving addition and subtraction of fractions and decimals and can explain why/how the algorithm works.
  - Use estimation to check for reasonableness of answer.

Standard #4 Geometry ~ **Shapes and Designs & Fluency Workbook Ch 9**
- 4.2a Identify, compare, and analyze the attributes of two and three dimensional shapes and develop vocabulary to describe the attributes.
  - Describe the attributes (parallelism, perpendicularity, and congruence) of triangles and quadrilaterals
  - Identify angles as acute, obtuse, or right. Identify lines as parallel, perpendicular, intersecting and/or segments.
- 4.6a Identify congruent shapes using reflections, rotations, and translations.
  - Identify congruency

4th Quarter

Standard #4 Geometry ~ **Covering and Surrounding & Fluency Workbook Ch 10**
- 4.5a Solve problems involving the perimeter of polygons
  - Use dimensions appropriately to find perimeter
- 4.5b Solve problems involving areas of polygons
  - Use dimensions appropriately to find area
  - Find area by decomposing into other shapes
Standard #5 Measurement ~ **Covering and Surrounding**
- 5.4a Use formulas and/or procedures to solve problems involving the perimeter of a polygon
  - Describe the formula for finding the perimeter and justify how it works
- 5.4b Use formulas and/or procedures to solve problems involving the area of squares, rectangles, parallelograms, rhombus, and triangles
  - Describe the formula for finding the perimeter and justify how it works

Standard #3 Statistics and Probability ~ **How Likely Is It?**
- 3.7a Determine the number of possible outcomes for simple events using a variety of methods such as: organized lists or tree diagrams.
  - Determine experimental probability using methods such as an organized list
ADVANCED INTEGRATED MATH 6
Assessed Benchmarks and “Look Fors”

1st Quarter

Standard #2 Algebra ~ *Fluency Workbook Gr. 6: Ch 6*
- 2.1a *(7th)* Represent, describe and analyze numeric or geometric patterns involving common positive rational numbers or integers using tables, graphs, rules, or symbols
  - Analyze patterns in order to draw conclusions
- 2.2a Solve problems by representing and analyzing patterns using tables, words, concrete objects, or pictures
  - Describe a pattern represented in a table, written situation, or picture
  - Use a pattern to solve a problem

Standard #1 Number Sense ~ *Bits I & Fluency Workbook Gr. 6: Ch 2-3*
- 1.1b Use physical materials or pictures to demonstrate the meaning and equivalence of commonly used fractions, decimals and percents.
  - Uses double bar models, number lines, area models, and hundred grids to demonstrate meaning.
  - Uses models and materials to find equivalent fractions, decimals, and percents.
  - Move flexibly between fractions, decimals, and percents (equivalence).
- 1.2a Read, write order, and compare common fractions, decimals and percents in a variety of forms.
  - Relate fraction benchmarks to decimal benchmarks.
  - Use 0, ½, 1, 1½ as benchmarks to estimate the size of a number.
  - Includes non-benchmark numbers and values greater than 100% and less than 1%.

Standard #3 Statistics and Probability ~ *Data and Distribution & Data About Us & Fluency Workbook Gr. 6: Ch 8*
- 3.1a Organize and construct a line graph, bar graph, and frequency table from a given set of data.
  - Determine appropriate labels and scale based on the data set
  - Organize and construct a variety of data displays, including scatter plot, stem-and-leaf plot.
- 3.1b Read, interpret and draw conclusions from a line graph, bar graph, circle graph, and frequency table
  - Interpret tables, line plots, scatter plots, stem-and-leaf plots, and bar graphs
- 3.2a Find and use measures of central tendency including mean, median, and mode
  - Compare data sets by using measures of center (mean, median, mode, range)

2nd Quarter

Standard #6 Computation ~ **Bits II(CMP1)** or **Bits II & III(CMP2) & Fluency Workbook Gr. 6: Ch 5**
- 6.2a Demonstrate understanding of +/- of fractions, decimals, and percents.
- 6.2b Explain strategies for +/- of fractions, decimals, and percents.

Standard #4 Geometry ~ **Shapes and Designs & Fluency Workbook Gr. 6: Ch 9**
- 4.2a Identify, compare, and analyze the attributes of two and three dimensional shapes and develop vocabulary to describe the attributes.
  - Describe the attributes (parallelism, perpendicularity, and congruence) of triangles and quadrilaterals
  - Identify angles as acute, obtuse, or right. Identify lines as parallel, perpendicular, intersecting and/or segments.
- 4.5a Solve problems involving perimeter of polygons.
  - Understand and use perimeter as a linear measure of regular and irregular shapes.
- 4.5b Solve problems involving area of polygons.
  - Understand and use area as a measure of square units of regular and irregular shapes.
- 4.6a Identify congruent shapes using reflections, rotations, and translations.
  - Identify congruency
3rd Quarter

Standard #4 Geometry ~ **Covering and Surrounding & Fluency Workbook Gr. 6: Ch 10**

- 4.5b Solve problems involving areas of polygons
  - Use dimensions appropriately to find area
  - Find area by decomposing into other shapes

Find the area of circles

Standard #3 Statistics and Probability ~ **What Do You Expect & Fluency Workbook Gr. 7: Ch 8**

- 3.6a (7th) Determine and record the probability of an event in fraction, decimal and percent form

- 3.6c (7th) Make predictions based on theoretical probability
  - Uses probability analysis to make decisions

- 3.7a (7th) Determine the number of possible outcomes from a given event using a variety of strategies.
  - Uses area models, organized lists, or tree diagrams to model outcomes of sequential events

Standard #2 Algebra ~ **Variables and Patterns & Fluency Workbook Gr. 7: Ch 6**

- 2.1a (7th) Represent, describe and analyze numeric or geometric patterns involving common positive rational numbers or integers using tables, graphs, rules or symbols
  - Makes a table and graph from a scenario
  - Makes a graph from a table or a table from a graph
  - Represents a relationship between variables with symbols
  - Given a table, graph, or rule, informally describe linear function.

- 2.3a (7th) Predict and describe how a change in one quantity results in a change in another quantity in a linear relationship
  - Describes patterns of change with rules
4th Quarter

Standard #1 Number Sense ~ Accentuate the Negative & Fluency Workbook Gr. 7: Ch 1
  o 1.2a (7th) Read, write, order and compare positive rational numbers and integers
    • Represents and compares integers using a number line
  o 1.4a (7th) Use the relationships among fractions, decimals and percents including the concepts of ratio and proportion in problem-solving situations

Standard #6 Computation Sense ~ Accentuate the Negative & Fluency Workbook Gr. 7: Ch 1
  o 6.2a (7th) Apply order of operations, (including exponents) with positive rational numbers
    • Applies correct order of operations in simple expressions
    • Applies correct order of operations in expressions with exponents and parentheses
    • Can express why you have to do operations in PEMDAS order
  o 6.2.c (7th) Add, subtract, multiply and divide positive rational numbers or integers
    • Develops strategies to add, subtract, multiply and divide integers
    • Use models (chip model, number line, etc.) to explain strategies to add, subtract, multiply and divide integers.

Standard #4 (7th) Geometry ~ Stretching and Shrinking & Fluency Workbook Gr. 7: Ch 10
  o 4.3a Identify and compare similar shapes using ratio, proportion, or scale factor
    • Predicts how figures on a coordinate plane are affected by a given rule
    • Determines scale factor between two similar figures
    • Determines and justify when figures are similar using scale factor and angle measures
INTEGRATED MATH 7
Assessed Benchmarks and “Look Fors”

1st Quarter

Standard #2  Algebra ~ **Variables and Patterns & Fluency Workbook Ch 6**
  o 2.1a Represent, describe and analyze numeric or geometric patterns involving common positive rational numbers or integers using tables, graphs, rules or symbols
    - Makes a table and graph from a scenario
    - Makes a graph from a table or a table from a graph
    - Represents a relationship between variables with symbols
  o 2.3a Predict and describe how a change in one quantity results in a change in another quantity in a linear relationship
    - Describes patterns of change with rules

Standard #4 Geometry ~ **Stretching and Shrinking & Fluency Workbook Ch 9**
  o 4.3a Identify and compare similar shapes using ratio, proportion, or scale factor
    - Predicts how figures on a coordinate plane are affected by a given rule
    - Determines scale factor between two similar figures
    - Determines and justify when figures are similar using scale factor and angle measures

Standard #5 Measurement ~ **Stretching and Shrinking & Fluency Workbook Ch 9**
  o 5.3b Select the appropriate scale for a given problem
    - Chooses appropriate axes and scales to graph a relationship between variables
  o 5.5a Describe how a change in an object’s linear dimensions affects its perimeter and area
    - Determines perimeters of similar figures using scale factor
    - Determines areas of similar figures using scale factor

2nd Quarter

Standard #1 Number Sense ~ **Comparing and Scaling**
  o 1.2a Read, write, order and compare positive rational numbers and integers
    - Represents and compares integers using a number line
  o 1.4a Use the relationships among fractions, decimals and percents including the concepts of ratio and proportion in problem-solving situations
Standard #6 Computation ~ **Comparing and Scaling**
- 6.1a Use concrete materials or pictures to explain how ratios, proportion, and percents can be used to solve real world problems
  - Develops strategies for solving proportions
  - Uses proportional reasoning to solve scaling problems

Standard #6 Computation ~ **Accentuate the Negative & Fluency Workbook Ch 1**
- 6.2b Add, subtract, multiply and divide positive rational numbers or integers
  - Develops strategies to add, subtract, multiply and divide integers
  - Use models (chip model, number line, etc.) to explain strategies to add, subtract, multiply and divide integers.

