# Mathematics Standards

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1. Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Number System:**
- Compare, contrast and apply the properties of numbers and the real number system, including rational and irrational numbers  MA 12.1.1.b

**Operations:**
- Use drawings, words, and symbols to explain the effects of such operations as multiplication and division, and computing positive powers and roots on the magnitude of quantities (e.g., if you take the square root of a number, will the result always be smaller than the original number? (e.g., \(\sqrt{2}\) ) MA 12.1.2.a
- Use drawings, words, and symbols to explain that the distance between two numbers on the number line is the absolute value of their difference  MA 12.1.2.b

**Computation:**
- Compute accurately with real numbers  MA 12.1.3.a
- Simplify exponential expressions (e.g., powers of \(-1, 0, \frac{1}{2}, 3^2 \cdot 3^2 = 3^4\) ) MA 12.1.3.b
- Multiply and divide numbers using scientific notation  MA 12.1.3.c
- Select, apply, and explain the method of computation when problem solving using real numbers (e.g., models, mental computation, paper-pencil, or technology)  MA 12.1.3.d

**Estimation:**
- Use estimation methods to check the reasonableness of real number computations and decide if the problem calls for an approximation or an exact number (e.g., 10 \(\pi\) (pi) is approximately 31.4, square and cube roots)  MA 12.1.4.a
- Distinguish relevant from irrelevant information, identify missing information and either find what is needed or make appropriate estimates  MA 12.1.4.b

2. Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Coordinate Geometry:**
- Use coordinate geometry to analyze geometric situations (e.g., parallel lines, perpendicular lines)  MA 12.2.2.a

**Measurement:**
- Apply appropriate units and scales to solve problems involving measurement  MA 12.2.5.b
- Convert equivalent rates (e.g., feet/second to miles/hour)  MA 12.2.5.d
- Know that the effect of a scale factor \(k\) on length is to multiply each by \(k\)  MA12.2.5.g
3. Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Relationships:**
- Represent, interpret, and analyze functions with graphs, tables, and algebraic notation and convert among these representations (e.g., linear, non-linear) *MA 12.3.1.a*
- Identify domain and range of functions represented in either symbolic or graphical form (e.g., linear, non-linear) *MA 12.3.1.b*
- Identify the slope and intercepts of a linear relationship from an equation or graph *MA 12.3.1.c*
- Identify characteristics of linear and non-linear functions *MA 12.3.1.d*
- Graph linear functions *MA 12.3.1.e*
- Compare and analyze the rate of change by using ordered pairs, tables, graphs, and equations *MA 12.3.1.f*
- Graph and interpret linear inequalities *MA 12.3.1.g*
- Represent, interpret, and analyze linear functions and their inverses *MA 12.3.1.h*
- Determine if a relation is a function *MA 12.3.1.i*

**Modeling:**
- Model contextualized problems using various representations (e.g., graphs, tables, one variable equations, one variable inequalities, linear equations in slope intercept form, inequalities in slope intercept form, system of linear equations with two variables) *MA 12.3.2.a*
- Represent a variety of quantitative relationships using linear equations and one variable inequalities *MA 12.3.2.b*
- Analyze situations to determine the type of algebraic relationship (e.g., linear, nonlinear) *MA 12.3.2.c*
- Model contextualized problems using various representations for non-linear (quadratic and absolute value) functions *MA 12.3.2.d*

**Procedures:**
- Explain/apply the reflexive, symmetric, and transitive properties of equality *MA 12.3.3.a*
- Simplify algebraic expressions involving exponents (e.g., \(3x^4\)) *MA 12.3.3.b*
- Add and subtract polynomials *MA 12.3.3.c*
- Multiply and divide polynomials (e.g., divide \(x^3 - 8\) by \(x - 2\), divide \(x^4 - 5x^3 - 2x\) by \(x^2\)) *MA 12.3.3.d*
- Factor polynomials *MA 12.3.3.e*
- Identify and generate equivalent forms of linear equations *MA 12.3.3.f*
- Solve linear equations and inequalities including absolute value *MA 12.3.3.g*
- Identify and explain the properties used in solving equations and inequalities *MA 12.3.3.h*
- Solve quadratic equations (e.g., factoring, graphing, quadratic formula) *MA 12.3.3.i*
- Evaluate polynomial and rational expressions and expressions containing radicals and absolute values at specified values of their variables *MA 12.3.3.l*
- Solve an equation involving several variables for one variable in terms of the others *MA 12.3.3.o*
- Analyze and solve systems of two linear equations in two variables algebraically and graphically *MA 12.3.3.p*

4. Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Display and Analysis:**
- Interpret data represented by the normal distribution and formulate conclusions *MA 12.4.1.a*
- Compute, identify, and interpret measures of central tendency (mean, median, mode) when provided a graph or data set *MA 12.4.1.b*
- Explain how statistics are used or misused in the world *MA 12.4.1.e*
- Create scatter plots, analyze patterns, and describe relationships in paired data *MA 12.4.1.f*
Predictions and inferences:
- Compare data sets and evaluate conclusions using graphs and summary statistics MA 12.4.2.a
- Support inferences with valid arguments MA 12.4.2.b
- Develop linear equations for linear models to predict unobserved outcomes using a line of best fit MA 12.4.2.c

Probability:
- Construct a sample space and a probability distribution MA 12.4.3.a
- Determine the relative frequency of a specified outcome of an event to estimate the probability of the outcome MA 12.4.3.e
1. **Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:**

**Number System:**
- Demonstrate multiple equivalent forms of irrational numbers (e.g., $\sqrt{8} = 2\sqrt{2}$) MA 12.1.1.a
- Compare, contrast and apply the properties of numbers and the real number system, including imaginary, and complex numbers MA 12.1.1.b

**Estimation:**
- Distinguish relevant from irrelevant information, identify missing information and either find what is needed or make appropriate estimates MA 12.1.4.b

2. **Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:**

**Coordinate Geometry:**
- Use coordinate geometry to analyze geometric situations (e.g., circle equations) including conic sections MA 12.2.2.a

3. **Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:**

**Relationships:**
- Graph non-linear functions MA 12.3.1.e
- Represent, interpret, and analyze non-linear functions and their inverses MA 12.3.1.h

**Modeling:**
- Model contextualized problems using various representations (e.g., graphs, tables, one variable equalities, one variable inequalities, linear equations in slope intercept form, inequalities in slope intercept form, system of linear equations with two variables) MA 12.3.2.a
- Model contextualized problems using various representations for non-linear functions (e.g., quadratic, exponential, and square root) MA 12.3.2.d

**Procedures:**
- Divide polynomials (e.g., divide $x^3 - 8$ by $x - 2$, divide $x^3 - 5x^2 - 2x$ by $x^2$) MA 12.3.3.d
- Add, subtract, and simplify rational expressions MA 12.3.3.j
- Multiply, divide, and simplify rational expressions MA 12.3.3.k
- Combine functions by composition, as well as by addition, subtraction, multiplication, and division MA 12.3.3.n
- Analyze and solve systems of two linear equations in two variables graphically and algebraically, including matrix methods MA 12.3.3.p
- Solve non-linear equations
4. Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Display and Analysis:**
- Explain how sample size and transformations of data affect measures of central tendency **MA 12.4.1.c**
- Describe the shape and determine spread (variance, standard deviation) and outliers of a data set **MA 12.4.1.d**
- Explain how statistics are used or misused in the world **MA 12.4.1.e**
- Explain the impact of sampling methods, bias, and the phrasing of questions asked during data collection and the conclusions that can rightfully be made **MA 12.4.1.g**
- Explain the differences between randomized experiment and observational **MA 12.4.1.h**

**Predictions and Inferences:**
- Compare data sets and evaluate conclusions using graphs and summary statistics **MA 12.4.2.a**
- Support inferences with valid arguments **MA 12.4.2.b**
- Develop linear equations for linear models to predict unobserved outcomes using regression line and correlation coefficient predictions **MA 12.4.2.c**
- Recognize when arguments based on data confuse correlation with causation **MA 12.4.2.d**

