Unit 1: Properties of Numbers and Sets  
Grade: Integrated Algebra

Performance Indicators to be mastered in this unit:

<table>
<thead>
<tr>
<th>Number</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.N.1</td>
<td>Identify and apply the properties of real numbers (closure, commutative, associative, distributive, identity, inverse)  <em>Note: Students do not need to identify groups and fields; but students should be engaged in the ideas.</em> Define and identify the commutative and associative properties of addition and multiplication, Define and identify the distributive property of multiplication over addition, Define and identify the identity and inverse properties of addition and multiplication</td>
</tr>
<tr>
<td>7.N.11</td>
<td>Simplify expressions using order of operations  <em>Note: Expressions may include absolute value and/or integral exponents greater than 0.</em></td>
</tr>
<tr>
<td>A.N.6</td>
<td>Evaluate expressions involving factorial(s), absolute value(s), and exponential expression(s)</td>
</tr>
<tr>
<td>A.A.29</td>
<td>Use set-builder notation and/or interval notation to illustrate the elements of a set, given the elements in roster form</td>
</tr>
<tr>
<td>A.A.30</td>
<td>Find the complement of a subset of a given set, within a given universe</td>
</tr>
<tr>
<td>A.A.31</td>
<td>Find the intersection of sets (no more than three sets) and/or union of sets (no more than three sets) ie: Venn Diagram</td>
</tr>
</tbody>
</table>

**Major Concepts:**
- Identify number sets and find where each number belongs
- Identify the number properties and how they help when working with numbers
- Understand the order of operations with absolute values and implement it
- Identify and use the different representations involving sets
- Work with sets using intersection, complement, and union

**Essential Understandings:**
- A number can belong to more than one number set
- Know which properties apply to each of the four basic operations
- Complete a Venn Diagram and answer questions based on given information
- Shade Venn Diagram for union, intersection, and complement
- Solve word problems using Venn Diagrams
- Go back and forth between intervals, inequalities, and number lines
- Understand the use of “and” and “or” and how they are depicted in number lines, intervals and inequalities
**Essential Questions:**
- What set is shaded on this Venn Diagram?
- What property does this example represent and why?
- Write an equation that demonstrates the following property
- What is the next step in evaluating this expression?
- What is the intersection? Complement? Union?
- Express the following set in set notation (in interval notation)
- What set does the following number belong to and why?

**Essential S-VE Exit Behaviors:** Life long learning/self discipline

**Skills needed for mastery (& possible teaching strategies):**

*Optional review:
Basic operations with rational numbers (crypto problems) - negatives/positives with fractions and decimals

1. **Number sets**
   - Graphic organizer to define/classify different real numbers

2. **Properties of real numbers**
   - review - cumulative, associative, identity, inverse, distributive, zero property
   - new - closure
   - work with the properties - match properties to example, have students create examples, label examples with names of the properties, column on notes for acronyms for the properties (ie - distributive = dating property), online activities on [www.regentsprep.org](http://www.regentsprep.org)

3. **Working with real numbers**
   - order of operations, simplifying expressions, & absolute values
   - Divisibility rules (?)

   *Don’t write fractions as decimals - know typical decimal’s fraction equivalents (.3333)*

4. **Sets**
   - The notation of sets, use of inequalities, representation of inequalities on a number line (where does the X go on a number line when have more than one inequality)
   - Review basic inequalities & introduce interval notation
   - Introduce roster & set-builder, interval notation
   - Two activities on [www.regentsprep.org](http://www.regentsprep.org)
   - [www.jmap.org](http://www.jmap.org) for regents questions

5. **Venn Diagrams** - a way to organize information, which can be numbers
   - Union, intersection & complement
   - Students list ten animals, then students in pairs fill out Venn Diagrams and discuss union and intersection
   - Students draw 7 cards, then in pairs fill out Venn Diagrams

6. **Universe, subsets**
   - can do this with the animals, cards, shapes, numbers

7. **Using Venn Diagrams to solve situational word problems**
   - Begin with intersection and complement
   - Then building outward in the diagram
8. Using Venn Diagrams with 3 sets
   - Key words - at least, at most
   - Follow same steps that were used in 7.

