High School Pre-Algebra Curriculum

Course Description: The course is designed to prepare students for future coursework in mathematics, particularly Algebra 1A. This course will include simplifying expressions, graphing equations, simplifying radical and exponential expressions and using radicals to solve equations, polynomials, and solving for measures of central tendency.

Scope and Sequence:

<table>
<thead>
<tr>
<th>Timeframe</th>
<th>Unit</th>
<th>Instructional Topics</th>
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<tr>
<td>10 weeks</td>
<td>Linear Equations and Functions</td>
<td>Topic 1: Number Sense and Operations&lt;br&gt;Topic 2: Solving Equations&lt;br&gt;Topic 3: Graphing Equations&lt;br&gt;Topic 4: Writing Equations&lt;br&gt;Topic 5: Systems</td>
</tr>
<tr>
<td>1-2 weeks</td>
<td>Inequalities</td>
<td>Topic 1: Solving Multi-Step&lt;br&gt;Inequalities/Graph on Number Line&lt;br&gt;Topic 2: Word Problem with One-Variable</td>
</tr>
<tr>
<td>2 weeks</td>
<td>Exponentials</td>
<td>Topic 1: Radicals and Exponents</td>
</tr>
<tr>
<td>1-2 weeks</td>
<td>Polynomials</td>
<td>Topic 1: Polynomials</td>
</tr>
<tr>
<td>1 week</td>
<td>Data and Statistics</td>
<td>Topic 1: Measures of Central Tendency and Displays</td>
</tr>
</tbody>
</table>
Unit 1: Linear Equations and Functions

Subject: Pre-Algebra
Grade: 9, 10
Name of Unit: Linear Equations and Functions
Length of Unit: 10 weeks
Overview of Unit: Students will simplify expressions. Students will write, solve and graph equations.

Priority Standards for unit:
- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.CED.A.2: Create and graph linear equations in two variables.
- Alg1.LQE.A.3: Construct linear equations given graphs, verbal descriptions or tables.
- Alg1.IF.C.1: Graph functions expressed symbolically and identify and interpret key features of the graph.
- Alg1.DS.A.6: Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.
- Alg1.REL.C.1: Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.
- Alg1.REL.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.
- Alg1.REL.B.1: Solve a system of linear equations algebraically and/or graphically.
- Alg1.IF.B.1: Using tables, graphs and verbal descriptions, interpret key characteristics of a function that models the relationship between two quantities.
- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.

Supporting Standards for unit:
- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.
- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
  a. Identify, label and use appropriate units of measure within a problem.
  b. Convert units and rates.
  c. Use units within problems.
  d. Choose and interpret the scale and the origin in graphs and data displays.
- Alg1.IF.B.2: Relate the domain and range of a function to its graph and, where applicable, to the quantitative relationship it describes.
- Alg1.IF.C.3: Compare the properties of two functions given different representations.
- Alg1.IF.B.3: Determine the average rate of change of a function over a specified interval and interpret the meaning.
- Alg1.DS.A.1: Analyze and interpret graphical displays of data.
- Alg1.CED.A.4 Solve literal equations and formulas for a specified variable that highlights a quantity of interest.
- ISTE-KNOWLEDGE COLLECTOR.3.D - build knowledge by actively exploring real-world issues and problems, developing ideas and theories and pursuing answers and solutions.

<table>
<thead>
<tr>
<th>Unwrapped Concepts (Students need to know)</th>
<th>Unwrapped Skills (Students need to be able to do)</th>
<th>Bloom’s Taxonomy Levels</th>
<th>Webb's DOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.</td>
<td>Interpret</td>
<td>Understand</td>
<td>2</td>
</tr>
<tr>
<td>linear, quadratic and exponential equations in two variables.</td>
<td>Create</td>
<td>Create</td>
<td>3</td>
</tr>
<tr>
<td>linear, quadratic and exponential equations in two variables.</td>
<td>Graph</td>
<td>Apply</td>
<td>2</td>
</tr>
<tr>
<td>linear, quadratic and exponential equations given graphs, verbal descriptions or tables.</td>
<td>Construct</td>
<td>Create</td>
<td>3</td>
</tr>
<tr>
<td>functions expressed symbolically and key features of the graph.</td>
<td>Graph</td>
<td>Apply</td>
<td>2</td>
</tr>
<tr>
<td>key features of the graph.</td>
<td>Identify</td>
<td>Remember</td>
<td>1</td>
</tr>
<tr>
<td>key features of the graph.</td>
<td>Interpret</td>
<td>Understand</td>
<td>2</td>
</tr>
<tr>
<td>the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.</td>
<td>Interpret</td>
<td>Understand</td>
<td>3</td>
</tr>
<tr>
<td>that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.</td>
<td>Explain</td>
<td>Understand</td>
<td>2</td>
</tr>
<tr>
<td>how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.</td>
<td>Explain</td>
<td>Understand</td>
<td>2</td>
</tr>
<tr>
<td>a system of linear equations algebraically and/or graphically.</td>
<td>Solve</td>
<td>Analyze</td>
<td>3</td>
</tr>
<tr>
<td>that a function from one set (domain) to another set (range) assigns to each element of the domain exactly one element of the range.</td>
<td>Understand</td>
<td>Understand</td>
<td>2</td>
</tr>
</tbody>
</table>
Essential Questions:
1. How do you evaluate algebraic expressions?
2. How do you solve linear equations with variables on both sides?
3. How do you determine the slope of a line?
4. How do you graph a linear equation?
5. How do you write a linear equation given two points?