3rd Quarter

Standard #2 Algebra ~ **Moving Straight Ahead & Fluency Workbook Ch 7-8**
- 2.2a Solve problems by representing and analyzing patterns involving positive rational number or integers using tables, graphs or rules
  - Makes predictions from data in tables and graphs
  - Recognizes how rate of change is shown in different representations
  - Recognizes how y-intercept is shown in different representations
  - Develops strategies for writing an equation of a linear relationship

- 2.5a Solve simple linear equations in problem solving situations using a variety of methods (informal, formal or graphic)
  - identifies rate of change (slope) from tables
  - identifies rate of change (slope) from graphs

- 2.5b Translate written words to algebraic expressions/equations and conversely, algebraic expressions/equations to words
  - Given a real life situation can write an algebraic expression that matches.
  - Given an algebraic expression can tell the meaning of each part and create a real life situation that matches.

Standard #4 Geometry ~ **Accentuate the Negative**
- 4.4a Construct a coordinate graph and plot ordered integer pairs in all four quadrants
  - Makes tables and graphs in 4 quadrants from equations
  - Graphs points accurately in four quadrants

Standard #6 Computation ~ **Accentuate the Negative CMP2**
- 6.2a Apply order of operations, (including exponents) with positive rational numbers
  - Applies correct order of operations in simple expressions
• Applies correct order of operations in expressions with exponents and parentheses
• Can express why you have to do operations in PEMDAS order

4th Quarter

Standard #3 Statistics and Probability ~ What Do You Expect & Fluency Workbook Ch 8
  o 3.6a Determine the probability of an event in fraction, decimal and percent form
    • Uses theoretical probabilities to make predictions
    • Records probability as a fraction, decimal and percent
  o 3.6c Make predictions based on theoretical probability
    • Uses probability analysis to make decisions
  o 3.7a Determine the number of possible outcomes from a given event using a variety of strategies such as: tree diagrams or organized lists
    • Uses area models or tree diagrams to model outcomes of sequential events

Standard #4 Geometry ~ Filling and Wrapping & Fluency Workbook Ch 10
  o 4.5a Solve problems involving perimeter and area in two dimensions, and involving surface area and volume in three dimensions (including right prisms and cylinders)
    • Applies perimeter and area of plane figures to finding surface area
    • Solve problems involving the areas of circles, triangles, and parallelograms (formulas not provided)
    • Solve problems involving the surface area of rectangular prisms (formulas not provided)
1st Quarter

Standard #1 Number Sense ~ Comparing and Scaling

- 1.4a Use the relationships among fractions, decimals and percents including the concepts of ratio and proportion in problem-solving situations
  - Interprets fractions as ratios, rates, and comparisons using division
  - Develops strategies for solving proportions
  - Uses proportional reasoning to solve scaling problems
  - Apply the concept of ratio, proportion, similarity, and scale factor in problem solving situations
  - Uses concrete materials or pictures to explain how ratios, proportion, and percents can be used to solve real world problems

Standard 3 - Statistics and Probability ~ Samples and Populations & Fluency Workbook Gr. 8: Ch 6

- 3.2a Display and use measures of central tendency (such as mean, median, and mode) and measures of variability (such as range and quartiles) in problem solving situations.
  - Use measures of center (mean and median) measures of spread (range and percentile) to describe data
  - Use measures of center (mean and median) measures of spread (range and percentile) to analyze data.
  - Use range and quartiles to analyze a distribution of data.
  - Read and construct displays of data such as stem-and-leaf plots, histograms, and box-and-whisker plots using appropriate techniques
  - Analyze data presented in stem-and-leaf plots, histograms, and box-and-whisker plots.

Standard #2 Algebra ~ Moving Straight Ahead & Fluency Workbook Gr. 7: Ch 7

- 2.1a Represent, describe, and analyze numeric or geometric patterns involving common positive rational numbers or integers using tables, graphs, rules, or symbols
  - Makes predictions from data in tables and graphs
  - Recognizes how rate of change is shown in different representations
  - Recognizes how y-intercept is shown in different representations
  - Develops strategies for writing an equation of a linear relationship
  - Solves problems using tables, graphs, and rules
o 2.5a Solve simple linear equations in problem solving situations using a variety of methods (formal, informal, and graphical)
  - Explain whether data presented in a chart or graph is changing at a constant rate
  - Identifies rate of change (slope) from tables
  - Identifies rate of change (slope) from graphs
  - Identifies slope and y-intercept in the context of a problem
  - Solve simple linear equations using graphing, tables and symbolic representation

o 2.5b Translate written words to algebraic expressions/equations and conversely, algebraic expressions/equations to words
  - Given a real life situation can write an algebraic expression that matches.
  - Given an algebraic expression can tell the meaning of each part and create a real life situation that matches.

2nd Quarter

Standard # 4 Geometry ~ **Filling and Wrapping & Fluency Workbook Gr. 7: Ch 10**

o 4.5a Solve problems involving perimeter and area in two dimensions, and involving surface area and volume in three dimensions (including right prisms and cylinders)
  - Applies perimeter and area of plane figures to finding surface area
  - Solve problems involving the areas of circles, triangles, and parallelograms (formulas not provided)
  - Solve problems involving the surface area of rectangular prisms and cylinders (formulas not provided)
  - Able to find the volume of three dimensional figures in a problem solving situation (formulas not provided)

Standard #1 Number Sense ~ **Thinking With Mathematical Models**

o 1.4a Use the relationships among fractions, decimals, and percents including the concepts of ratio and proportion in problem-solving situations (similarity, scale factor, unit rate).
  - Connects unit rate to the slope of a line
  - Determines the slope of a line using equivalent fractions
  - Uses ratios and proportions to solve problems involving fractions, decimals, and percents (determining tax, discounts, sale price, and unit price)
Standard #2 Algebra ~ **Thinking With Mathematical Models**

- 2.1a Represent, describe and analyze patterns and relationships using tables, graphs, verbal rules and standard algebraic notation.
  - Be able to take a table and create an equation and graph.
  - Extend and make predictions of linear patterns.
  - Explain and analyze linear patterns.
  - Write simple linear equations. \( y = mx + b \)
  - Identify and interpret slope in a variety of representations.
  - Identify and interpret the y-intercept in a variety of representations.

- 2.4a Distinguish between linear and non linear relationship functions through informal investigations
  - Distinguish between linear and nonlinear relationships using tables, graphs, and equations
  - Use rates of change to sketch graphs for linear and non linear situations
  - Makes predictions for linear and non linear situations
  - Describe patterns using variables, expressions, and equations in problem-solving situations for both linear and non linear situations

**3rd Quarter**

Standard #4 Geometry ~ **Looking For Pythagoras & Fluency Workbook Gr. 8: Ch 9**

- 4.5b Apply the Pythagorean Theorem to solve real-world problems.
  - Use the Pythagorean Theorem to find the missing side length in a right triangle.
  - Recognize when to use the Pythagorean Theorem in problem solving-situations
  - Relate the areas of the squares on the sides of a right triangle to the Pythagorean Theorem
  - Recognize and use equivalent representations of positive rational numbers and common irrational numbers, such as square roots
  - Identify square roots as lengths of sides of squares

Standard #5 Measurement ~ **Looking For Pythagoras**

- 5.4a Develop and use procedures or formulas to solve problems involving measurements (for example, distance, area, surface area, volume of right prisms and cylinders).
  - Use procedures or formulas to find perimeter and areas of irregular and regular polygons
  - Communicate the reasoning they used to find the perimeter and area in two dimensional shapes.
  - Use procedures or formulas to find surface area and volume of right prisms and cylinders
Standard #2 Algebra~ Growing, Growing, Growing & Fluency Workbook Gr. 8: Ch 5

- 2.1a Represent, describe and analyze patterns and relationships using tables, graphs, verbal rules and standard algebraic notation.
  - Extend and make predictions of linear and non-linear patterns.
  - Identify and interpret exponential relationships
  - Explain and analyze linear and non-linear patterns
  - Describe similarities and differences between linear, exponential, and quadratic patterns of change
  - Analyze functional relationships to explain how a change in one quantity results in a change in another
  - Write equations from slope and y-intercept

- 2.1b Convert from one functional representation (table, graph, verbal rule, standard algebraic notation) to another.
  - Be able to explain the difference between linear and non-linear patterns.
  - Be able to take an equation and create a table and graph.
  - Be able to take a table and create an equation and graph.
  - Be able to take a graph and create an equation and table.
  - Uses a model to predict unknown values.

4th Quarter

Standard #2 Algebra ~ Frogs, Fleas, and Painted Cubes & Say It With Symbols

- 2.2a Describe patterns using variables, expressions, equations and inequalities in problem-solving situations.
  - Write symbolic sentences that communicate reasoning
  - Write equations to represent problem solving situations.
  - Apply order of operations to evaluate simple expressions with integers
  - Write equivalent equations for problem solving situations.
  - Use the distributive property to write equivalent expressions

- 2.5a Solve simple linear equations in problem-solving situations using a variety of methods (informal, formal and graphic).
  - Uses tables and graphs to solve simple linear equations.
  - Uses symbolic methods to solve simple linear equations.
Standard #4 Geometry ~ Kaleidoscopes, Hubcaps, and Mirrors & Fluency Workbook Gr. 8: Ch 8

- 4.6a Transform geometric figures using reflections, translation, and rotations to determine congruence.
  - Use the properties of parallel and perpendicular lines to perform transformations.
  - Use the properties of reflection, rotation and translation to perform transformations.
  - Recognize and describe symmetries (reflections, translations, and rotations) of figures
  - Describe the relationships between symmetry, transformations and congruence.
  - Write coordinate rules for specifying the image of a general point under particular transformations.
1st Quarter

- Standard #2 Algebra ~ **Thinking With Mathematical Models**
  - 2.1a Represent, describe and analyze patterns and relationships using tables, graphs, verbal rules and standard algebraic notation.
    - Extend and make predictions of linear patterns.
    - Explain and analyze linear patterns.
    - Write simple linear equations.
    - Identify and interpret slope in problem solving situations.
    - Identify and interpret the y-intercept in problem solving situations.
    - Be able to take a table and create an equation and graph.