**Key Terms:**
Factors, integers, multiples, set, subset, complement, union, intersection, even, odd, element of, empty set, null set, commutative, associative, identity, inverse, distributive, closure, universe, interval, inequality, roster, set builder, interval notation, evaluate,

**Mastery checks/culminating assessments:**
Homework
Teacher made quizzes
Unit assessment

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**Unit: 2a writing algebra expressions**

**Grade: Integrated Algebra**

Performance Indicators to be mastered in this unit:

<table>
<thead>
<tr>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>A.A.1</td>
<td>Translate a quantitative verbal phrase into an algebraic expression</td>
</tr>
<tr>
<td>A.A.2</td>
<td>Write a verbal expression that matches a given mathematical expression</td>
</tr>
<tr>
<td>A.A.3</td>
<td>Distinguish the difference between an algebraic expression and an algebraic equation</td>
</tr>
<tr>
<td>A.A.4</td>
<td>Translate verbal sentences into mathematical equations or inequalities</td>
</tr>
<tr>
<td>A.A.5</td>
<td>Write algebraic equations or inequalities that represent a situation</td>
</tr>
</tbody>
</table>

**Major Concepts:**
To represent verbal situations using mathematical symbols
**Essential Understandings:**
Recognize the key words that represent the different operations
Know the difference between an expression, equation and inequality
Find a pattern in a situation
Know the concepts of consecutive integers
Know the difference between 4 less than a number and a number less 4, subtract vs. subtract from
Know half, doubling, twice, 2X vs. X²
Understand that dividing is also multiplying by a fraction
That quantity of represents a grouping
Know the difference between sum of 4 times a number and 5 vs. 4 times the sum of a number and 5

**Essential Questions:**
How can we represent consecutive integers (even/odd)?
What words mean addition? Subtraction? …
What is the difference between an equation and an expression?
What is the difference between an inequality and an equation?

**Essential S-VE Exit Behaviors:** Independent Thinker

**Skills needed for mastery (& possible teaching strategies):**
1. Roundtable with words that represent the four operations.
   - Ideas: 4 section graphic organizer with = in the middle
   - Maybe having a stack of word problems to go through and underline key words and what they mean.
2. Start by giving verbal expressions with numbers only: Ex: “The sum of four and eight”. Then reverse: numbers to verbal expressions
3. Then go to expressions with variables: verbal → numeric
4. The structure of “_____ and _____” as used with sum of, difference between, product of, and quotient of. Ex: “The sum of 4 times a number and 7 = 4n + 7”
5. Introduce parentheses as “the quantity”
6. Discuss the difference between expressions and equations, practice
7. Discuss inequalities, practice
   - Is more than, at least, is less than, at most, etc.

**Key Terms:** expression, equation, inequality, sum, difference, quotient, product, is, at least, at most, quantity, double, twice, half, reciprocal, opposite, per, diminished by, exceeds by,

**Mastery checks/culminating assessments:**
Homework
Quiz

**Comments/reflections**
See Algebra1 online for PowerPoint presentations.
Unit: 2b solving linear algebra  
Grade: Integrated Algebra

Performance Indicators to be mastered in this unit:

<table>
<thead>
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<th>Number</th>
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</thead>
<tbody>
<tr>
<td>A.A.6</td>
<td>Analyze and solve verbal problems whose solutions requires solving a linear equation in one variable or linear inequality in one variable.</td>
</tr>
<tr>
<td>A.A.24</td>
<td>Solve linear inequalities in one variable</td>
</tr>
<tr>
<td>A.A.21</td>
<td>Determine whether a given value is a solution to a given linear equation in one variable or linear inequality in one variable</td>
</tr>
<tr>
<td>A.A.22</td>
<td>Solve all types of linear equations in one variable (Solve multi-step equations by combining like terms, using the distributive property, or moving variables to one side of the equation)</td>
</tr>
<tr>
<td>A.A.23</td>
<td>Solve literal equations for a given variable</td>
</tr>
<tr>
<td>A.A.26</td>
<td>Solve algebraic proportions in one variable which result in linear or quadratic equations</td>
</tr>
<tr>
<td>A.A.25</td>
<td>Solve equations involving fractional expressions Note: Expressions which result in linear equations in one variable.</td>
</tr>
</tbody>
</table>

**Major Concepts:**
Setting up and solving various equations and inequalities with one variable

**Essential Understandings:**
Understand the concept of inverse operations (Be clear about negatives and subtraction)  
How to use a word problem to set up an equation to represent a given situation  
Combining like terms  
Distributive property  
Fractional  
Variables on both sides of equation  
Proportions  
Solving linear inequalities (Multiplication/Division by a negative quantity)  
Solving literal equations (no numbers)  
Determining if a value is in a solution set (identity or empty set)

**Essential Questions:**
Given an equation, solve for the value of the variable  
What is the solution set of this equation?  
What is the next step to solve this?
<table>
<thead>
<tr>
<th>Is this value in the solution set?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Does the inequality get switched in this problem? (multiply/divide by a negative)</td>
</tr>
</tbody>
</table>