Enduring Understanding/Big Ideas:
1. Substitute a value into the expression and follow order of operations.
2. Get the variables together on one side; isolate the variable by using inverse operations.
3. By counting the rise over run or using the slope formula.
4. By creating a table, determining the x and y intercept, or determining the slope and y intercept.
5. Find the slope, then write equation in slope intercept form.

Unit Vocabulary:

<table>
<thead>
<tr>
<th>Academic Cross-Curricular Words</th>
<th>Content/Domain Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratios</td>
<td>Algebraic expression</td>
</tr>
<tr>
<td>Rate of change</td>
<td>Equation</td>
</tr>
<tr>
<td>Solve</td>
<td>Linear</td>
</tr>
<tr>
<td>Variable</td>
<td>Domain</td>
</tr>
<tr>
<td>Independent variable</td>
<td>Range</td>
</tr>
<tr>
<td>Dependent variable</td>
<td>Function</td>
</tr>
<tr>
<td>Constant</td>
<td>Proportions</td>
</tr>
<tr>
<td></td>
<td>Evaluate</td>
</tr>
<tr>
<td></td>
<td>Simplify</td>
</tr>
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<td></td>
<td>Parallel</td>
</tr>
<tr>
<td></td>
<td>Solution</td>
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<tr>
<td></td>
<td>Slope</td>
</tr>
<tr>
<td></td>
<td>Y-intercept</td>
</tr>
<tr>
<td></td>
<td>Rational Number</td>
</tr>
</tbody>
</table>

Board Approved: March 30, 2017
<table>
<thead>
<tr>
<th>Irrational Number</th>
<th>Real Number System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Number</td>
<td>Integer</td>
</tr>
<tr>
<td>Percentages</td>
<td>Absolute Value</td>
</tr>
<tr>
<td>Distribute</td>
<td>Like terms</td>
</tr>
<tr>
<td>Coefficient</td>
<td>Square root</td>
</tr>
<tr>
<td>Perfect square</td>
<td>Identity</td>
</tr>
<tr>
<td>System of equation</td>
<td></td>
</tr>
</tbody>
</table>

**Resources for Vocabulary Development:** textbook
Topic 1: Number Sense and Operations

Engaging Experience 1
Title: Student White Board Work with Distributive Property and Combining Like Terms
Suggested Length of Time: 20 minutes per day/every other day over a period of 1-2 weeks
Standards Addressed

  Priority:
  - Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.

Detailed Description/Instructions: Teacher will provide problems. Students will solve those on individual white boards so teacher can check for understanding. Beginning with basic examples of the distributive property then moving on to basic example of combining like terms. Finally, combine distributing and combining like terms together in multi-step expressions.

Bloom’s Levels: Understand
Webb’s DOK: 2
Rubric: N/A

Engaging Experience 2
Title: Bowling with Order of Operations
Suggested Length of Time: 20 minutes
Standards Addressed

  Priority:
  - Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.

Supporting:
  - Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.

Detailed Description/Instructions: Teacher will provide dice to groups of students (or can roll dice on SMART Notebook document - see Schoology lesson for Order of Operations). Groups will roll 3 dice and then use operations to try and create numbers #0-7 using the order of operations concept.

Bloom’s Levels: Understand
Webb’s DOK: 2
Rubric: N/A
**Engaging Experience 1**

**Title:** Around the Room Rotation Stations

**Suggested Length of Time:** 45 minutes after lesson on multi-step equations with variable on one side of equal sign and 45 minutes after lesson on multi-step equations with variables on both sides of the equation

**Standards Addressed**

*Priority:*

- Alg1.REI.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.