**Probability:**
- Construct a sample space and a probability distribution **MA 12.4.3.a**
- Identify dependent and independent events and calculate their probabilities **MA 12.4.3.b**
- Use the appropriate counting techniques to determine the probability of an event (e.g., combinations, permutations) **MA 12.4.3.c**
- Analyze events to determine if they are mutually exclusive **MA 12.4.3.d**
AP Calculus AB 1-2
040451; 040452

Semester 1
1. Limits
2. Derivatives
3. Application of derivatives

Semester 2
1. Integrals
2. Logs, Exponential and other Transcendental Functions
3. Application of Integration

AP Calculus BC 1-2
040461; 040462

Semester 1
1. Limits
2. Differentiation
3. Application of derivatives
4. Integration

Semester 2
1. Application of Integrals
2. Techniques of Integration
3. Sequence and Series
4. Parametric and Polar Equations
5. Improper Integrals and L’Hopital’s Rule
Semester 1
1. Organizing data
2. Producing data
3. Probability

Semester 2
1. Probability
2. Inference for distributions
3. Inference for proportions
4. Inference for tables
5. Inference for regression
### Consumer Math
#### 2013/2014 Unit Titles/Reporting Standards

#### Semester 1

<table>
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<tr>
<th>Section</th>
<th>Pacing (in days)</th>
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<tr>
<td>1. Gross Pay</td>
<td>19 days</td>
</tr>
<tr>
<td>2. Net Pay</td>
<td>19 days</td>
</tr>
<tr>
<td>3. Banking</td>
<td>22 days</td>
</tr>
<tr>
<td>4. Credit Cards</td>
<td>19 days</td>
</tr>
<tr>
<td><strong>Total days</strong></td>
<td><strong>79 days 86.5 days in the semester</strong></td>
</tr>
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Each section is allowed 3 teaching days. Two days for bookwork and one day for the supplemental workbook material included with the curriculum. There are two days allowed for each chapter test.

There are 7 flex days to be used as needed by the teacher. There are 20 skill workshops at the beginning of the book covering various topics needed throughout the textbook. The 7 flex days could be used to cover this material at the beginning of the semester or throughout the semester as needed. The skill workshops are not a part of the curriculum and do not need to be covered. These flex days can be added to a chapter if more time is needed or they can be used for a semester test. There is not a semester test included with this curriculum. Teachers would need to create their own semester test.

#### Semester 2

<table>
<thead>
<tr>
<th>Section</th>
<th>Pacing (in days)</th>
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<tr>
<td>5. Loans</td>
<td>18 days</td>
</tr>
<tr>
<td>6. Own a Home or a Car</td>
<td>24 days</td>
</tr>
<tr>
<td>7. Insurance and Investments</td>
<td>26 days</td>
</tr>
<tr>
<td>8. Budgets</td>
<td>20 days</td>
</tr>
<tr>
<td><strong>Total days</strong></td>
<td><strong>88 days 90.5 days in the semester</strong></td>
</tr>
</tbody>
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Each section this semester is allowed 2 days plus 2 days for review and 2 days for testing. 4 flex days have been added to each chapter. The flex days have been added because of the different ending dates for the seniors.
Geometry 1-2

1. Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

Estimation:
- Use estimation methods to check the reasonableness of real number computations and decide if the problem calls for an approximation or an exact number (e.g., $10\pi$ is approximately $31.4$, square and cube roots) MA 12.1.4.a
- Distinguish relevant from irrelevant information, identify missing information and either find what is needed or make appropriate estimates MA 12.1.4.b

2. Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

Characteristics:
- Identify and explain the necessity of and give examples of definitions and theorems MA12.2.1.a
- Analyze properties and relationships among classes of two and three dimensional geometric objects using inductive reasoning and counter-examples MA 12.2.1.b
- State and prove geometric theorems using deductive reasoning (e.g., parallel lines with transversals, congruent triangles, similar triangles) MA 12.2.1.c
- Apply geometric properties to solve problems (e.g., parallel lines, line transversals, similar triangles, congruent triangles, proportions) MA 12.2.1.d
- Identify and apply right triangle relationships (e.g., sine, cosine, tangent, special right triangles, converse of Pythagorean Theorem) MA 12.2.1.e
- Recognize that there are geometries, other than Euclidean geometry, in which the parallel postulate is not true MA 12.2.1.f
- Know the definitions and basic properties of a circle and use them to prove basic theorems and solve problems MA12.2.1.g