**Essential S-VE Exit Behaviors:**
self discipline

**Skills needed for mastery (& possible teaching strategies):**

1. Discuss the concept of a solution set and determine if a given value from a replacement set in the solution set.
2. Discuss, practice, and write the steps for balancing 1-step and 2-step equations using inverse operations.
   - Stations #1-7, students work at own pace and check with teacher before moving on.
3. Discuss, practice, and write the steps for solving equations using the distributive property, combining like terms, fractional equations, and proportions.
   - Include problems with "no solution" and "all real numbers" as solutions.
4. Discuss, practice, and write the steps for solving equations with variables on both sides of the equation.
5. Discuss, practice, and write the steps for balancing 1-step and 2-step inequalities using inverse operations.
6. Discuss, practice, and write the steps for solving inequalities using the distributive property, combining like terms, fractional equations, and proportions.
7. Discuss, practice, and solve inequalities with variables on both sides of the equation.
8. Discuss, practice, and solve literal equations and inequalities
   - Look at how to rewrite solutions in different ways.
   
   \[
   \frac{-b + c}{2} = \frac{c-b}{2} = \frac{1}{2}(c-b)
   \]
9. Set up and solve equations or inequalities based on a given word problem (verbal problems, age, consecutive integers, perimeter, money, etc.)

**Key Terms:** solution set, identity, empty set, variable, distributive property, like terms, literal equations, proportions

**Mastery checks/culminating assessments:**
Homework
Ticket Out the Door
End or Unit Quiz
Unit: 3 Ratios, Proportions, and Percents
Grade: Integrated Algebra

Performance Indicators to be mastered in this unit:

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<tr>
<th>Number</th>
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<tbody>
<tr>
<td>6.N.16</td>
<td>Add and subtract fractions with unlike denominators</td>
</tr>
<tr>
<td>6.N.18</td>
<td>Add, subtract, multiply, and divide mixed numbers with unlike denominators</td>
</tr>
<tr>
<td>6.N.21</td>
<td>Find multiple representations of rational numbers (fractions, decimals, and percents 0 to 100)</td>
</tr>
<tr>
<td>6.N.11</td>
<td>Read, write, and identify percents of a whole (0% to 100%)</td>
</tr>
<tr>
<td>Review</td>
<td>Conversions in measurement systems</td>
</tr>
<tr>
<td>A.N.5</td>
<td>Solve algebraic problems arising from situations that involve fractions, decimals, percents (decrease/increase and discount), and proportionality/direct variation</td>
</tr>
<tr>
<td>A.M.1</td>
<td>Calculate rates using appropriate units (e.g., rate of a space ship versus the rate of a snail)</td>
</tr>
<tr>
<td>A.M.2</td>
<td>Solve problems involving conversions within measurement systems, given the relationship between the units</td>
</tr>
</tbody>
</table>

**Major Concepts:**
solving proportions, increasing problem solving skills

**Essential Understandings:**
- Identify a ratio
- Understand the concept of ratios
- Understand the relationships between percents and fractions (ratios)
- Label of units
- Cross cancelling
- Conversion of units

**Essential Questions:**
- Do these ratios form a proportion?
- How would you solve a proportion?
- How do you change a ratio to a decimal to a percent?
- How do you change a percent to a decimal to a ratio?

**Essential S-VE Exit Behaviors:** life-long learning & effective communicator

**Skills needed for mastery:**
1. Review of ratios, rate, proportions & cross multiplying
   - Ways to express a ratio: fraction, use of a colon, use of the word to
   - Meaning of the word per (miles per hour)
   - Proportions are when two ratios are equal
   - If units exist, make sure to include them with the numbers
   - Unit rates
2. Word problems with ratios and proportions
   • Be sure to include some more difficult proportions
   • Inside, outside circle (setting proportions up) - ½ class makes outside circle and other ½ makes an inside circle, set up given proportions for a word problem, then rotate and set next proportion, continue until all given proportions are set up, then students go back to their seats to solve the proportions. *Any questions see Abby Gentile

3. direct variation
   • setting up the ratios; as one increases the other increases
   • the faster the speed; bigger the ticket, more you eat; more weight you gain

4. percents
   • relationship between fractions, decimals, percents
   • part over whole, percent over one hundred, is over of (alpha. order)

5. percent increase/decrease
   • identify the original value and the new value
   • \( \frac{N - O}{O} \) (new − original)

6. word problems with percents

7. conversions
   • review standard conversion units (ie: 12 inches in 1 foot)
   • convert from one unit to another
   • know the units - if the new unit is larger than the original than the number is smaller
   • if the unit is smaller than the original than the number is larger because I need more to equal the original
   • bigger unit to smaller unit - multiply and smaller unit to bigger unit - divide
   • set up the ratios (not proportions) - have to set it up so old unit cancels out when you multiply across