**Detailed Description/Instructions:** Students will walk around the classroom/hallway solving equations. Once they find their solution they will need to search around the room/hallway to find their next equation

**Bloom’s Levels:** Create

**Webb’s DOK:** 3

**Rubric:** N/A
Topic 3: Graphing Equations

Engaging Experience 1
Title: Find your Partner

Suggested Length of Time: 20 minutes/day as warm-up throughout the 5 day lessons

Standards Addressed

Priority:
- Alg1.CED.A.2: Create and graph linear equations in two variables.
- Alg1.DS.A.6: Interpret the slope (rate of change) and the y-intercept (constant term) of a linear model in the context of the data.

Supporting:
- Alg1.CED.A.4 Solve literal equations and formulas for a specified variable that highlights a quantity of interest.

Detailed Description/Instructions: Pass out a half-sheet of paper with an equation or graph on it to every student. Have students identify important information from the equation or graph they were given. Then allow students time to wander around the room and find their “partner” with the equivalent equation or graph.

Bloom’s Levels: Create, Understand

Webb’s DOK: 3

Rubric: N/A
Topic 4: Writing Equations

Engaging Experience 1
Title: Foldable
Suggested Length of Time: 15-20 minutes developing the foldable over 2 days

Standards Addressed

Priority:
- Alg1.LQE.A.3: Construct linear equations given graphs, verbal descriptions or tables.
- Alg1.IF.B.1: Using tables, graphs and verbal descriptions, interpret key characteristics of a function that models the relationship between two quantities.
- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.

Supporting:
- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
  d. Choose and interpret the scale and the origin in graphs and data displays.

Detailed Description/Instructions: The class will create a foldable together. It will be divided into three sections; tables, equations and graphs. In each section they will see the same data displayed as each type.

Bloom’s Levels: Create

Webb’s DOK: 3

Rubric: N/A Teacher example is provided in Schoology.
**Topic 5: Systems**

**Engaging Experience 1**

**Title:** Lotus Chart - Systems of Equations  

**Suggested Length of Time:** 30 minutes per day during Systems topic focusing on one method per day  

**Standards Addressed**

*Priority:*

- Alg1.REI.B.1: Solve a system of linear equations algebraically and/or graphically.
- Alg1.REI.C.1: Explain that the graph of an equation in two variables is the set of all its solutions plotted in the Cartesian coordinate plane.
- Alg1.IF.C.1: Graph functions expressed symbolically and identify and interpret key features of the graph.

*Supporting:*

- Alg1.DS.A.1: Analyze and interpret graphical displays of data.

**Detailed Description/Instructions:** Students will be given a Lotus chart that the teacher created with various systems around the outside boxes. On day 1, students will receive a Lotus chart and solve the systems graphically. On day 2, students will receive a new Lotus chart and solve the systems with the substitution method. On day 3, students will receive a new Lotus chart and solve the systems with the elimination method. All systems will equal the same coordinate located at the middle of each Lotus chart.

**Bloom’s Levels:** Analyze

**Webb’s DOK:** 3

**Rubric:** N/A
Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.) Based on the Algebra I EOC Performance Event, students will be given various cell phone plans and various individuals who are purchasing a new plan. Students must match each individual with each plan. Students must explain their reasoning for the match and display each plan as an equation, table, and graph.

Students will be given a crime scene scenario where they have to create a portfolio of evidence proving that they have arrested the right person and will demonstrate their understanding of their mathematical content present in the problem.

*Can be found on SCHOOLEGY*

Rubric for Engaging Scenario:
<table>
<thead>
<tr>
<th>Topic</th>
<th>Engaging Experience Title</th>
<th>Description</th>
<th>Suggested Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number Sense and Operations</td>
<td>Student White Board Work with Distributive Property and Combining Like Terms</td>
<td>Teacher will provide problems. Students will solve those on individual white boards so teacher can check for understanding. Beginning with basic examples of the distributive property then moving on to basic example of combining like terms. Finally, combine distributing and combining like terms together in multi-step expressions.</td>
<td>20 minutes per day/every other day over a period of 1-2 weeks</td>
</tr>
<tr>
<td>Number Sense and Operations</td>
<td>Bowling with Order of Operations</td>
<td>Teacher will provide dice to groups of students (or can roll dice on SMART Notebook document - see Schoology lesson for Order of Operations). Groups will roll 3 dice and then use operations to try and create numbers #0-7 using the order of operations concept.</td>
<td>20 minutes</td>
</tr>
<tr>
<td>Solving Equations</td>
<td>Around the Room Rotation Stations</td>
<td>Students will walk around the classroom/hallway solving equations. Once they find their solution they will need to search around the room/hallway to find their next equation.</td>
<td>45 minutes after lesson on multi-step equations with variable on one side of equal sign and 45 minutes after lesson on multi-step equations with variables on both sides of the equation</td>
</tr>
<tr>
<td>Topic</td>
<td>Activity</td>
<td>Description</td>
<td>Time Required</td>
</tr>
<tr>
<td>---------------------</td>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>--------------------------------</td>
</tr>
<tr>
<td>Graphing Equations</td>
<td>Find your Partner</td>
<td>Pass out a half-sheet of paper with an equation or graph on it to every student. Have students identify important information from the equation or graph they were given. Then allow students time to wander around the room and find their “partner” with the equivalent equation or graph.</td>
<td>20 minutes/day as warm-up throughout the 5 day lessons</td>
</tr>
<tr>
<td>Writing Equations</td>
<td>Foldable</td>
<td>The class will create a foldable together. It will be divided into three sections; tables, equations and graphs. In each section they will see the same data displayed as each type.</td>
<td>15-20 minutes developing the foldable over 2 days</td>
</tr>
<tr>
<td>Systems</td>
<td>Lotus Chart - Systems of Equations</td>
<td>Students will be given a Lotus chart that the teacher created with various systems around the outside boxes. On day 1, students will receive a Lotus chart and solve the systems graphically. On day 2, students will receive a new Lotus chart and solve the systems with the substitution method. On day 3, students will receive a new Lotus chart and solve the systems with the elimination method. All systems will equal the same coordinate located at the middle of each Lotus chart.</td>
<td>30 minutes per day during Systems topic focusing on one method per day</td>
</tr>
</tbody>
</table>
Unit 2: Inequalities