Coordinate Geometry:
- Apply the midpoint formula MA 12.2.2.b
- Apply the distance formula MA 12.2.2.c
- Prove special types of triangles and quadrilaterals (e.g., right triangles, isosceles trapezoid, parallelogram, rectangle, square) MA 12.2.2.d

Transformations:
- Explain and justify the effects of simple transformations on the ordered pairs of two-dimensional shapes MA 12.2.3.a
- Perform and describe multiple transformations MA 12.2.3.b

Spatial Modeling:
- Sketch and draw appropriate representations of geometric objects using ruler, protractor, or technology MA 12.2.4.a
- Use geometric models to visualize, describe, and solve problems (e.g., find the height of a tree; find the amount of paint needed for a room; scale model) MA 12.2.4.b

Measurement:
- Use strategies to find surface area and volume of complex objects MA 12.2.5.a
- Convert between various units of area and volume, such as square feet to square yards MA 12.2.5.c
- Find arc length and area of sectors of a circle MA 12.2.5.e
- Determine surface area and volume of three-dimensional objects (e.g., spheres, cones, pyramids) MA 12.2.5.f
- Know that the effect of a scale factor $k$ on length, area and volume is to multiply each by $k^2$ and $k^3$, respectively MA12.2.5.g
3. Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.

4. Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Display and Analysis:**
- Explain how statistics are used or misused in the world MA 12.4.1.e
- Create scatter plots, analyze patterns, and describe relationships in paired data MA 12.4.1.f

**Predictions and Inferences:**
- Support inferences with valid arguments MA 12.4.2.b

**Probability:**
- Construct a sample space and a probability distribution MA 12.4.3.a
- Determine the relative frequency of a specified outcome of an event to estimate the probability of the outcome MA 12.4.3.e
Honors Differential Equations
040542

1. First order differential equations and applications
2. Higher order linear differential equations and applications
3. LaPlace transforms
4. Systems
5. Series solutions
Honors Discrete Math
040521 and 040522

Semester 1
1. Systems of Equations
2. Matrices
3. Determinants
4. Vectors
5. Vector spaces

Semester 2
1. Systems of Equations
2. Matrices
3. Determinants
4. Vectors
5. Vector spaces
Math 7

1. Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Number system:**
- Show equivalence among fractions, decimals, and percents  \( MA \ 7.1.1.a \)
- Compare and order rational numbers (e.g., fractions, decimals, percents)  \( MA \ 7.1.1.b \)
- Represent large numbers using scientific notation  \( MA \ 7.1.1.c \)
- Classify numbers as natural, whole, integer, or rational  \( MA \ 7.1.1.d \)
- Find least common multiple and greatest common divisor given two numbers  \( MA \ 7.1.1.e \)

**Operations:**
- Use drawings, words, and symbols to explain the meaning of multiplication and division of fractions (e.g., \( \frac{2}{3} \times 6 \) as two-thirds of six, or \( 6 \times \frac{2}{3} \) as 6 groups of two-thirds, or \( 6 \div \frac{2}{3} \) as how many two-thirds there are in six.)  \( MA \ 7.1.2.a \)
- Use drawings, words, and symbols to explain the meaning of multiplication and division of decimals  \( MA \ 7.1.2.b \)
- Use drawings, words, and symbols to explain the addition and subtraction of integers  \( MA \ 7.1.2.c \)

**Computation:**
- Compute accurately with integers  \( MA \ 7.1.3.a \)
- Select, apply, and explain the method of computation when problem solving using integers and positive rational numbers (e.g., models, mental computation, paper-pencil, technology, divisibility rules)  \( MA \ 7.1.3.b \)
- Solve problems involving percent of numbers (e.g., percent of, % increase, % decrease)  \( MA \ 7.1.3.c \)

**Estimation:**
- Use estimation methods to check the reasonableness of solutions for problems involving integers and positive rational numbers  \( MA \ 7.1.4.a \)

2. Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Characteristics:**
- Identify and describe similarity of two-dimensional shapes using side and angle measurements  \( MA \ 7.2.1.a \)
- Name line, line segment, ray, and angle (e.g. \( AB, PR, \angle LMN \))  \( MA \ 7.2.1.b \)

**Coordinate Geometry:**
- Plot the location of an ordered pair in the coordinate plane  \( MA \ 7.2.2.a \)
- Identify the quadrant of a given point in the coordinate plane  \( MA \ 7.2.2.b \)
- Find the distance between points along horizontal and vertical lines of a coordinate plane (e.g., what is the distance between (0, 3) and (0, 9))  \( MA \ 7.2.2.c \)

**Transformations:**
- Identify lines of symmetry for a reflection  \( MA \ 7.2.3.a \)
- Perform and describe positions and orientation of shapes under a single transformation (e.g., translation, rotation, reflection) on a coordinate plane  \( MA \ 7.2.3.b \)

**Spatial Modeling:**
- Identify the shapes that make up the three-dimensional object  \( MA \ 7.2.4.a \)
- Create two-dimensional representations of three-dimensional objects to visualize and solve problems (e.g., perspective drawing of surface area)  \( MA \ 7.2.4.b \)
- Draw angles to given degree  \( MA \ 7.2.4.c \)

**Measurement:**
- Measure angles to the nearest degree  \( MA \ 7.2.5.a \)
- Determine the area of trapezoids and circles, and the circumference of circles  \( MA \ 7.2.5.b \)
- Recognize the inverse relationship between the size of a unit and the number of units used when measuring  \( MA \ 7.2.5.c \)
3. Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Relationships:**
- Describe and create algebraic expressions from words, tables, and graphs  \( MA \ 7.3.1.a \)
- Use a variable to describe a situation with an inequality (e.g., one-step, one variable)  \( MA \ 7.3.1.b \)
- Recognize and generate equivalent forms of simple algebraic expressions  \( MA \ 7.3.1.c \)

**Modeling:**
- Model contextualized problems using various representations (e.g., one-step/variable expressions, one-step/variable equations)  \( MA \ 7.3.2.a \)
- Represent a variety of quantitative relationships using algebraic expressions and one-step equations  \( MA \ 7.3.2.b \)

**Procedures:**
- Explain additive inverse of addition (e.g., \( 7 + (-7) = 0 \))  \( MA \ 7.3.3.a \)
- Use symbolic representation of the distributive property (e.g., \( 2(x + 3) = 2x + 6 \))  \( MA \ 7.3.3.b \)
- Given the value of the variable(s), evaluate algebraic expressions with respect to order of operations  \( MA \ 7.3.3.c \)
- Solve two-step equations involving integers and positive rational numbers  \( MA \ 7.3.3.d \)
- Solve one-step inequalities involving positive rational numbers  \( MA \ 7.3.3.e \)
- Identify and explain the properties used in solving two-step equations (e.g., addition, subtraction, multiplication and division)  \( MA \ 7.3.3.f \)

4. Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

**Display and Analysis:**
- Analyze data sets and interpret their graphical representations  \( MA \ 7.4.1.a \)
- Find and interpret mean, median, mode, and range for sets of data  \( MA \ 7.4.1.b \)
- Explain the difference between a population and a sample  \( MA \ 7.4.1.c \)
- List biases that may be created by various data collection processes  \( MA \ 7.4.1.d \)
- Formulate a question about a characteristic within one population that can be answered by simulation or a survey  \( MA \ 7.4.1.e \)

**Predictions and Inferences:**
- Determine if data collected from a sample can be used to make predictions about a population  \( MA \ 7.4.2.a \)

**Probability:**
- Find the probability of independent compound events (e.g., tree diagram, organized list)  \( MA \ 7.4.3.a \)
- Compare and contrast theoretical and experimental probabilities  \( MA \ 7.4.3.b \)
Quarter 1
- Unit 1: Problem Solving and Critical Thinking
  - Inductive and deductive reasoning
  - Mathematical models
- Unit 2: Number Sense
  - Set theory
  - Number theory
  - Equations and inequalities
  - Functions
    - Linear
    - Quadratic
    - Polynomial