8. other types of word problems
   • given ratios and a total, need to set up an equation to solve
   • similarities, corresponding sides, corresponding angles, wire cut into two pieces with a ratio of ..., number in a given ratio, angles in a given ratio
   • I have ... who has ... (in groups of three, each person has six cards)

Key Terms: ratio, proportion, rate, direct variation, percent, conversion, units, unit price, discount, sale price, cross multiply, decimal, fraction,

Mastery checks/culminating assessments: homework, quizzes, end of unit test
Unit: 4a Linear Equations in the Coordinate Plane
Grade: Integrated Algebra

Performance Indicators to be mastered in this unit:

<table>
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<tr>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>A.A.32</td>
<td>Explain slope as a rate of change between dependent and independent variables</td>
</tr>
<tr>
<td>A.A.33</td>
<td>Determine the slope of a line, given the coordinates of two points on the line</td>
</tr>
<tr>
<td>A.A.34</td>
<td>Write the equation of a line, given its slope and the coordinates of a point on the line</td>
</tr>
<tr>
<td>A.A.35</td>
<td>Write the equation of a line, given the coordinates of two points on the line</td>
</tr>
<tr>
<td>A.A.36</td>
<td>Write the equation of a line parallel to the x- or y-axis</td>
</tr>
<tr>
<td>A.A.37</td>
<td>Determine the slope of a line, given its equation in any form</td>
</tr>
<tr>
<td>A.A.38</td>
<td>Determine if two lines are parallel, given their equations in any form</td>
</tr>
<tr>
<td>A.A.39</td>
<td>Determine whether a given point is on a line, given the equation of the line</td>
</tr>
<tr>
<td>A.G.4</td>
<td>Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions</td>
</tr>
</tbody>
</table>

Major Concepts:
Slope (what it is, what it means, & different types +, -, zero, und)
Concept of a linear function (it is a line)
Parallel lines

Essential Understandings:
Formula for slope & how to use it
Three forms of a line
How to graph a line

Essential Questions:
Does this point lie on a given line or an equation of a line?
Given two equations, are these lines parallel?
Give an equation of a line with .....?

Essential S-VE Exit Behaviors: self discipline

Skills needed for mastery on performance indicators:

Discuss the meaning of slope. - What does it do? (Rise vs Run, Rate of change, Independent vs Dependant variables) How do we find it? (formula is given on reference sheet)

Note: use the letter m to denote slope

Know the four types of slopes (positive, negative, zero, and undefined)

Be able to identify the slope of a line from a graph.

Look at different points and determine if they satisfy an equation or lie on a given line.
Use a given slope and point to find the y intercept (b value).
Find the x and y intercepts of an equation by plugging in 0 for the opposite variable.

Given two points, find the slope and y intercept and put into \( y = mx + b \) formula

Understand that horizontal lines are \( y = \# \) and vertical lines are \( x = \# \). These lines are parallel to the x or y axis.

Find the slope and y intercept for a given equation.

Isolate y to get the equation into slope-intercept form.

Understand the concept of two lines being parallel.

Parallel lines have the same slope.

Identify if two lines are parallel using their equations (usually getting y by itself).

Graph all types of linear equations.

This can be done using \( y = mx + b \) form, finding x and y intercepts, or making a table.

** Extension: Point slope formula \( y - y_1 = m(x - x_1) \)

** Extension: Identify and group different functions

Students put in different equations for linear, quadratic, absolute value and exponential functions and then group the different graphs. Teacher then provides the names for the different groups. (use of graphing calculator)

**Review Game-Jeopardy

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| Key Terms: slope, intercept, coordinates, coordinate plane, independent, dependent, parallel, equation, rate of change, rise, run, origin, undefined, x axis, y axis, vertical, horizontal, equations of horizontal & vertical lines, standard form/general form |
| Mastery checks/culminating assessments: |
| Homework |
| Warm ups |
| End of unit quiz |
Unit: 4b Linear Inequalities
Grade: Integrated Algebra

Performance Indicators to be mastered in this unit:

<table>
<thead>
<tr>
<th>Number</th>
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</thead>
<tbody>
<tr>
<td>A.G.6</td>
<td>Graph linear inequalities</td>
</tr>
<tr>
<td>A.A.7</td>
<td>Analyze and solve verbal problems whose solution requires solving linear inequalities in two variables</td>
</tr>
<tr>
<td>A.A.40</td>
<td>Determine whether a given point is in the solution set of a system of linear inequalities</td>
</tr>
</tbody>
</table>

Major Concepts: “A line with two extras”
- Know that it is a line that is either dotted or solid
- Know appropriate regions to shade in

Essential Understandings:
- Know the differences between less than and less than or equal to
- Know the differences between greater than and greater than or equal to
- Understand a solution set is a collection of points
- Know when and when not to include the points on the line as solutions
- Understand when to use an inequality instead of an equal sign when solving word problems
- Match the graph to the inequality and match the inequality to a graph

Essential Questions:
- Does this point lie on the solution set?
- Where should you shade?
- Dotted or solid line?