Subject: Pre-Algebra
Grade: 9, 10
Name of Unit: Inequalities
Length of Unit: 1-2 weeks
Overview of Unit: Students will solve and graph inequalities. Students will solve word problems with one variable.

Priority Standards for unit:
- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.
- Alg1.REI.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.

Supporting Standards for unit:
- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.
- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
  a. Identify, label and use appropriate units of measure within a problem.
  b. Convert units and rates.
  c. Use units within problems.
  d. Choose and interpret the scale and the origin in graphs and data displays.
- ISTE-GLOBAL COLLABORATOR.7.C - contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.
<table>
<thead>
<tr>
<th>Unwrapped Concepts (Students need to know)</th>
<th>Unwrapped Skills (Students need to be able to do)</th>
<th>Bloom’s Taxonomy Levels</th>
<th>Webb's DOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.</td>
<td>Interpret</td>
<td>Understand</td>
<td>2</td>
</tr>
<tr>
<td>equation and inequalities in one variable and use them to model and/solve problems.</td>
<td>Create</td>
<td>Create</td>
<td>3</td>
</tr>
<tr>
<td>how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.</td>
<td>Explain</td>
<td>Understand</td>
<td>2</td>
</tr>
</tbody>
</table>

**Essential Questions:**
1. How do you solve a multi-step linear inequality?
2. How do you graph an inequality on a number line?

**Enduring Understanding/Big Ideas:**
3. Isolate the variable by using inverse operations
4. Determine whether an open dot or closed dot is used and draw an arrow representing the numbers that make the inequality true

**Unit Vocabulary:**

<table>
<thead>
<tr>
<th>Academic Cross-Curricular Words</th>
<th>Content/Domain Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Inequality</td>
</tr>
<tr>
<td></td>
<td>Less than</td>
</tr>
<tr>
<td></td>
<td>Greater than</td>
</tr>
<tr>
<td></td>
<td>Less than or equal to</td>
</tr>
<tr>
<td></td>
<td>Greater than or equal to</td>
</tr>
</tbody>
</table>

**Resources for Vocabulary Development:** textbook
Engaging Experience 1
Title: Rows and Columns Game

Suggested Length of Time: 20 minutes after covering 1-2 step inequalities and 20 minutes after covering multi-step inequalities.

Standards Addressed

Priority:

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.REI.A.1: Explain how each step taken when solving an equation or inequality in one variable creates an equivalent equation or inequality that has the same solution(s) as the original.

Supporting:

- ISTE-GLOBAL COLLABORATOR.7.C - contribute constructively to project teams, assuming various roles and responsibilities to work effectively toward a common goal.

Detailed Description/Instructions: Every student gets a sheet of paper with two columns of inequality problems. They fold the paper in half and then work the problems out in their column (the right side of the paper) while their partner sitting in the row next to them, works out the problems on the other half of the paper (the left side of the paper). Each side-by-side problem will have the same answer. After both partners solve the inequalities, they check their answers before moving on to the next problem.

Bloom’s Levels: Understand
Webb’s DOK: 2
Rubric: N/A
**Engaging Experience 1**

**Title:** Card Sort Match. LESS METHOD

**Suggested Length of Time:** 30 minutes

**Standards Addressed**

*Priority:*

- Alg1.CED.A.1: Create equations and inequalities in one variable and use them to model and/or solve problems.