Quarter 2
- Unit 3: Personal Finance
  - Taxes
  - Interest
  - Saving
  - Investing
  - Spending
- Unit 4: Geometry and Measurement
  - Plane geometry
  - Coordinate geometry
  - Mathematical modeling
  - Measurement
    - Work
    - Force
    - Temperature
    - Mass and volume

Quarter 3
- Unit 5: Combinatorics
  - Fundamental counting principle
  - Permutations
  - Combinations
- Unit 6: Probability
  - Simple probability
  - Compound probability
  - Conditional probability
  - Complements and odds

Quarter 4
- Unit 7: Statistics
  - Sampling
  - Frequency distributions
  - Central tendency
  - Dispersion
  - Standard normal distribution
- Unit 8: Logic
  - Statements and negations
  - Quantified statements
  - Compound statements and connectives
  - Truth tables
  - Arguments and truth tables
  - Arguments and Euler diagrams
Pre-Algebra

1. Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

   **Number System:**
   - Compare and order real numbers \( MA \ 8.1.1.a \)
   - Demonstrate relative position of real numbers on the number line (e.g., square root of 2 is left of 1.5) \( MA \ 8.1.1.b \)
   - Represent small numbers using scientific notation \( MA \ 8.1.1.c \)
   - Classify numbers as natural, whole, integer, rational, irrational, or real \( MA \ 8.1.1.d \)

   **Operations:**
   - Use drawings, words, and symbols to explain the meaning of addition, subtraction, multiplication, and division of integers. \( MA \ 8.1.2.a \)
   - Use words and symbols to explain the zero property of multiplication (e.g., if \( ab = 0 \) then \( a \) or \( b \) or both must be zero) \( MA \ 8.1.2.b \)
   - Use words and symbols to explain why division by zero is undefined \( MA \ 8.1.2.c \)

   **Computation:**
   - Compute accurately with rational numbers \( MA \ 8.1.3.a \)
   - Evaluate expressions involving absolute value of integers \( MA \ 8.1.3.b \)
   - Calculate squares of integers, the square roots of perfect squares, and the square roots of whole numbers using technology \( MA \ 8.1.3.c \)
   - Select, apply, and explain the method of computation when problem solving using rational numbers (e.g., models, mental computation, paper-pencil, technology, divisibility rules) \( MA \ 8.1.3.d \)
   - Solve problems involving ratios and proportions (e.g., \( \frac{x}{5} = \frac{10}{17} \)) \( MA \ 8.1.3.e \)

   **Estimation:**
   - Use estimation methods to check the reasonableness of solutions for problems involving rational numbers \( MA \ 8.1.4.a \)

2. Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

   **Characteristics:**
   - Identify and describe similarity of three-dimensional objects \( MA \ 8.2.1.a \)
   - Compare and contrast relationships between similar and congruent objects \( MA \ 8.2.1.b \)
   - Identify geometric properties of parallel lines cut by a transversal and related angles (e.g., perpendicular and parallel lines with transversals) and angles (e.g., corresponding, alternate interior, alternate exterior) \( MA \ 8.2.1.c \)
   - Identify pairs of angles (e.g., adjacent, complementary, supplementary, vertical) \( MA \ 8.2.1.d \)
   - Examine the relationships of the interior angles of a triangle (e.g., the sum of the angles is 180 degrees) \( MA \ 8.2.1.e \)

   **Coordinate Geometry:**
   - Use coordinate geometry to represent and examine the properties of rectangles and squares using horizontal and vertical segments \( MA \ 8.2.2.a \)

   **Transformations:**
   - Identify the similarity of dilated shapes \( MA \ 8.2.3.a \)
   - Perform and describe positions and sizes of shapes under dilations (e.g., scale factor, ratios) \( MA \ 8.2.3.b \)
Spatial Modeling:
• Draw geometric objects with specified properties (e.g., parallel sides, number of sides, angle measures, number of faces) MA 8.2.4.a