Essential S-VE Exit Behaviors: independent thinker

Skills needed for mastery (& possible teaching strategies):
- Intro and reinforce lines: Regents Prep activity - 4 points above the line, 4 points below the line and 2 on the line
- What it means to be above the line (greater than)
- What it means to be below the line (less than)
- When it was on the line (greater/less than or equal to)
- Brief breakdown of notes to clarify
- 2 methods - graph or plug in
- Graphing and shading practice
- vertical and horizontal boundary lines
- **If we divide by a negative then flip the inequality sign
  *On homework - have last problem with a negative, graph to verify 2 points for each problem
- Word problems
  - clue words: at most, at least, is more than,
  - start with a let statement (define what variable stand for)

**resource “What’s my Line?” activity (see Pam Brock)
**Key Terms**: at most, at least, is more than, is less than, greater than, solution set, no more than, no less than, boundary line, verify

**Mastery checks/culminating assessments**: Graphing inequalities quiz on K drive

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**Unit: 4c Systems of Linear Equations & Inequalities**  
**Grade: Integrated Algebra**

Performance Indicators to be mastered in this unit:

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<tbody>
<tr>
<td>A.A.7</td>
<td>Analyze and solve verbal problems whose solution requires solving systems of linear equations and inequalities in two variables</td>
</tr>
<tr>
<td>A.A.10</td>
<td>Solve systems of two linear equations in two variables algebraically (See A.G.7)</td>
</tr>
<tr>
<td>A.A.40</td>
<td>Determine whether a given point is in the solution set of a system of linear inequalities</td>
</tr>
<tr>
<td>A.G.7</td>
<td>Graph and solve systems of linear equations and inequalities with rational coefficients in two variables (See A.A.10)</td>
</tr>
</tbody>
</table>

**Major Concepts**:  
- Identifying points that satisfy more than one equation

**Essential Understandings**:  
- Recognize common solution areas graphically (where the shading overlaps)  
- Understand the number of solutions that a system can have (inequalities many or none, & equations have 0, 1, or infinite)  
- Difference between solving algebraically and graphically

**Essential Questions**:  
- Does this point lie on the solution set?  
- Which method is easiest to solve this? (elimination, substitution, graphing)

**Essential S-VE Exit Behaviors**: independent thinker

**Skills needed (& possible teaching strategies)**:  
- Solving systems of inequalities graphically  
- Listing points in the solution set  
- Solving systems of equations graphically  
- Listing point, no point, or infinite  
  - Understanding how many points satisfy both equations  
- Solving word problems - put into number sentences & solving them graphically
• Solving systems of equations algebraically (substitution & elimination
  - Use PowerPoint on Substitution and Elimination found on Algebra 1 online
  - Easy elimination - coefficients are already equal
  - Hard elimination - have to multiply to change the coefficients

• Solving word problems of equations - put into number sentences and solving algebraically

• Determining which method to Solve:
  - if y is by itself - graph
  - If one variable is by itself (either x or y) in only one equation - use substitution
  - If its in standard form (ax + by = c) then use elimination