**Detailed Description/Instructions:** LESS method is using a Label, Equation, showing your work by Solving for a solution and a Sentence to correctly answer different word problems. Students will be given cards with examples of word problems then they will need to identify the correct label solving and sentence that goes with the equation. Each group will have to sort them and match them accordingly.

**Bloom’s Levels:** Create  
**Webb’s DOK:** 3  
**Rubric:** N/A
**Engaging Scenario** (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

“You’re the Teacher”

You are the math teacher of a 9th grade Pre-Algebra class. Your students just took a test on solving and graphing inequalities and you are beginning to grade them... A fictional student assessment will be graded by the “teacher” and they will include feedback on each question that is missed. At the end of grading, the “teacher” must create 3 additional questions that will help the student practice what he or she missed.

**Rubric for Engaging Scenario:** to be created
<table>
<thead>
<tr>
<th>Topic</th>
<th>Engaging Experience Title</th>
<th>Description</th>
<th>Suggested Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solving Multi-Step Inequalities/Graph on Number Line</td>
<td>Rows and Columns Game</td>
<td>Every student gets a sheet of paper with two columns of inequality problems. They fold the paper in half and then work the problems out in their column (the right side of the paper) while their partner sitting in the row next to them, works out the problems on the other half of the paper (the left side of the paper). Each side-by-side problem will have the same answer. After both partners solve the inequalities, they check their answers before moving on to the next problem.</td>
<td>20 minutes after covering 1-2 step inequalities and 20 minutes after covering multi-step inequalities</td>
</tr>
<tr>
<td>Word Problem with One-Variable</td>
<td>Card Sort Match. LESS METHOD</td>
<td>LESS method is using a Label, Equation, showing your work by Solving for a solution and a Sentence to correctly answer different word problems. Students will be given cards with examples of word problems then they will need to identify the correct label solving and sentence that goes with the equation. Each group will have to sort them and match them accordingly.</td>
<td>30 minutes</td>
</tr>
</tbody>
</table>
Unit 3: Exponentials

Subject: Pre-Algebra
Grade: 9, 10
Name of Unit: Exponentials
Length of Unit: 2 weeks
Overview of Unit: Students will simplify radical and exponential expressions. Student will use radials to solve equations.

Priority Standards for unit:
- Alg1.NQ.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1.

Supporting Standards for unit:
- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.
- ISTE-EMPOWERED LEARNER 1.C - use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
- ISTE-KNOWLEDGE COLLECTOR.3.C - curate information from digital resources using a variety of tools and methods to create collections of artifacts that demonstrate meaningful connections or conclusions.
- ISTE-CREATIVE COMMUNICATOR.6.B - create original works or responsibly repurpose or remix digital resources into new creations.

<table>
<thead>
<tr>
<th>Unwrapped Concepts (Students need to know)</th>
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</tr>
</thead>
<tbody>
<tr>
<td>expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1</td>
<td>Rewrite</td>
<td>Remember</td>
<td>1</td>
</tr>
</tbody>
</table>

Essential Questions:
1. How do you apply properties of exponents to simplify expressions?
2. How are exponents and scientific notation related?
3. How do you simplify a radical expression?

Enduring Understanding/Big Ideas:
1. Use the properties of exponents to decide whether to add, subtract, multiply.
2. Scientific notation uses powers of 10 to write very large or very small numbers.
3. By finding a perfect square factor.
### Unit Vocabulary:

<table>
<thead>
<tr>
<th>Academic Cross-Curricular Words</th>
<th>Content/Domain Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exponent</td>
</tr>
<tr>
<td></td>
<td>Base</td>
</tr>
<tr>
<td></td>
<td>Scientific notation</td>
</tr>
<tr>
<td></td>
<td>Radical</td>
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<td>Square root</td>
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<tr>
<td></td>
<td>Perfect square number</td>
</tr>
<tr>
<td></td>
<td>Factor</td>
</tr>
</tbody>
</table>

**Resources for Vocabulary Development:** textbook
Engaging Experience 1
Title: Exponents Tarsia Puzzle
Suggested Length of Time: 15-20 minutes after each new exponent property is covered
Standards Addressed
  
  Priority:
    • Alg1.NQ.A.2: Rewrite expressions involving radicals and rational exponents using the properties of exponents. Limit to rational exponents with a numerator of 1.

Detailed Description/Instructions: Students will cut out the puzzle pieces and then work to put the puzzle pieces together - matching question and answer together. A Tarsia puzzle example is located on Schoology.

Bloom’s Levels: Remember
Webb’s DOK: 1
Rubric: N/A
Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Students will create a prezi or powerpoint explaining the key concepts of the chapter per section (properties, steps to simplify, etc.). They will need to include examples of their own work (i.e., notes, homework) as a part of their presentation.