Measurement:
• Use strategies to find the perimeter and area of complex shapes MA 8.2.5.a
• Determine surface area and volume of three-dimensional objects (e.g., rectangular prisms, cylinders) MA 8.2.5.b
• Apply the Pythagorean theorem to find missing lengths in right triangles and to solve problems MA 8.2.5.c
• Use scale factors to find missing lengths in similar shapes MA 8.2.5.d
• Convert between metric and standard units of measurement, given conversion factors (e.g., meters to yards) MA 8.2.5.e

3. Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

Relationships:
• Represent and analyze a variety of patterns with tables, graphs, words, and algebraic equations MA 8.3.1.a
• Describe relationships using algebraic expressions, equations, and inequalities (e.g., two-step, one variable) MA 8.3.1.b
• Identify constant slope from tables and graphs MA 8.3.1.c

Modeling:
• Model contextualized problems using various representations (e.g., two-step/one variable equations) MA 8.3.2.a
• Represent a variety of quantitative relationships using algebraic expressions and two-step/one variable equations MA 8.3.2.b

Procedures:
• Explain the multiplicative inverse (e.g., \( \frac{1}{4} \times 4 = 1 \)) MA 8.3.3.a
• Evaluate numerical expressions containing whole number exponents (e.g., if \( x = 4 \), then \( (x+3)^2 + 5x = ? \)) MA 8.3.3.b
• Solve multi-step equations involving rational numbers MA 8.3.3.c
• Solve two-step inequalities involving rational numbers MA 8.3.3.d
• Identify and explain the properties used in solving two-step inequalities and multi-step equations MA 8.3.3.e

4. Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines. Students will:

Display and Analysis:
• Represent data using circle graphs and box plots with and without the use of technology MA 8.4.1.a
• Compare characteristics between sets of data or within a given set of data MA 8.4.1.b
• Find, interpret, and compare measures of central tendency (mean, median, mode) and the quartiles for sets of data MA 8.4.1.c
• Select the most appropriate unit of central tendency for sets of data MA 8.4.1.d
• Identify misrepresentation and misinterpretation of data represented in circle graphs and box plots MA 8.4.1.e

Predictions and Inferences:
• Evaluate predictions to formulate new questions and plan new studies MA 8.4.2.a
• Compare and contrast two sets of data to make inferences MA 8.4.2.b

Probability:
• Identify complementary events and calculate their probabilities MA 8.4.3.a
• Compute probabilities for independent compound events MA 8.4.3.b
Pre-Calculus/Trigonometry

1. **Students will communicate number sense concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.** Students will:

**Operations:**
- Add and subtract vectors
- Use scalar multiplication with vectors

2. **Students will communicate geometric concepts and measurement concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.** Students will:

**Characteristics:**
- Define six trigonometric functions in terms of the unit circle
- Identify and explain the Pythagorean, quotient, and reciprocal identities

**Transformations:**
- Translate conics away from the origin

3. **Students will communicate algebraic concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.** Students will:

**Relationships:**
- Graph parametric equations using a graphing utility
- Graph the six trigonometric functions and inverse trig functions with translations and transformations (sine and cosine only)
- Identify various polar graphs
- Graph rational functions and identify the domain and range
- Identify and explain the inverse relationship between exponential and logarithmic functions
- Graph exponential and logarithmic functions

**Modeling:**
- Model contextualized problems using various representations of natural and common logarithms

**Procedures:**
- Use Law of Sines, Law of Cosines, and right triangle relationships to solve triangles
- Use area formulas to find the area of triangles
- Given one trigonometric function value, find the other five trig functions
- Verify trig identities
- Solve trigonometric equations
- Convert polar to rectangular and rectangular to polar coordinates
- Convert parametric to rectangular and rectangular to parametric equations
- Write circular and elliptical equations in parametric form
- Find the vertical and horizontal asymptotes of the graphs of rational functions
- Find x- and y-intercepts of rational functions
- Simplify a difference quotient
- Convert conics between standard and general forms

4. **Students will communicate data analysis/probability concepts using multiple representations to reason, solve problems, and make connections within mathematics and across disciplines.**
Semester 1
1. Data distributions
2. Measures of central tendency and variance and position
3. Probability
4. Standard normal distribution
5. Confidence intervals

Semester 2
1. Hypothesis testing
2. Regression analysis
3. Advanced hypothesis testing