- Standard #4 Geometry ~ **Filling and Wrapping & Fluency Workbook Ch 9**
  - 4.5a Solve problems involving perimeter and area in two dimensions, and involving surface area and volume in three dimensions.
    - Communicate the reasoning they used to find surface area in three dimensional shapes.
    - Communicate the reasoning they used to find volume in three dimensional shapes.

- Standard #5 Measurement ~ **Filling and Wrapping & Fluency Workbook Ch 9**
  - 5.4a Develop and use procedures or formulas to solve problems involving measurements (for example, distance, area, surface area, volume of right prisms and cylinders).
    - Use procedures or formulas to find areas of irregular and regular polygons.
    - Use procedures or formulas to find perimeter of irregular and regular polygons.
    - Communicate the reasoning they used to find area in two dimensional shapes.
    - Communicate the reasoning they used to find perimeter in two dimensional shapes.
    - Use procedures or formulas to find surface area of right prisms and cylinders.
    - Use procedures or formulas to find volume of right prisms and cylinders.
2nd Quarter

- Standard #4  Geometry ~ **Looking For Pythagoras & Fluency Workbook Ch 9**
  o 4.5b Apply the Pythagorean Theorem to solve real-world problems.
    - Use the Pythagorean Theorem to find the missing side length in a right triangle.
    - Recognize when to use the Pythagorean Theorem in problem solving-situations.

- Standard #2  Algebra ~ **Growing, Growing, Growing & Fluency Workbook Ch 4**
  o 2.1a Represent, describe and analyze patterns and relationships using tables, graphs, verbal rules and standard algebraic notation.
    - Extend and make predictions of linear and non-linear patterns.
    - Explain and analyze linear and non-linear patterns.
    - Write equations from slope and y-intercept.
  o 2.1b Convert from one functional representation (table, graph, verbal rule, standard algebraic notation) to another.
    - Be able to explain the difference between linear and non-linear patterns.
    - Be able to take an equation and create a table and graph.
    - Be able to take a table and create an equation and graph.
    - Be able to take a graph and create an equation and table.
    - Uses a model to predict unknown values.

- Standard #1 Number Sense ~ **Fluency Workbook Ch 2**
  o 1.4a Use the relationships among fractions, decimals, and percents including the concepts of ratio and proportion in problem-solving situations (similarity, scale factor, unit rate).
    - Use unit rates to make predictions.
    - Use equivalent fractions to determine slope of a line.

- Standard #3  Statistics and Probability ~ **Fluency Workbook Ch 7**
  o 3.7a Use a model or counting technique to determine all the possible outcomes from an experiment.
    - Construct systematic lists of outcomes for complex problems.
    - Find all possible outcomes for an experiment.
3rd Quarter

- **Standard #2  Algebra ~ Say It With Symbols & Fluency Workbook Ch 5**
  - 2.2a Describe patterns using variables, expressions, equations and inequalities in problem-solving situations.
    - Write equations to represent problem solving situations.
    - Write equivalent equations for problem solving situations.
  - 2.5a Solve simple linear equations in problem-solving situations using a variety of methods (informal, formal and graphic).
    - Uses tables and graphs to solve simple linear equations.
    - Uses symbolic methods to solve simple linear equations.

- **Standard #3  Statistics and Probability ~ Samples and Populations & Fluency Workbook Ch 6**
  - 3.1a Read and construct displays of data using appropriate techniques
    - Construct stem-and-leave plots, histograms, and box-and-whisker plots.
    - Analyze data presented in stem-and-leaf plots, histograms, and box-and-whisker plots.
  - 3.2a Display and use measures of central tendency (such as mean, median, and mode) and measures of variability (such as range and quartiles) in problem solving situations.
    - Use measures of center (mean and median) measures of spread (range and percentile) to describe data
    - Use measures of center (mean and median) measures of spread (range and percentile) to analyze data.
    - Use range and quartiles to analyze a distribution of data.

- **Standard #3  Statistics and Probability ~ Fluency Workbook Ch 7**
  - 3.7a Use a model or counting technique to determine all the possible outcomes from an experiment.
    - Construct systematic lists of outcomes for complex problems.
    - Find all possible outcomes for an experiment.
4th Quarter

- Standard #2 Algebra ~ *Frogs, Fleas, and Painted Cubes*
  - 2.1a Algebra: Represent, describe and analyze patterns and relationships using tables, graphs, verbal rules and standard algebraic notation.
    - Extend and make predictions of linear and non-linear patterns.
    - Explain and analyze linear and non-linear patterns.
  - 2.1b Algebra: Convert from one functional representation (table, graph, verbal rule, standard algebraic notation) to another.
    - Be able to explain the difference between linear and non-linear patterns.
    - Be able to take an equation and create a table and graph.
    - Be able to take a table and create an equation and graph.
    - Be able to take a graph and create an equation and table.

- Standard #6 Computation ~ *Fluency Workbook Ch 3*
  - 6.4a Apply computational methods (including ratio and proportion) to solve problems involving commonly used fractions, decimals, percents and integers and determine whether the results are reasonable.
    - Be able to find equivalent representations
    - Add/subtract fractions and mixed numbers
    - Multiply/divide fractions and mixed numbers

- Standard #4 Geometry ~ *Kaleidoscopes, Hubcaps, and Mirrors*
  - 4.6a Transform geometric figures using reflections, translation, and rotations to determine congruence.
    - Use the properties of parallel and perpendicular lines to perform transformations.
    - Use the properties of reflection, rotation and translation to perform transformations.
    - Describe the relationships between symmetry, transformations and congruence.
Integrated 1 Assessed Benchmarks by Quarter
(Including the “Look Fors”)

1st Quarter

Standard #2 Algebra
  o 2.2b Convert from one functional representation to another.
  - Convert from one functional representation to another (written explanations, tables, equations, graphs)

  o 2.2c Interpret a graphical representation of a real-world situation.
  - Graph and interpret meanings of functional relationships
  - Recognize the connection between two variable relationships and their graphs

Standard #3 Statistics and Probability
  o 3.4a Determine, analyze, and use measure of central tendency (such as mean, median, and mode) and measures of variability (such as range and quartiles) in problem solving situations.
  - Determine and use measures of central tendency (mean, median, mode) from data in context
  - Determine, and interpret measures of variability (IQR, deviation) from data in context
  - Use appropriate measures of central tendency and variability to summarize a distribution of data
  - Calculate a five number summary and use it to analyze a distribution of data
  - Determine the effects of additional data on measures of central tendency and variability
  - Use graphical displays (histograms, box plots) to analyze variability

2nd Quarter

Standard #2 Algebra
  o 2.1a Model real world phenomena involving linear relationships using multiple representations of rules that can take the form of recursive processes, functions, equations, or inequalities.
  - Organize/interpret real world data with table/graph/equation
  - Write linear equations in slope-intercept from
  - Use Now-Next equations to represent recursive processes

  o 2.2a Represent functional relationships using written explanations, tables, equations, and graphs, and describe the connections among these representations.
  - Write equation of a line from two points and interpret its meaning
• Write equation from slope and y-intercept and interpret its meaning
• Explain relationships among tables, graphs, and equations of linear models
• Use a and b to sketch a graph of a line and graph from \( y = a + bx \)

  o 2.3a  Solve problems involving functions and relations using calculators, graphs, tables, and algebraic methods.
  • Solve linear equations algebraically
  • Solve linear equations using tables and graphs
  • Interpret the meaning of the solution of a linear equation in real-world contexts

Standard #3 Statistics and Probability
  o 3.3a  Fit curves to scatter plots using informal methods or appropriate technology to make predictions about the data.
  • Use technology to produce linear regression and interpret its meaning
  • Predict values for the dependent using a line of best fit

3rd Quarter

Standard #4 Geometry
  o 4.2a  Solve problems involving perimeter, area, surface area, and volume of regular and irregular geometric figures.
  • Apply knowledge of perimeter, area, surface area, and volume in problem-solving situations
  • Understand and calculate volume of simple geometric solids
  o 4.2b  Use the Pythagorean Theorem to solve real-world problems.
  • Apply the Pythagorean Theorem in real-world situations
  • Explain methods for finding the area of triangles using the Pythagorean Theorem
  • Represent irrational numbers and their squares geometrically

Standard #5 Measurement
  o 5.1c  Describe how changing one attribute of a shape affects its angle measure, perimeter, circumference, area, surface area and volume
  • Demonstrate how changing dimensions and shapes of simple figures affects their perimeter, area and volume
  • Determine maximum and minimum perimeter values when the dimensions of figures are changed
4th Quarter

Standard #2  Algebra
  o  2.1a Model real world phenomena involving non-linear relationships using multiple representations of rules that can take the form of recursive processes, functions, equations, or inequalities.
    • Identify exponential patterns in tables
    • Write exponential equations
    • Identifies exponential growth vs. decay in tables, graphs and equations
    • Model compound interest situations
    • Uses a model to predict unknown values
    • Use Now-Next equations to represent recursive processes

Standard #3 Statistics and Probability
  o  3.4b Use averages (including average per trial, expected value) to draw conclusions about distributions of data
    • Calculates the expected value and uses in problem-solving situations

Standard #6 Computation
  o  6.1a Use ratios, proportions, and percents in problem solving situations that involve rational numbers.
    • Use ratios and proportions accurately
    • Use ratios, proportions, and percents to solve real-world problems
Integrated 2 Assessed Benchmarks and “Look Fors” by Quarter

1st Quarter

Standard #2 Algebra
- 2.3b The student solves systems of equations in context.
  - The student solves systems of equations in context using at least one method (matrices, graphs/tables, substitution, elimination)
- 2.4a The student can identify in context and use x and y intercepts and slope.
  - The student can identify slope in context.
  - The student can identify x and y intercepts in context.
  - The student can use slope in context.
  - The student can use x and y intercepts in context.