**Rubric for Engaging Scenario:** to be created
## Summary of Engaging Learning Experiences for Topics

<table>
<thead>
<tr>
<th>Topic</th>
<th>Engaging Experience Title</th>
<th>Description</th>
<th>Suggested Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Radicals and Exponents</td>
<td>Exponents Tarsia Puzzle</td>
<td>Students will cut out the puzzle pieces and then work to put the puzzle pieces together - matching question and answer together. A Tarsia puzzle example is located on Schoology.</td>
<td>15-20 minutes after each new exponent property is covered</td>
</tr>
</tbody>
</table>
Unit 4: Polynomials

Subject: Pre-Algebra
Grade: 9, 10
Name of Unit: Polynomials
Length of Unit: 1-2 weeks
Overview of Unit: Students will identify and name polynomials. Students will then add, subtract, or multiply/factor basic polynomials.

Priority Standards for unit:
- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.SSE.A.2: Analyze the structure of polynomials to create equivalent expressions or equations.
- Alg1.SSE.A.3: Choose and produce equivalent forms of a quadratic expression or equations to reveal and explain properties.
- Alg1.APR.A.1: Add, subtract and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations.

Supporting Standards for unit:
- Alg1.NQ.B.2: Define and use appropriate quantities for representing a given context or problem.
- Alg1.NQ.B.1: Use units of measure as a way to understand and solve problems involving quantities.
  a. Identify, label and use appropriate units of measure within a problem.
  b. Convert units and rates.
  c. Use units within problems.
- ISTE-GLOBAL COLLABORATOR.7.A - use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
- ISTE-GLOBAL COLLABORATOR.7.B - use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.

<table>
<thead>
<tr>
<th>Unwrapped Concepts (Students need to know)</th>
<th>Unwrapped Skills (Students need to be able to do)</th>
<th>Bloom’s Taxonomy Levels</th>
<th>Webb's DOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.</td>
<td>Interpret</td>
<td>Understand</td>
<td>2</td>
</tr>
</tbody>
</table>
the structure of polynomials

equivalent expressions or equations

equivalent forms of a quadratic expression or equations to reveal and explain properties.

equivalent forms of a quadratic expression or equations to reveal and explain properties.

polynomials

that polynomials follow the same general rules of arithmetic and are closed under these operations.

<table>
<thead>
<tr>
<th>Analyze</th>
<th>Analyze</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create</td>
<td>Create</td>
<td>2</td>
</tr>
<tr>
<td>Choose</td>
<td>Remember</td>
<td>1</td>
</tr>
<tr>
<td>Produce</td>
<td>Create</td>
<td>2</td>
</tr>
<tr>
<td>Add, subtract and multiply</td>
<td>Apply</td>
<td>2</td>
</tr>
<tr>
<td>Understand</td>
<td>Understand</td>
<td>3</td>
</tr>
</tbody>
</table>

**Essential Questions:**

1. How do you classify polynomials?
2. How do you simplify polynomial expressions?
3. How do you factor binomials?
4. How do you factor trinomials with a leading coefficient of 1?

**Enduring Understanding/Big Ideas:**

1. Number of terms (monomial, binomial, trinomial) and degree (linear, quadratic, cubic)
2. Add, subtract, multiply
3. GCF
4. Factor trinomial by short-cut method (answer of 2 binomials)

**Unit Vocabulary:**

<table>
<thead>
<tr>
<th>Academic Cross-Curricular Words</th>
<th>Content/Domain Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polynomial</td>
<td></td>
</tr>
<tr>
<td>Monomial</td>
<td></td>
</tr>
<tr>
<td>Binomial</td>
<td></td>
</tr>
<tr>
<td>Trinomial</td>
<td></td>
</tr>
<tr>
<td>Linear</td>
<td></td>
</tr>
<tr>
<td>Quadratic</td>
<td></td>
</tr>
<tr>
<td>Cubic</td>
<td></td>
</tr>
<tr>
<td>Degree</td>
<td></td>
</tr>
<tr>
<td>Like terms</td>
<td></td>
</tr>
<tr>
<td>Leading coefficient</td>
<td></td>
</tr>
<tr>
<td>Factor</td>
<td></td>
</tr>
<tr>
<td>Terms</td>
<td></td>
</tr>
<tr>
<td>Greatest common factor</td>
<td></td>
</tr>
</tbody>
</table>

**Resources for Vocabulary Development:** textbook
**Engaging Experience 1**

**Title:** Polynomial Dice Activity

**Suggested Length of Time:** 20-30 minutes over a week long period focusing on one method per day then a mixed review at the end.