**Key Terms:** substitution, elimination, solution set, distribute, systems,

**Mastery checks/culminating assessments:**

Unit 4c quiz

**Unit: 5 Probability**

**Grade: 9 - Integrated Algebra**

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<tr>
<td></td>
<td><strong>Performance Indicator</strong></td>
</tr>
<tr>
<td></td>
<td>Review</td>
</tr>
<tr>
<td></td>
<td>Counting Techniques</td>
</tr>
<tr>
<td>Review</td>
<td>Common knowledge of dice, cards, months, days, hours, minutes, coins</td>
</tr>
<tr>
<td>A.S.18</td>
<td>Know the definition of conditional probability and use it to solve for probabilities in finite sample spaces</td>
</tr>
<tr>
<td>A.S.19</td>
<td>Determine the number of elements in a sample space and the number of favorable events</td>
</tr>
<tr>
<td>A.S.20</td>
<td>Calculate the probability of an event and its complement</td>
</tr>
<tr>
<td>A.S.21</td>
<td>Determine empirical probabilities based on specific sample data</td>
</tr>
<tr>
<td>A.S.22</td>
<td>Determine, based on calculated probability of a set of events, if:</td>
</tr>
<tr>
<td></td>
<td>o some or all are equally likely to occur</td>
</tr>
<tr>
<td></td>
<td>o one is more likely to occur than another</td>
</tr>
<tr>
<td></td>
<td>o whether or not an event is certain to happen or not to happen</td>
</tr>
<tr>
<td>A.S.23</td>
<td>Calculate the probability of:</td>
</tr>
<tr>
<td></td>
<td>o a series of independent events</td>
</tr>
<tr>
<td></td>
<td>o a series of dependent events</td>
</tr>
<tr>
<td></td>
<td>o two mutually exclusive events</td>
</tr>
<tr>
<td></td>
<td>o two events that are not mutually exclusive</td>
</tr>
<tr>
<td>A.N.7</td>
<td>Determine the number of possible events, using counting techniques or the Fundamental Principle of Counting</td>
</tr>
<tr>
<td>A.N.8</td>
<td>Determine the number of possible arrangements (permutations) of a list of items</td>
</tr>
</tbody>
</table>
### A.N.6 Evaluate expressions involving factorial(s), absolute value(s), and exponential expression(s)

**Major Concepts:**
- Understanding what probability is - chance, how many orders can you make
- Understand that probability is situational - takes variety of approaches

**Essential Understanding:**
- Counting principle
- Permutations
- Factorial
- Mutually exclusive
- Non-mutually exclusive
- Series of independent
- Series of dependent
- Conditional probability
- Theoretical vs. Empirical
- Sample space
- Definite events
- Impossible events
- Compliment
- Total probability is one

**Essential Questions:**
- Given the situation ______, what process do you use?
- What is the probability of ______?
- Given the probability ____, what is the compliment?
- What is the probability of an impossible event or definite event?
- What are all the possible outcomes in the sample space?

**Essential S-VE Exit Behaviors:** independent thinker/effective communicator

**Skills needed for mastery (& possible teaching strategies):**

1. **Basics**
   - Sample space - tree diagrams
   - Favorable outcomes (event)
   - Probability ratio
   - Counting principle
   - Background information on materials used
     - days/month, suits/cards, number of cards in a deck, heads & tails on coins,
   - Complement
   - Empirical probability (experiments to collect data)
   - Certain and impossible events - what is more likely to happen

2. **series of independent and dependent events**
   - AND vs. OR (P(pulling 2 black marbles with/without replacement = AND) P(draw 1 card & pulling a black OR a ten))
   - series of independent -with replacement
   - series of dependent - without replacement (depends on what happens in the first draw)
   - Mutually exclusive (don’t overlap - 2 separate Venn Diagram circles, ex: P(face card or a ten))
   - Non-mutually exclusive (have something in common, ex: P(black card or ten card))
3. **factorials and permutations**
   - factorial symbol and how it works
   - permutations small things – all the ways to do the letters of cat, arrange people
   - permutation formula $n\,P\,r = \frac{n!}{(n-r)!}$ and its location in the calculator
   - repeating letters (divide the number that repeat factorial)

**Key Terms**: Counting principle, Permutations, Factorial, Mutually exclusive, Non-mutually exclusive, Series of independent, Series of dependent, Conditional probability, Theoretical vs. Empirical, Sample space, tree diagram, Definite events, Impossible events, Compliment, Total probability is one, replacement