Standard #4 Geometry
- 4.3 The student can prove types of shapes using geometric properties.
  - The student can prove the type of shape through congruence, parallel lines, and perpendicular lines using slope and distance formula/Pythagorean Theorem.
  - The student uses distance formula to identify equal side measures.
  - The student uses slope to identify parallel and perpendicular lines.
- 4.6 The student can perform transformations of shapes on the coordinate grid.
  - The student can perform transformations in the coordinate plane.
  - The student can perform rotations in the coordinate plane.
  - The student can perform reflections in the coordinate plane.
  - The student can perform size transformations in the coordinate plane.

2nd Quarter

Standard #1 Number Sense
- 1.2a The student can state and use algebraic properties.
  - The student can state properties of powers.
  - The student can use properties of powers to simplify expressions.
  - The student can simplify one-step radical and power expressions.
  - The student can define square and cube root.

Standard #2 Algebra
2.1a The student can identify and use models of linear and non-linear relationships.

- The student can recognize the type of relationship, for all models discussed in Unit 4.
- The student can match type of equation to graph for all models discussed in Unit 4.
- The student can write equations, make graphs and tables, from quadratic and linear situations.
- The student can use quadratic and linear relationships to answer questions about situations.

2.4 The student can analyze and explain types of equations and functions.

- The student can demonstrate and identify translations of linear and quadratic models in context.
- The student can recognize translations of models (quadratic, linear, exponential) in tables, equations, graphs.
- The student can identify quadratic and linear functions from the table, graph, equation, situation.
- The student can recognize translations of a quadratic model in a graph.
- The student can identify slope and y-intercept from a graph, equation, and situation.

3rd Quarter

Standard #4 Geometry

- 4.3 The student can use trigonometric ratios to solve problems.
  - The student can use trigonometric ratios to solve problems. The student can find sides and angles effectively.
  - The student can set-up problems involving trigonometric ratios.

- 4.6 The student can recognize and apply similarity
  - The student can recognize similar shapes.
  - The student can apply properties of similar shapes to solve problems.
  - The student can find ratios for similar shapes.

Standard #5 Measurement

- 5.1 The student can describe how changing one attribute of a shape affects other measures of the shape.
  - The student can describe how a change in one measure of a shape affects the other measures. The student may need to use calculations to do this. (ex: calculate the area, volume, radius and say how they change).
• The student uses similarity to analyze how a change in one measure of a shape changes other measures. (ex: Similar figures with a ratio of sides 3:1 would have a ratio of area 9:1)

Standard #6 Computation
  o 6.1 The student can use ratios and proportions to solve problems.
    • The student can use simple ratios and proportions to solve problems.

Quarter 4

Standard #2 Algebra
  o 2.1 The student can model real world data using regression equations.
    • The student can model real-world data using regression equations.
    • The student can determine whether a relationship is linear or non-linear
    • The student can write regression equations using technology.
    • The student can make predictions from regression equations.
    • The student can interpret regression equations in context.

Standard #3 Statistics/Probability
  o 3.1 The student can fit curves to scatterplots and determine the strength and direction of the relationship.
    • The student can match correlation to appropriate scatterplot
    • The student can describe the strength and direction of a relationship.
    • The student can calculate the correlation coefficient using technology.
    • The student can fit a line of best fit/curve of best fit to data.
    • The student can determine the strength and direction of a relationship using the correlation coefficient.

  o 3.6 The student can solve problems involving theoretical and experimental probability.
    • The student can use at least one model effectively to solve problems involving theoretical and experimental probability.
    The student can identify independent and dependent events and alter calculations appropriately.
Integrated Math 3 Assessed Benchmarks by Quarter
(Including the “Look Fors”)

Quarter 1 (1 Unit, 3 Standards, 4 Benchmarks)
Multiple-Variable Models
- Standard #2 Algebra
  - Represent functional relationships using written explanations, tables, equations, and graphs, and describing the connections among these representations.
  - (Represent and analyze relationships using tables/equations/graphs)
    - Can model relationships of the form \( ax + by = c, z = ax/y \).
    - Can model various situations (offers, production . . .) with appropriate equations and inequalities.
  - Solve problems involving functional relationships using graphing calculators and/or computers as well as appropriate paper-and-pencil techniques.
  - (Solve relationships using paper and pencil as well as technology)
    - Can solve for equations of the form \( ax + by = c, z = ax/y \).
    - Can solve trigonometric relationships for different variables.
  - Solve and analyze systems of equalities and inequalities
    - Solve systems of equalities and inequalities to determine the best deal.
    - Solve systems of equalities and inequalities to maximize or minimize.

- Standard #4 Geometry and Standard #5 Measurement
  - Use trigonometric relationships in problem-solving situations (for example, finding the height of a building from a given point, if the distance to the building and the angle of elevation are known)
  - (Use trigonometric relationships in problem-solving situations)
    - Know when to use trigonometric ratios, law of sines, and law of cosines
    - Use right triangle trigonometric ratios to find missing sides and angles.
    - Use the law of sines and law of cosines to find missing sides and angle.

Quarter 2 (2 Units, 3 Standards, 4 Benchmarks)
- Standard #2 Algebra
  - Recognize when a relation is a function
    - Can determine if a table or a graph represents a function.
    - Can determine a practical and theoretical domain and range for a given function.
    - Can recognize and use function notation.
  - Recognize and use properties (distributive, commutative, associative . . .) on and between functions
  - (Recognize and use properties on and between functions)
    - Can use properties to simplify functional expressions.
    - Can recognize and use properties to defend thinking.
- Solve problems involving functional relationships using appropriate paper-and-pencil techniques as well as graphing calculators and/or computers.
- (Solve relationships using paper and pencil as well as technology)
  - Solve systems of equations and inequalities.
  - Use quadratic formula to find intercepts and intersects.
- Analyze and explain the behaviors, transformation and general properties, of types of equations and functions.
- (Analyze and explain the behaviors of types of equations and functions.)
  - Can identify and interpret x- and y-intercepts in the context of a problem using standard and factored form of one and two degree polynomials.
  - Can use standard and factored forms of one and two degree polynomials to identify the maximum and minimum value within a given domain.

Quarter 3 (2 Units, 3 Standards, 5 Benchmarks)
- Standard #2 Algebra
  - Interpret algebraic equations and inequalities geometrically and describe geometric relationships algebraically
  - (Interpret algebra relations geometrically & geometry relations algebraically)
    - Use algebraic thinking and geometric properties to determine and explain angle measures.
- Standard #4 Geometry
  - Make and test conjectures about geometric shapes and their properties, incorporating technology where appropriate
  - (Make and test conjectures about geometric shapes and their properties)
    - Use geometric relationships to determine and explain similarity and congruence.

Quarter 4 (2 Units, 3 Standards, 4 Benchmarks)
- Standard #2 Algebra
  - Model real world phenomena (for example, distance-versus-time relationships, compound interest, amortization tables, mortality rates) using functions, equations, inequalities, and matrices
  - (Model real world phenomena using functions/equations/inequalities/matrices)
    - Use iteration and recursion to model sequential change.
    - Understand and apply arithmetic and geometric series.
- Analyze and explain the behaviors, transformations, and general properties of types of equations and functions (for example, linear, quadratic, exponential).
- (Analyze and explain the behaviors of types of equations and functions)
  - Recognize and use the behavior of the parts of a function: af(bx + c) + d.
• Standard #3 Statistics and Probability
  o Draw conclusions about distributions of data based on analysis of statistical summaries (for example, the combination of mean and standard deviation, and differences between the mean and median)
  o (Draw conclusions about distributions based on analysis of statistical summaries)
    ▪ Calculate and interpret the standard deviation
    ▪ Calculate and interpret z-scores
    ▪ Recognize characteristics of a normal distribution

• Standard #4 Geometry
  o Describe, analyze, and extend patterns produced by processes of geometric change (for example sequences and series)
  o (Describe, analyze, and extend patterns produced by geometric change)
    ▪ Analyze long-term behavior when iterating linear functions.
Quarter 1

1. Calculate and describe rates of change for linear and non-linear functions
   a. Approximate instantaneous rates of change for linear and non-linear functions
   b. Sketch the derivative of a function from its graph
   c. Estimate rates of change for linear and non-linear functions from table/graph/equations
   d. Describe the patterns relating various function types to their derivatives (i.e. linear functions have constant derivatives, quadratics have linear derivatives, etc)

2. Demonstrate the meaning of area under a curve
   a. Estimate the net change in a quantity from its rate of change graph using systematic geometric approximations
   b. Calculate net change using algebra or calculator
   c. Describe the meaning of net change in real world situations