**Standards Addressed**

**Priority:**

- Alg1.SSE.A.1: Interpret the contextual meaning of individual terms or factors from a given problem that utilizes formulas or expressions.
- Alg1.SSE.A.2: Analyze the structure of polynomials to create equivalent expressions or equations.
- Alg1.APR.A.1: Add, subtract and multiply polynomials, and understand that polynomials follow the same general rules of arithmetic and are closed under these operations.

**Detailed Description/Instructions:** Students will roll two dice. Use those two monomials/polynomials for the problem. Each time they will name/identify the polynomial. Then students will be told whether they are adding, subtracting, or multiplying.

**Bloom’s Levels:** Apply, Understand

**Webb’s DOK:** 2, 3

**Rubric:** n/a

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**Engaging Experience 2**

**Title:** Kahoot Factoring Practice

**Suggested Length of Time:** 20-25 minutes

**Standards Address:**

**Priority:**

- Alg1.SSE.A.3: Choose and produce equivalent forms of a quadratic expression or equations to reveal and explain properties.
- ISTE-EMPOWERED LEARNER1.C - use technology to seek feedback that informs and improves their practice and to demonstrate their learning in a variety of ways.
- ISTE-GLOBAL COLLABORATOR.7.A - use digital tools to connect with learners from a variety of backgrounds and cultures, engaging with them in ways that broaden mutual understanding and learning.
- ISTE-GLOBAL COLLABORATOR.7.B - use collaborative technologies to work with others, including peers, experts or community members, to examine issues and problems from multiple viewpoints.
Detailed Description/Instructions: Teacher creates or searches for a Kahoot game with factoring binomials and basic trinomials (leading coefficient of one). Students participate in the kahoot activity with their phone or laptop. After each question is answered, students explain their process for factoring to their partner before moving on to the next question.

Bloom’s Levels: Remember
Webb’s DOK: 1
Rubric: n/a
Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.) Students complete the polynomial problems (adding, subtracting, multiplying, factoring) on a worksheet and find the answer from the two choices. The answer designates which “item” they draw on the attached face. The result is a picture of a face created and colored.

Rubric for Engaging Scenario: to be created
### Summary of Engaging Learning Experiences for Topics

<table>
<thead>
<tr>
<th>Topic</th>
<th>Engaging Experience Title</th>
<th>Description</th>
<th>Suggested Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polynomials</td>
<td>Polynomial Dice Activity</td>
<td>Students will roll two dice. Use those two monomials/polynomials for the problem. Each time they will name/identify the polynomial. Then students will be told whether they are adding, subtracting, or multiplying.</td>
<td>20-30 minutes over a week long period focusing on one method per day then a mixed review at the end</td>
</tr>
<tr>
<td>Polynomials</td>
<td>Kahoot Factoring Practice 🟢</td>
<td>Teacher creates or searches for a Kahoot game with factoring binomials and basic trinomials (leading coefficient of one). Students participate in the Kahoot activity with their phone or laptop. After each question is answered, students explain their process for factoring to their partner before moving on to the next question.</td>
<td>20-25 minutes</td>
</tr>
</tbody>
</table>
Unit 5: Data and Statistics

Subject: Pre-Algebra
Grade: 9, 10
Name of Unit: Data and Statistics
Length of Unit: 1 week
Overview of Unit: Students will solve for measures of central tendency. Student will identify relationships between different forms of data.

Priority Standards for unit:
- Alg1.DS.A.8: Distinguish between correlation and causation.

Supporting Standards for unit:
- Alg1.DS.A.3: Interpret differences in shape, center and spreads in the context of the data sets, accounting for possible effects of outliers.
- ISTE-EMPOWERED LEARNER 1A - articulate and set personal learning goals, develop strategies leveraging technology to achieve them and reflect on the learning process itself to improve learning outcomes.
- ISTE-DIGITAL CITIZEN.2.D - manage their personal data to maintain digital privacy and security and are aware of data-collection technology used to track their navigation online.
- ISTE-COMPUTATIONAL THINKER.5.A - formulate problem definitions suited for technology-assisted methods such as data analysis, abstract models and algorithmic thinking in exploring and finding solutions.
- ISTE-COMPUTATIONAL THINKER.5.B - collect data or identify relevant data sets, use digital tools to analyze them, and represent data in various ways to facilitate problem-solving and decision-making.