---

**Unit: 6a Analyzing Univariate Data**

**Grade: Integrated Algebra**

**Performance Indicators to be mastered in this unit:**

<table>
<thead>
<tr>
<th>Number</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.S.1</td>
<td>Categorize data as qualitative or quantitative</td>
</tr>
<tr>
<td>A.S.2</td>
<td>Determine whether the data to be analyzed is univariate or bivariate</td>
</tr>
<tr>
<td>A.S.3</td>
<td>Determine when collected data or display of data may be biased</td>
</tr>
<tr>
<td>A.S.4</td>
<td>Compare and contrast the appropriateness of different measures of central tendencies for a given data set</td>
</tr>
<tr>
<td>A.S.5</td>
<td>Construct a histogram, cumulative frequency histogram, and a box-and-whisker plot, given a set of data</td>
</tr>
<tr>
<td>A.S.11</td>
<td>Find the percentile rank of an item in a data set and identify the point values for first, second, and third quartiles</td>
</tr>
<tr>
<td>A.S.6</td>
<td>Understand how the five statistical summary (minimum, maximum, and the three quartiles) is used to construct a box-and-whisker plot</td>
</tr>
<tr>
<td>A.S.16</td>
<td>Recognize how linear transformations of one-variable data affect the data’s mean, median, mode, and range</td>
</tr>
<tr>
<td>A.S.9</td>
<td>Analyze and interpret a frequency distribution table or histogram, a cumulative frequency distribution table or histogram, or a box-and-whisker plot</td>
</tr>
<tr>
<td>A.S.10</td>
<td>Evaluate published reports and graphs that are based on data by considering: experimental design, appropriateness of the data analysis, and the soundness of the conclusions</td>
</tr>
<tr>
<td>A.S.15</td>
<td>Identify and describe sources of bias and its effect, drawing conclusions from data</td>
</tr>
<tr>
<td>Major Concepts:</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td></td>
</tr>
<tr>
<td>Display data</td>
<td></td>
</tr>
<tr>
<td>Draw conclusions, make predictions based on observations of data</td>
<td></td>
</tr>
<tr>
<td>Think critically about the graphical representation (introducing)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Essential Understandings:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Create appropriate graphical representations of data</td>
</tr>
<tr>
<td>Knowledge of what data is being represented</td>
</tr>
<tr>
<td>Recognize the difference between frequency &amp; cumulative frequency</td>
</tr>
<tr>
<td>Knowledge of mean, median, mode</td>
</tr>
<tr>
<td>Knowledge of what the graph is based on</td>
</tr>
<tr>
<td>How data is distributed - quartiles</td>
</tr>
<tr>
<td>Who, what, when where, why, &amp; how was data collected</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Essential Questions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>What would be the best way to display the data?</td>
</tr>
<tr>
<td>What is the purpose for this graph?</td>
</tr>
<tr>
<td>What can you infer about the information displayed?</td>
</tr>
<tr>
<td>What would additional data do to this graph?</td>
</tr>
<tr>
<td>Is there any thing in the graph that is suspicious?</td>
</tr>
</tbody>
</table>

<p>| Essential S-VE Exit Behaviors: Higher level thinking/Effective communications |</p>
<table>
<thead>
<tr>
<th>Skills needed for mastery on performance indicators (&amp; possible teaching strategies):</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sources of data</td>
</tr>
<tr>
<td>- Asking questions to get data (index cards with teacher created questions)</td>
</tr>
<tr>
<td>- Students get data from surveying groups in the classroom</td>
</tr>
<tr>
<td>- Post on board</td>
</tr>
<tr>
<td>- Compare data on chalkboard - numbers vs. categories</td>
</tr>
<tr>
<td>2. Homework - find data represented in the media - numbers &amp; categories</td>
</tr>
<tr>
<td>3. Biased information (from data in media - who, what, when, where, why &amp; how was data collected)</td>
</tr>
<tr>
<td>4. Differences between qualitative and quantitative</td>
</tr>
<tr>
<td>5. All of this data is one dimensional (univariate) not bivariate</td>
</tr>
<tr>
<td>6. Convert qualitative to quantitative (numbers tv show clip)</td>
</tr>
<tr>
<td>7. Now that you have quantitative data - what can you do with it?</td>
</tr>
<tr>
<td>- mean</td>
</tr>
<tr>
<td>- median (cross off data in pairs from opposite ends)</td>
</tr>
<tr>
<td>- mode</td>
</tr>
<tr>
<td>- range</td>
</tr>
<tr>
<td>8. Review construction of stem and leaf plot</td>
</tr>
<tr>
<td>9. Interpret data represented in a stem and leaf plot</td>
</tr>
<tr>
<td>10. Using graphing calculator for organizing data for use in a stem and leaf plot</td>
</tr>
<tr>
<td>11. Discuss best ways to show central tendency &amp; when to use them - mean, median, mode (examples: incomes, student grades, housing, temperature) (Justify your thoughts)</td>
</tr>
<tr>
<td>12. Constructing frequency tables</td>
</tr>
<tr>
<td>13. Constructing frequency histograms</td>
</tr>
<tr>
<td>14. Construct frequency histograms on a graphing calculator</td>
</tr>
</tbody>
</table>
15. Constructing cumulative frequency tables
16. Constructing cumulative histograms
17. Construct cumulative frequency histograms on a graphing calculator
18. Compare/contrast frequency vs. cumulative frequency tables & histograms - same data, just shown two different ways
19. Interpret - draw conclusions on both frequency & cumulative (Justify your thoughts)
20. percentiles
21. Construct box and whisker plot - minimum, maximum, and 3 quartiles
22. Interpret box and whisker plot
23. Shifting box and whisker plot - linear transformation - manipulating the data
24. Linear transformation affects mean, median, mode
25. Construct box and whisker plot on a graphing calculator
26. Wrap up - Teacher provides a set of data, students in groups will first organize their data in stem and leaf plot, calculate mean, median, & mode, decide the best graphical representation to display their data, and justify in written format why they chose that representation