3. Describe and use the concept of vectors in real world situations
   a. Represent vectors geometrically (drawing accurately heading, direction, and magnitude)
   b. Perform operations on vectors using geometry and trigonometry (scalar multiple, opposite vector, resultants, components)
   c. Solve real world problems involving modeling linear motion and forces with vectors

Quarter 2

1. Analyze motions using parametric equations
   a. Write parametric equations to simulate and analyze linear motion
   b. Write parametric equations to simulate and analyze projectile (quadratic) motion
   c. Write parametric equations to simulate and analyze circular and elliptical motion
   d. Use both radian and degree measure to describe angular velocity
   e. Solve problems using graphing calculators

2. Explore, understand, and represent inverse relationships algebraically
   a. Determine if a function has an inverse from a table, graph, or equation
   b. Know how to find the inverse of a function from equations, graphs, and tables
   c. Know the relationship between a function and its inverse graphically

3. Exhibit knowledge of logarithms
Quarter 3

1. Use combinations, permutations, and probability to solve real world problems
   a. Apply a variety of counting techniques, including tree diagrams, systematic lists, and the Multiplication Principle of Counting to determine the number of possibilities in a variety of contexts
   b. Understand and apply concepts, techniques and formulas related to combinations and permutations
   c. Use counting methods to solve probability problems
   d. Understand and apply the General Multiplication Rule for probability
   e. Understand and apply the Binomial Theorem and use its connections to Pascal’s triangle and combinations

2. Use polynomial functions of degree higher than 2 in problem solving situations
   a. Find polynomial functions that fit data patterns
   b. Describe, understand, and use the zeroes, end behavior, and maxima/minima in real world problems
   c. Describe and illustrate the shape of a graph based on the equation
   d. Write polynomials in factored form
   e. Understand what an imaginary number is and how it is useful
   f. Using complex numbers to find all roots of a polynomial
   g. Add, subtract, multiply, and divide complex numbers

Quarter 4

1. Use rational functions in problem solving situations
   a. Describe, understand, and use the end behavior and asymptotes in real world problems
   b. Describe and illustrate the shape of a graph based on the equation
   c. Manipulate and use rational functions to solve real world problems

2. Exhibit knowledge of common and natural logarithms
   a. Ability to switch between exponential and logarithmic forms
   b. Understand and use the number $e$ and natural logarithms
   c. Understand and use the properties of logarithms
   d. Solving exponential equations using logarithms in real world situations
   e. Linearize data in real world situations
3. Use trigonometric functions in problem solving situations
   a. Know and use the six trigonometric functions
   b. Describe the period of each trigonometric function
   c. Know and use the fundamental trigonometric identities
   d. Verify identities
   e. Know and use the sum and difference identities for sine and cosine
   f. Solve trigonometric equations (simplifying with identities and writing general solutions)
1st Quarter

Standard #2 Algebra
- 2.2b Convert from one functional representation to another.
  - Convert from one functional representation to another (written explanations, tables, equations, graphs)
- 2.2c Interpret a graphical representation of a real-world situation.
  - Graph and interpret meanings of functional relationships
  - Recognize the connection between two variable relationships and their graphs

Standard #3 Statistics and Probability
- 3.4a Determine, analyze, and use measures of central tendency (such as mean, median, and mode) and measures of variability (such as range and quartiles) in problem solving situations.
  - Determine and use measures of central tendency (mean, median, mode) from data in context
  - Determine, and interpret measures of variability (IQR, deviation) from data in context
  - Use appropriate measures of central tendency and variability to summarize a distribution of data
  - Calculate a five number summary and use it to analyze a distribution of data
  - Determine the effects of additional data on measures of central tendency and variability
  - Use graphical displays (histograms, box plots) to analyze variability
2\textsuperscript{nd} Quarter

Standard #2 Algebra
- 2.1a (Linear) Model real world phenomena involving linear relationships using multiple representations of rules that can take the form of recursive processes, functions, equations, or inequalities.
  - Organize/interpret real world data with table/graph/equation
  - Write equation from slope and y-intercept and interpret its meaning
  - Use Now-Next equations to represent recursive processes
  - Use \( a \) and \( b \) to sketch a graph of a line in the form \( y = a + bx \)

Standard #3 Statistics and Probability
- 3.3a Fit curves to scatter plots using informal methods or appropriate technology to make predictions about the data.
  - Use technology to produce linear regression and interpret its meaning
  - Predict values for the dependent using a line of best fit

Standard #4 Geometry
- 4.2a Solve problems involving perimeter, area, surface area, and volume of regular and irregular geometric figures.
  - Apply knowledge of perimeter, area, surface area, and volume in problem-solving situations
  - Understand and calculate volume of simple geometric solids

- 4.2b Use the Pythagorean Theorem to solve real-world problems.
  - Apply the Pythagorean Theorem in real-world situations
  - Explain methods for finding the area of triangles using the Pythagorean Theorem
  - Represent irrational numbers and their squares geometrically
3rd Quarter

Standard # 2 Algebra

2.1a (Linear and Non-Linear) Model real world phenomena involving linear relationships using multiple representations of rules that can take the form of recursive processes, functions, equations, or inequalities.

- Extend and make predictions of linear and non-linear patterns.
- Explain and analyze linear and non-linear patterns.
- Identify exponential patterns in tables.
- Write exponential equations.
- Identifies exponential growth vs. decay in tables, graphs and equations.
- Model compound interest situations.
- Uses a model to predict unknown values.
- Use Now-Next equations to represent recursive processes.

2.1b Convert from one functional representation (table, graph, verbal rule, standard algebraic notation) to another.

- Be able to explain the difference between linear and non-linear patterns.
- Be able to take an equation and create a table and graph.
- Be able to take a table and create an equation and graph.
- Be able to take a graph and create an equation and table.

2.2a Represent functional relationships using written explanations, tables, equations, and graphs, and describe the connections among these representations.

- Explain relationships among tables, graphs, and equations of linear and non-linear models.
- Sketch graphs of equations in the forms $y = a + bx$, $y = ab^x$, and $y = ax^2 + bx + c$.
4th Quarter

Standard #2 Algebra
  o 2.3a Solve problems involving functions and relations using calculators, graphs, tables, and algebraic methods.
    - Solve linear equations algebraically
    - Solve linear equations using tables and graphs
    - Interpret the meaning of the solution of a linear equation in real-world contexts
    - The student solves systems of equations in context using at least one method (matrices, graphs/tables, substitution, elimination)
  o 2.5a Graph solutions to equations and inequalities in one- and two-dimensions and determine solutions.
    - Use inequalities to interpret and represent situations
    - Develop graphical representations of inequalities

Standard #3 Statistics and Probability
  o 3.1 Design and conduct a statistical experiment to study a problem, and interpret and communicate the results using the appropriate technology
    - Construct probability distributions from simulation
    - Use large populations to formulate hypothesis, draw conclusions, and make convincing arguments based on data analysis
  o 3.4b Use averages (including average per trial, expected value) to draw conclusions about distributions of data
    - Calculates the expected value and uses in problem-solving situations
HONORS INTEGRATED ALGEBRA/GEOMETRY 2
Assessed Benchmarks and “Look Fors”

1st Quarter

Standard #2 Algebra

- 2.3a Solve problems involving functions and relations using calculators, graphs, tables, and algebraic methods.
  - Solve linear equations algebraically
  - Solve linear equations using tables and graphs
  - Interpret the meaning of the solution of a linear equation in real-world contexts
  - The student solves systems of equations in context using at least one method (matrices, graphs/tables, substitution, elimination)

- 2.3b The student solves systems of equations in context.
  - The student solves systems of equations in context using at least one method (matrices, graphs/tables, substitution, elimination)

- 2.4a The student can identify in context and use x and y intercepts and slope.
  - The student can identify slope in context.
  - The student can identify x and y intercepts in context.
  - The student can use slope in context.
  - The student can use x and y intercepts in context.

- 2.5a Graph solutions to equations and inequalities in one- and two-dimensions and determine solutions.
  - Use inequalities to interpret and represent situations
  - Develop graphical representations of inequalities

2nd Quarter

Standard #1 Number Sense

- 1.2a The student can state and use algebraic properties.
  - The student can state properties of powers.
  - The student can use properties of powers to simplify expressions.
  - The student can simplify one-step radical and power expressions.
  - The student can define square and cube root.

Standard #2 Algebra
o 2.1a The student can identify and use models of linear and non-linear relationships.
   • The student can recognize the type of relationship, for all models discussed in Unit 4.
   • The student can match type of equation to graph for all models discussed in Unit 4.
   • The student can write equations, make graphs and tables, from quadratic and linear situations.
   • The student can use quadratic and linear relationships to answer questions about situations.

o 2.4 The student can analyze and explain types of equations and functions.
   • The student can demonstrate and identify translations of linear and quadratic models in context.
   • The student can recognize translations of models (quadratic, linear, exponential) in tables, equations, graphs.
   • The student can identify quadratic and linear functions from the table, graph, equation, situation.
   • The student can recognize translations of a quadratic model in a graph.
   • The student can identify slope and y-intercept from a graph, equation, and situation.

Standard #4 Geometry
o 4.3 The student can prove types of shapes using geometric properties.
   • The student can prove the type of shape through congruence, parallel lines, and perpendicular lines using slope and distance formula/Pythagorean Theorem.
   • The student uses distance formula to identify equal side measures.
   • The student uses slope to identify parallel and perpendicular lines.

o 4.6 The student can perform transformations of shapes on the coordinate grid.
   • The student can perform transformations in the coordinate plane.
   • The student can perform rotations in the coordinate plane.
   • The student can perform reflections in the coordinate plane.
   • The student can perform size transformations in the coordinate plane.