<table>
<thead>
<tr>
<th>Unwrapped Concepts (Students need to know)</th>
<th>Unwrapped Skills (Students need to be able to do)</th>
<th>Bloom’s Taxonomy Levels</th>
<th>Webb's DOK</th>
</tr>
</thead>
<tbody>
<tr>
<td>between correlation and causation</td>
<td>Distinguish</td>
<td>Analyze</td>
<td>2</td>
</tr>
</tbody>
</table>

Essential Questions:
1. How do you represent a given set of data?
2. How do you find mean, median, mode and range?
**Enduring Understanding/Big Ideas:**
1. Stem and leaf, box and whisker, scatter plot, histogram, frequency tables.
2. Use appropriate formulas

**Unit Vocabulary:**

<table>
<thead>
<tr>
<th>Academic Cross-Curricular Words</th>
<th>Content/Domain Specific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average</td>
<td>Box and whisker</td>
</tr>
<tr>
<td>Data</td>
<td>Stem and leaf</td>
</tr>
<tr>
<td></td>
<td>Scatter plot</td>
</tr>
<tr>
<td></td>
<td>Histogram</td>
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<tr>
<td></td>
<td>Mean</td>
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<td></td>
<td>Median</td>
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<tr>
<td></td>
<td>Mode</td>
</tr>
<tr>
<td></td>
<td>Range</td>
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<tr>
<td></td>
<td>Outliers</td>
</tr>
<tr>
<td></td>
<td>Interquartile range</td>
</tr>
<tr>
<td></td>
<td>Sample</td>
</tr>
<tr>
<td></td>
<td>Frequency table</td>
</tr>
</tbody>
</table>

**Resources for Vocabulary Development:** textbook
Topic 1: Measures of Central Tendency and Displays

Engaging Experience 1
Title: Around the Room Rotation Stations
Suggested Length of Time: 45 minutes

Standards Addressed

Priority:
- Alg1.DS.A.8: Distinguish between correlation and causation.

Supporting:
- Alg1.DS.A.3: Interpret differences in shape, center and spreads in the context of the data sets, accounting for possible effects of outliers.

Detailed Description/Instructions: Students will walk around the classroom/hallway solving measures of central tendency or finding the graph to match that measure. Once they find their solution they will need to search around the room/hallway to find their next equation

Bloom’s Levels: Analyze
Webb’s DOK: 2

Rubric: Answer Key for questions with matching graph will need to teacher made.
Engaging Scenario

(An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

M&M activity: Students will get a mini bag of M&M’s (or skittles) They will use the contents of those bags and find the measures of central tendency.

Students will use classroom and individual data based on continuous improvement data tracking to analyze correlations and reflect on progress in the course.

Rubric for Engaging Scenario: to be created
### Summary of Engaging Learning Experiences for Topics

<table>
<thead>
<tr>
<th>Topic</th>
<th>Engaging Experience Title</th>
<th>Description</th>
<th>Suggested Length of Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measures of Central Tendency and Displays</td>
<td>Around the Room Rotation Stations</td>
<td>Students will walk around the classroom/hallway solving measures of central tendency or finding the graph to match that measure. Once they find their solution they will need to search around the room/hallway to find their next equation</td>
<td>45 minutes</td>
</tr>
</tbody>
</table>
Unit of Study Terminology

**Appendices:** All Appendices and supporting material can be found in this course’s shell course in the District’s Learning Management System.

**Assessment Leveling Guide:** A tool to use when writing assessments in order to maintain the appropriate level of rigor that matches the standard.

**Big Ideas/Enduring Understandings:** Foundational understandings teachers want students to be able to discover and state in their own words by the end of the unit of study. These are answers to the essential questions.

**Engaging Experience:** Each topic is broken into a list of engaging experiences for students. These experiences are aligned to priority and supporting standards, thus stating what students should be able to do. An example of an engaging experience is provided in the description, but a teacher has the autonomy to substitute one of their own that aligns to the level of rigor stated in the standards.

**Engaging Scenario:** This is a culminating activity in which students are given a role, situation, challenge, audience, and a product or performance is specified. Each unit contains an example of an engaging scenario, but a teacher has the ability to substitute with the same intent in mind.

**Essential Questions:** Engaging, open-ended questions that teachers can use to engage students in the learning.

**Priority Standards:** What every student should know and be able to do. These were chosen because of their necessity for success in the next course, the state assessment, and life.

**Supporting Standards:** Additional standards that support the learning within the unit.

**Topic:** These are the main teaching points for the unit. Units can have anywhere from one topic to many, depending on the depth of the unit.

**Unit of Study:** Series of learning experiences/related assessments based on designated priority standards and related supporting standards.

**Unit Vocabulary:** Words students will encounter within the unit that are essential to understanding. Academic Cross-Curricular words (also called Tier 2 words) are those that can be found in multiple content areas, not just this one. Content/Domain Specific vocabulary words are those found specifically within the content.

**Symbols:**
- This symbol depicts an experience that can be used to assess a student’s 21st Century Skills using the rubric provided by the district.
- This symbol depicts an experience that integrates professional skills, the development of professional communication, and/or the use of professional mentorships in authentic classroom learning activities.