3rd Quarter

Standard #4 Geometry
o 4.3 The student can use trigonometric ratios to solve problems.
   • The student can use trigonometric ratios to solve problems. The student can find sides and angles effectively.
   • The student can set-up problems involving trigonometric ratios.

o 4.6 The student can recognize and apply similarity
• The student can recognize similar shapes.
• The student can apply properties of similar shapes to solve problems.
• The student can find ratios for similar shapes.

Standard #5 Measurement
• 5.1 The student can describe how changing one attribute of a shape affects other measures of the shape.
• The student can describe how a change in one measure of a shape affects the other measures. The student may need to use calculations to do this. (ex: calculate the area, volume, radius and say how they change).
• The student uses similarity to analyze how a change in one measure of a shape changes other measures. (ex: Similar figures with a ratio of sides 3:1 would have a ratio of area 9:1)

Standard #6 Computation
• 6.1 The student can use ratios and proportions to solve problems.
• The student can use simple ratios and proportions to solve problems.

Quarter 4

Standard #2 Algebra
• 2.1 The student can model real world data using regression equations.
• The student can describe the strength and direction of the relationship.
• The student can model real-world data using regression equations.
• The student can determine whether a relationship is linear or non-linear.
• The student can write regression equations using technology.
• The student can make predictions from regression equations.
• The student can interpret regression equations in context.

Standard #3 Statistics/Probability
• 3.1 The student can fit curves to scatterplots and determine the strength and direction of the relationship.
• The student can match correlation to appropriate scatterplot.
• The student can describe the strength and direction of a relationship.
• The student can calculate the correlation coefficient using technology.
• The student can fit a line of best fit/curve of best fit to data.
• The student can determine the strength and direction of a relationship using the correlation coefficient.
• 3.6 The student can solve problems involving theoretical and experimental probability.
• The student can use at least one model effectively to solve problems involving theoretical and experimental probability. The student can identify independent and dependent events and alter calculations appropriately.
Honors Algebra 2

Solve problems involving functions and relations using calculators, graphs, tables, and algebraic methods.

Solve equations with more than one variable* for a given variable (for example, solve for \( p \) in \( 1 = prt \) or for \( r \) in \( C = 2pr \)).

- Real numbers and number operations
- Algebraic expressions and models
- Solving linear equations
- Rewriting equations and formulas
- Problem solving using algebraic models
- Solving linear inequalities
- Solving absolute value equations and inequalities

Model real world phenomena involving linear relationships using multiple representations of rules that can take the form of a recursive process, a function, an equation, or an inequality.

Predict values using a line of best fit.

- Functions and their graphs
- Slope and rate of change
- Quick graphs of linear equations
- Writing equations of lines
- Linear inequalities in two variables
- Piecewise functions
- Absolute value functions

- Correlation and best-fitting lines

Solve simple systems of equations using algebraic, graphical or numeric methods.

- Solving linear systems by graphing
- Solving linear systems algebraically
- Graphing and solving systems of linear inequalities
- Solve linear programming problems
- Graphing linear equations in three variables
- Solving systems of linear equations in three variables
Matrices and Determinants
- Matrix operations
- Multiplying matrices
- Determinants and Cramer’s Rule
- Identify and inverse matrices
- Solving systems using inverse matrices

Model real world phenomena involving quadratic relationships using multiple representations of rules that can take the form of a recursive process, a function, an equation, or an inequality.

Solve problems involving quadratic functions and relations using calculators, graphs, tables, and algebraic methods*.
- Graphing quadratic functions
- Solving quadratic equations by factoring
- Solving quadratic equations by finding square roots
- Complex numbers
- Completing the square
- The quadratic formula and the discriminant
- Graphing and solving quadratic inequalities
- Modeling with quadratic functions

Polynomials and Polynomial Functions
- Using properties of exponents
- Evaluating and graphing polynomial functions
- Adding, subtracting, and multiplying polynomials
- Factoring and solving polynomial equations
- The remainder and factor theorems
- Finding rational zeros
- Using the fundamental theorem of algebra
- Analyzing graphs of polynomial functions
- Modeling with polynomial functions

Power, Roots, and Radicals
- $n$th root and rational exponents
- Properties of rational exponents
- Power functions and function operations
- Inverse functions
- Graphing square root and cube root functions
- Solving radical equations
- Statistics and statistical graphs
Model real world phenomena involving exponential relationships using multiple representations of rules that can take the form of a recursive process, a function, an equation, or an inequality.

Solve problems involving exponential functions and relations using calculators, graphs, tables, and algebraic methods*.

- exponential growth
- exponential decay
- the number \( e \)
- logarithmic functions
- properties of logarithms
- solving exponential logarithmic equations
- modeling with exponential and power functions
- logistic growth functions

**Rational Equations and Functions**
- inverse and Joint variation
- graphing simple rational functions
- multiplying and dividing rational expressions
- addition, subtraction, and complex fractions
- solving rational equations

**Quadratic Relations and Conic Sections**
- the distance and midpoint formulas
- parabolas
- circles
- ellipses
- hyperbolas
- graphing and classifying conics
- solving quadratic systems

**Sequences and Series**
- an introduction to sequences and series
- arithmetic sequences and series
- geometric sequences and series
- infinite geometric series
- recursive rule for sequences

Differentiate between independent and dependent events to calculate the probability in real-world situations.
Apply organized counting techniques to determine combinations and permutations in problem solving situations.

- the fundamental counting principles
- combinations and the binomial theorem
- an introduction to probability
- probability of compound events
- probability of independent and dependent events
- binomial distributions
- normal distributions

Use trigonometric ratios in problem solving situations

- right triangle trigonometry
- general angles and radian measure
- trigonometric functions of any angle
- inverse trigonometric functions
- the law of sines
- the law of cosines
- parametric equations and projectile motion

Trigonometric Graphs, identities, and Equations

- graphing sine, cosine and tangent functions
- translations and reflections of trigonometric graphs
- verifying trigonometric identities
- solving trigonometric equations
- modeling with trigonometric functions
- using sum and difference formulas
- using double and half-angle formulas
Model real world phenomena involving linear, quadratic and exponential relationships using multiple representations of rules that can take the form of a recursive process, a function, an equation, or an inequality.

Represent functional relationships using written explanations, tables, equations, and graphs, and describe the connections among these representations.

Convert from one functional representation to another.

Interpret a graphical representation of a real-world situation.

Solve problems involving functions and relations using calculators, graphs, tables, and algebraic methods.

Solve simple systems of equations using algebraic, graphical or numeric methods.

Graph data sets, create a scatter plot, and identify the control (independent) variable and dependent variable.

Determine a line of best fit from a scatter plot using visual techniques.

Predict values using a line of best fit.

Recognize which model, linear or nonlinear, fits the data most appropriately.

Draw conclusions about a large population based upon a properly chosen random sample.

Select and use an appropriate display to represent and describe a set of data (for example, scatter plot, line graph and histogram).

Check a graph, table or summary for misleading characteristics.
Describe how data can be interpreted in more than one way or be used to support more than one position in a debate.

Describe how the responses to a survey can be affected by the way the questions are phrased and/or by the reader’s bias.

Verify and apply the properties of the operation “to the power of”.

Solve equations with more than one variable* for a given variable (for example, solve for p in 1 = prt or for r in C = 2pr).

Identify and interpret x and y intercepts in the context of a problem.

Demonstrate horizontal and vertical translations on graphs of functions and their meanings in the context of a problem.

Recognize when a relation is a function.

Graph solutions to equations and inequalities in one-and two-dimensions.

Use ratios, proportions, and percents in problem solving situations that involve rational numbers*.

Express the perimeter, area and volume* relationships of geometric figures algebraically.

Describe geometric relationships algebraically.

Convert from one set of units to another using proportions (for example, feet/minute to miles/hour).

Apply direct variation to problem solving situations.

Apply appropriate computational methods to solve multi-step problems involving all types of numbers from the real number system.

Given the rate of change, model real-world problems algebraically or graphically.

Use trigonometric ratios in problem solving situations (for example, finding the height of a building from a given point, if the distance to the building and the angle of elevation are known).

Differentiate between independent and dependent events to calculate the probability in real-world situations.
Apply organized counting techniques to determine combinations and permutations in problem solving situations.
Honors Trigonometry
Assessed Benchmarks and “Look-Fors”

**** represents essential chapters for trig****

****Linear Functions & Relations –
Perform operations, find zeros, & use concepts of parallelism & comparison.

- Determine whether a given relation is a function and perform algebraic manipulations & operations with functions including finding composites & inverses.
- Find zeros of linear and non-linear functions using algebraic, graphical, & technological methods.
- Prove and use geometric concepts of distance, slope & midpoint for two points in a coordinate plane.
- Write linear equations of two given points, & identify parallel & perpendicular concepts between lines, in slope-intercept form and standard form.
- Model data using scatter plots, calculate best-fit lines for data & making of predictions, both algebraically and technologically.

****Systems of Equations and Inequalities
Calculate solution sets of 2 & 3 variable systems using multiple methods.

- Use matrix operations; Add, subtract, multiply, evaluate determinants & find inverses.
- Solve 2, and 3 variable systems of equations using graphical, algebraical & matrix methods, and recognize solution characteristics (singular, infinite & non-existent).
- Graph systems of inequalities, identify critical vertices & recognize types of solution sets (bounded & unbounded).
- Use linear programming strategies to solve problems and to find the maximum or minimum value of a function defined for a polygonal convex set.

****The Nature of Graphs
Identify symmetries & characteristics among individual & families of functions.

- Identify & sketch/graph; odd & even polynomials, absolute value, step, rational and symmetrical graphs.
Use symmetry to complete a graph
Identify an odd function and an even function

Determine the inverse of a relation or function
Graph a function and its inverse
Determine horizontal, vertical and slant asymptotes
Graph & identify shifts of polynomial, absolute value, and radical inequalities based upon understanding of a parent function.

Find the critical points of the graph of a polynomial function and determine if each is a minimum, maximum or point of inflection.
Determine continuity or discontinuity of functions
Identify the end behavior of graphs

****Polynomial and Rational Functions
Use methods to plot & calculate the roots & characteristics of polynomials.

Determine roots of polynomial equations
Apply the fundamental theorem of algebra
Solve quadratic equations
Use the discriminant to describe the roots of quadratic equations
Graph quadratic equations and inequalities
Find the factors of polynomials using the remainder and factor theorems
Identify all possible rational roots of a polynomial equation by using the rational root theorem
Determine the number of positive and negative real zeros a polynomial function has
Approximate the real zeros of a polynomial function
Graph polynomial functions
Find the least common denominator of rational expressions
Solve rational equations and inequalities

****The Trigonometric Functions
Understand & use Trig. ratios to solve & define right triangle relationships.

Change from radian to degree measure and vice versa
Find angles that are coterminal with a give angle
Find the reference angle for a given angle
Find the length of an arc given the measure of the central angle
Find the linear and angular velocities
Find the area of a sector
Find the values of the six trigonometric functions of an angle in standard position given a point on its terminal side
Find exact values for the six trigonometric functions of special angles
Find decimal approximations for the values of the six trigonometric functions of any angle
Solve right triangles
Use the Ambiguous case of the law of Sines to determine whether a triangle has zero, one or two solutions
Solve triangles by using the law of sines
Prove the law of Sines.
Solve triangles by using the law of cosines
Prove the law of Cosine.
Find the area of triangles

***Graphs and Inverses of the Trigonometric Functions
Know & use radians & degrees in trig function manipulations & inverses.

- Use the graphs of the trigonometric functions
- Find the amplitude, period and phase shift for a trigonometric function
- Write equations of trigonometric functions given the amplitude, period and phase shift
- Graph various functions
- Evaluate inverse trigonometric functions
- Find principal values of inverse trigonometric functions
- Write equations for inverses of trigonometric functions
- Graph inverses of trigonometric functions
- Solve problems involving simple harmonic motion

***Trigonometric Identities and Equations
Use Trig. identities for solving of Trig. equations & verifying of angular identities.

- Identify and use reciprocal identities, quotient identities, Pythagorean identities, and symmetry identities
- Use the basic trigonometric identities to verify other identities
- Find numerical values of trigonometric functions
- Use the sum and difference identities for sine, cosine, and tangent functions
- Use the double- and half-angle identities for the sine, cosine, and tangent functions
- Solve trigonometric equations
- Write a linear equation in normal form
- Find the distance from a point to a line
- Find the distance between parallel lines
- Write the equations of lines that bisect angles formed by intersecting lines

Vectors and Parametric Equations
Use vector notation & operations for parametric eqns & transformations.

- Find equal, opposite, and parallel vectors
- Add and subtract vectors geometrically
- Find ordered pairs that represent vectors
- Add, subtract, multiply and find the magnitude of vectors algebraically
- Add and subtract vectors in three-dimensional space
- Find the inner and cross products of two vectors
- Determine whether two vectors are perpendicular
- Solve problems using vectors and right triangle trigonometry
- Write vector and parametric equations of lines
- Graph parametric equations
- Model the motion of a projectile using parametric equations
- Solve problems related to the motion of a projectile, its trajectory and range

***Polar Coordinates and Complex Numbers***  
Use of polar coordinate conversion to model & solve rectangular models.

- Graph polar coordinates and simple polar equations
- Graph polar equations
- Convert from polar coordinates to rectangular coordinates and vice versa
- Write the polar form of a linear equation
- Graph the polar form of a linear equation
- Add, subtract, multiply and divide complex numbers in rectangular form
- Change complex numbers from rectangular to polar form and vice versa
- Find the product and quotient of complex numbers in polar form
- Find powers and roots of complex numbers in polar form using DeMoivre’s theorem

Conics  
Recognize & use of conic characteristics for graphing & transformations.

- Use the standard and general forms of the equation of a circle
- Graph circles
- Use the standard and general forms of the equation of a parabola
- Graph parabolas
- Use the standard and general forms of the equation of an ellipse
- Graph ellipses
- Use the standard and general forms of the equation of a hyperbola
- Graph hyperbolas
- Recognize conic sections by their equations
- Find the eccentricity of conic sections
- Find the equations of conic sections that have been translated or rotated
- Find the angle of rotation for a give equations and sketch its graph
- Graph and solve systems of second-degree equations and inequalities
- Write equations of tangents and normals to conic sections
- Find the length of a segment tangent to a circle

***Exponential and Logarithmic Functions***  
Evaluation & use of exponential/logarithmic equations & functions.

- Use the properties of exponents
- Evaluate and simplify expressions containing rational exponents
- Evaluate expressions with irrational exponents
Graph exponential functions
Graph exponential inequalities
Use the exponential function $y=$
Evaluate expressions involving logarithms
Solve equations involving logarithms
Graph logarithmic functions and inequalities
Find common logarithms and antilogarithms of numbers
Use common logarithms to compute powers and roots
Solve exponential and logarithmic equations
Solve exponential and logarithmic inequalities
Find natural logarithms of numbers
Solve equations using natural logarithms

**Sequences and Series**
Use of iteration & summation methods, identification of limits & convergence.

- Find the $n$th term and arithmetic means of an arithmetic sequence
- Find the sum of $n$ terms of an arithmetic series
- Find the $n$th term and geometric means of a geometric sequence
- Find the sum of $n$ terms of a geometric series
- Find the limit of the terms of an infinite sequence
- Find the sum of an infinite geometric series
- Determine whether a series is convergent or divergent
- Use sigma notation
- Use binomial theorem to expand binomials
- Evaluate by using the exponential series
- Use Euler’s formula to write the exponential form of a complex number
- Evaluate the logarithms of negative numbers
- Use mathematical induction to prove the validity of formulas

**Combinatorics and Probability**
Technical use of Counting & Set Theory strategies including the Binomial Thm.

- Solve problems related to the basic counting principle
- Distinguish between dependent and independent events
- Solve problems involving permutations with repetitions
- Solve problems involving circular permutations
- Solve problems involving combinations
- Find the probability of an event
- Find the odds for the success and failure of an event
- Find the probability of independent and dependent events
- Identify mutually exclusive events
- Find the probability of mutually exclusive and inclusive events
- Find the probability of an event given the occurrence of another event
- Find the probability of an event by using the binomial theorem
Statistics and Data Analysis
Use of central trends of data, its variability & prediction, esp. the Normal Dist.

- Draw, analyze, and use bar graphs and histograms
- Organize data into a frequency distribution table
- Find the mean, mode and median of a set of data
- Find the mean and median of data organized in a stem and leaf plot or a frequency distribution table
- Find the mean deviation, semi-interquartile range, and standard deviation of a set of data
- Organize and compare data using box and whisker plots
- Use the normal distribution curve
- Find the standard error of the mean to predict the true mean of a population with a certain level of confidence
- Draw and analyze scatter plots
- Draw regression lines
- Compute correlation values to determine goodness of fit

****Limits, Derivatives, and Integrals
Demonstrates understanding & use of limits, derivatives & integrals.

- Use limit theorems to evaluate the limit of a polynomial function
- Find the derivative of a function
- Find the area between a curve and the x-axis by using the limit of areas of rectangles
- Use integration formulas
- Use the fundamental theorem of calculus to evaluate definite integrals and to find area
Limits and Differential Calculus

Standard 1:
Students demonstrate their knowledge of limits, continuity and derivatives:

- Students understand the concept of limit, find limits of functions at points and at infinity, decide if a function is continuous, and use continuity theorems.
- Students find derivatives of sums, products, quotients, composite and inverse functions.
- Students find derivatives of algebraic, trigonometric, logarithmic and exponential functions.

Benchmarks:

- Estimate and calculate limits of functions using algebra, graphs, and tables of data.
  **Look for students to:**
  - Use difference tables to estimate instantaneous rate of change
  - Use \( \delta \) to convey understanding of limits
  - Apply the Limit Theorems to a variety of functions

- Predict and explain the behaviors of continuous and discontinuous functions.
  **Look for students to:**
  - Identify removable, step and infinite discontinuities in given functions
  - Describe asymptotic behavior in terms of limits involving infinity
  - Determine continuity using one-sided limits
  - Apply the Intermediate Value Theorem and Extreme Value Theorem

- Define the derivative as the instantaneous rate of change.
  **Look for students to:**
  - Find the slope of a tangent to a point on the curve (graphically)
  - Apply limits to the symmetric difference quotient (numerically)
  - Geometrically interpret the Mean Value Theorem

- Calculate derivatives using the power rule, product rule, quotient rule and chain rule.
  **Look for students to:**
  - Find derivatives of algebraic, trigonometric, logarithmic, exponential, inverse and composite functions
  - Find derivatives of inverse functions
  - Find derivatives of higher order such as
  - Find implicitly-defined functions such as
Applications of Derivatives

Standard 2:
Students apply their knowledge of derivatives and their meaning to model and solve problems:

- Students find maximum and minimum points and points of inflection.
- Students interpret the derivative as a rate of change in varied applied contexts, including velocity, speed, and acceleration.
- Students solve optimization problems.
- Students use slope fields to geometrically interpret differential equations.

Benchmarks:

- Analyze the relationship between the function and the first and second derivatives.
  **Look for students to:**
  - Identify local maximum and minimum points, and points of inflection
  - Define the relationship between the concavity of and the sign of
  - Compare graphs of and and describe their corresponding characteristics

- Model rates of change including related rates in a variety of contexts
  **Look for students to:**
  - Define velocity given a position function
  - Define acceleration given a velocity function
  - Predict the rate at which one quantity varies as the rate of another related quantity varies

- Model optimization problems using local and global extrema
  **Look for students to:**
  - Use algebraic methods to create a function in terms of one variable
  - Find the approximate maximum or minimum through graphical analysis
  - Find the exact maximum or minimum by analyzing where the derivative is zero or infinite, and checking endpoints
  - Find the maximum or minimum for perimeter, area or volume problems given specific contexts.

- Apply knowledge of slope fields to approximate solutions to differential equations
  **Look for students to:**
  - Graph an approximate solution by hand or graphical technology
  - Use Euler’s Method to numerically solve differential equations
  - Solve problems such as predator-prey, endangered species, subdivision building as related to logistic growth
Integral Calculus

Standard 3:
Students define integrals using Riemann Sums, use the Fundamental Theorem of Calculus to find integrals, and use basic properties of integrals. They integrate by substitution and find approximate integrals using the Trapezoidal Rule.

- Students will express the relationship of a derivative to an integral and an integral to a derivative (antiderivatives).
- Students will use integral techniques to solve problems

Benchmarks:
- Understand the relationship between differentiation and antidifferentiation
  
  **Look for students to:**
  - Use the power rule for antiderivatives
  - Solve for $C$ in particular situations
  - State the difference between indefinite and definite integrals

- Use approximation techniques to find definite integrals

  **Look for students to:**
  - Compute Riemann sums using left, right, and midpoint evaluation points
  - Approximate definite integrals using the Trapezoidal Rule
  - Use technology to approximate a definite integral through graphing and tables

- Use the Fundamental Theorem of Calculus to evaluate definite integrals

  **Look for students to:**
  - Apply properties of definite integrals
    - 
    - 
    - 
    - 
    - 
    - Define a definite integral as the rate of change of a quantity over an interval interpreted as the change of the quantity over the interval:
      - Use technology to find the exact value of a definite integral

- Understand techniques for taking integrals of non-basic functions

  **Look for students to:**
  - Use integrand substitution
  - Use Integration by Parts
  - Use trigonometric substitution
  - Use Partial Fractions to integrate rational expressions
  - Use separation techniques to solve differential equations
Applications of Integration

Standard 4:
Students find velocity functions and position functions from their derivatives, solve separable differential equations, and use definite integrals to find areas and volumes.

- Students calculate the area under a curve over an interval.
- Students use integral models to solve a variety of problem situations

Benchmarks:

- **Understand definite integrals as applied to linear motion**
  
  **Look for students to:**
  - Calculate velocity given the function of acceleration
  - Calculate displacement given the function of velocity
  - State the mathematical relationship between displacement, velocity and acceleration

- **Understand definite integrals as applied to area**
  
  **Look for students to:**
  - Define area between two curves
  - Define area between a curve and the x-axis
  - State when to apply the numerical value of the integral and the absolute value of the numerical integral

- **Understand definite integrals as applied to volume**
  
  **Look for students to:**
  - Apply geometric techniques to get $dV$ in terms of sample points
  - Use algebra to get $dV$ in terms of one variable
  - Use plane slices to find the volume of a solid revolved about a given axis
  - Use cylindrical slices to find the volume of a region revolved about a given axis
1a) Constructs and Interprets graphical displays of distributions of univariate data (dotplot, stemplot, histogram, cumulative frequency plot)
- Students can find and interpret measures of center in graphical displays
- Students can identify and interpret clusters and gaps in graphical displays
- Students can identify, calculate, and analyze the effect of outliers and unusual features of graphical displays
- Students can describe the shape of graphical displays

1b) Summarizes distributions of univariate data (Center, Spread, and Position)
- Students can calculate, and analyze measures of center.
- Students can calculate, and analyze measures of spread, including Range, Interquartile Range, and Standard Deviation.
- Students can use measures of position, including quartiles, percentile, and z-scores, to analyze data.
- Students can use boxplots to analyze data.
- Students can calculate and analyze the effect of changing units on the summary data (measures of center, spread, position)

1c) Compares distributions of univariate data (dotplots, back-to-back stemplots, parallel boxplots)
- Students can compare measures of center and spread within (what happens if the data is altered?) and between groups of data.
- Students can compare clusters and gaps between groups of data.
- Students can compare outliers and unusual features between groups of data.
- Students can compare shape between groups of data.

1d) Exploring bivariate data using correlation, least squares regression, and transforming data
- Students can analyze patterns in scatterplots.
- Students can use correlation to analyze linearity.
- Students can construct, write the equation for, and use the least squares regression line to analyze linearity of bivariate data.
- Students can create and analyze residual plots.
- Students can identify and analyze influential points and outliers.
- Students can transform data to achieve linearity using logarithmic and power transformations.
- Students can analyze the necessity for and effectiveness of transformations to achieve linearity.
1e) Exploring categorical data (marginal and joint frequencies)
- Students can create and analyze frequency tables and bar charts.
- Students can create and analyze frequencies for a two-way table.
- Students can compare distributions using bar charts.

2a) Overview of methods of data collection (Surveys and Experiments)
- Students can identify and compare Census, Sample Survey, Experiment, and Observational Study.

2b) Planning and conducting surveys
- Students can define the characteristics of a well-designed and well-conducted survey
- Students can identify populations and samples.
- Students can identify and perform random sampling.
- Students can identify sources of bias in sampling and surveys
- Students can identify and use various sampling methods, including simple random sampling, stratified random sampling, and cluster sampling

2c) Planning and conducting experiments
- Students can identify characteristics of a well-designed and well-conducted experiment
- Students can identify and create treatments, control groups, experimental units, random assignments and replication
- Students can identify sources of bias and confounding, including placebo effect and blinding
- Students can create and identify a completely randomized design.
- Students can create and identify randomized block design, including matched pairs design
- Students can design a good experiment.

2d) Generalizability of results and types of conclusions that can be drawn from observational studies, experiments, and surveys
- Students can decide if cause and effect can be determined
- Students can determine to whom the conclusions can be generalized
- Students can determine and compare the types of conclusions that can be drawn from observational studies, experiments, and surveys.

3a) Analyze random behavior using probability concepts
- Students can interpret probability, including long-run relative frequency interpretation
- Students can understand and use “Law of Large Numbers” concept.
- Students can use the addition rule, multiplication rule, conditional probability, and independence to find probabilities.
Students can identify and perform calculations involving discrete random variables and their probability distributions, including binomial and geometric.

Students can perform and create simulations of random behavior and probability distributions

Students can calculate mean (expected value) and standard deviation of a random variable, and linear transformation of a random variable

3b) Combining independent random variables using probability concepts

- Students understand the notion of independence versus dependence
- Students can calculate the mean and standard deviation for sums and differences of independent random variables

3c) Use the normal distribution in statistical models

- Students can describe the properties of the normal distribution
- Students can use tables of the normal distribution and calculator calculations.
- Students can use the normal distribution as a model for measurements.
- Students can perform calculations involving z-score and percentiles.

3d) Create and analyze sampling distributions as a basis for inferential statistics.

- Students can describe, identify properties of, and find probabilities involving sampling distribution of a sample proportion
- Students can describe, identify properties of, and find probabilities involving sampling distribution of a sample mean
- Students can define and use the Central Limit Theorem.
- Students can describe, identify properties of, and find probabilities involving sampling distribution of a difference between two independent sample proportions
- Students can describe, identify properties of, and find probabilities involving sampling distribution of a difference between two independent sample means
- Students can perform simulations of sampling distributions
- Students can identify, and perform calculations using the T-distribution.
- Students can identify and perform calculations using Chi-square distribution.

4a) Calculate and interpret point estimators and confidence intervals for various statistical measurements

- Students can estimate population parameters and margins of error
- Students can identify the properties of point estimators, including unbiasedness and variability
• Students understand the logic of confidence intervals, meaning of confidence level and confidence intervals, and properties of confidence intervals (What does 95% confident mean?)
• Students can calculate and analyze a large sample confidence interval for a proportion
• Students can calculate and analyze a large sample confidence interval for a difference between two proportions
• Students can calculate and analyze a confidence interval for a mean
• Students can calculate and analyze a confidence interval for a difference between two means (unpaired and paired)
• Students can calculate and analyze a confidence interval for the slope of a least-squares regression line

4b) Calculate and interpret tests of significance for various statistical measurements
• Students understand the logic of significance testing, null and alternative hypotheses; p-values; one- and two-sided tests; concepts of Type I and Type II errors; concept of power
• Students can perform a large sample test for a proportion
• Students can perform a large sample test for a difference between two proportions
• Students can perform a test for a mean
• Students can perform a test for a difference between two means (unpaired and paired)
• Students can perform a chi-square test for goodness of fit, homogeneity of proportions, and independence (one- and two-way tables)
• Students can perform a test for the slope of a least-squares regression line