**Key Terms:** quartile, univariate, bivariate, mean (average), median, mode, range, central tendency, bimodal, trimodal, frequency, cumulative, histogram, box & whiskers, frequency tables, stem & leaf, qualitative, quantitative, biased, data analyses, percentile rank, outliers, minimum, maximum, interval, upper quartile, lower quartile, data

**Unit: 6b Analyzing bivariate data**

**Grade: 9 - Integrated Algebra**

**Performance Indicators to be mastered in this unit:**

<table>
<thead>
<tr>
<th>Number</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.S.7</td>
<td>Create a scatter plot of bivariate data</td>
</tr>
<tr>
<td>A.S.8</td>
<td>Construct manually a reasonable line of best fit for a scatter plot and determine the equation of that line</td>
</tr>
<tr>
<td>A.S.12</td>
<td>Identify the relationship between the independent and dependent variables from a scatter plot (positive, negative, or none)</td>
</tr>
<tr>
<td>A.S.17</td>
<td>Use a reasonable line of best fit to make a prediction involving interpolation or extrapolation</td>
</tr>
<tr>
<td>A.S.13</td>
<td>Understand the difference between correlation and causation</td>
</tr>
<tr>
<td>A.S.14</td>
<td>Identify variables that might have a correlation but not a causal relationship</td>
</tr>
<tr>
<td>A.S.15</td>
<td>Identify and describe sources of bias and its effect, drawing conclusions from data</td>
</tr>
</tbody>
</table>

**Major Concepts:**

- Identify & understand differences between correlation and causation and effect of potential bias
- Representing a correlation with a line of best fit
### Essential Understandings:
- Independent vs. dependent variables
- Review of bias information (sources of bias & its effect) (biased data)
- Difference between correlation and causal
- Plot & interpret a scatterplot
- Understand line of best fit – approximation (by hand) & exact (calculator)

### Essential Questions:
- Construct a scatter plot and construct a line of best fit, then determine the equation of the Line
- What type of relationship exists (correlation, causation, positive, negative, zero/none) in this ...? (graph, data, table)
- What types of biases might exist in this data or occur in this situation?
- Which is the independent (dependent) variable?

### Essential S-VE Exit Behaviors: social responsibility

### Skills needed for mastery (& possible teaching strategies):

1. **Bivariate data**
   - look at bivariate data - what is it, independent & dependent
   - collect bivariate data - “Barbie Bungee” (number of rubber bands & distance she dropped)
   - brainstorm different situations & discuss correlation &/or causation
     - correlation (just a relationship): cancer/living in HH, char of personality/birth order,
     - causation (things that cause something else to happen): practice/skills, study/grades, # of pages/weight of a book
     - debate: smoking/cancer; is it a causation or correlation? (Endicott/cancer; IBM dumping)

2. **Create scatterplot graphs using data**
   - use data collected from Barbie Bungee
   - share examples of different correlations (positive, negative & none)
   - review possible effects of bias (Barbie Bungee - measurements, type of Barbie, type &/or length of rubber bands, clothing, hair length, rounding, point read, location of drop, where rubber band was placed, elasticity of rubber bands)

3. **Line of Best Fit of scatterplots (linear regression)**
   - **Do with Barbie Bungee data**
     - independent(x) vs. dependent(y)
     - correlation vs casual (positive or negative)
     - drawing the line of best fit
       - by hand
     - finding the equation for the line of best fit
       - by hand
       - using the calculator
     - find equation using two points
4. Interpolate and extrapolate
   **Continue using Barbie Bungee data**
   - **Interpolate**: determine points found on the line in between given points
     - using the graph
     - using the equation
   - **Extrapolate**: extend the line to predict additional values
     - using the graph
     - using the equation

**Key Terms**: scatterplot, independent, dependent, interpolate, extrapolate, correlation, causation, bias, bivariate, line of best fit

---

**Unit: 7 Radicals**

**Grade: Integrated Algebra**

Performance Indicators to be mastered in this unit:

<table>
<thead>
<tr>
<th>Number</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.N.2</td>
<td>Simplify radical terms (no variable in the radicand)</td>
</tr>
<tr>
<td>A.N.3</td>
<td>Perform the four arithmetic operations using like and unlike radical terms and express the result in simplest form</td>
</tr>
</tbody>
</table>

**Major Concepts**:
- Put a radical expression in simplest form
- Know how to add, subtract, multiply and divide radicals

**Essential Understandings**:
- Know like versus unlike radicals
- Know perfect squares

**Essential Questions**:
- What are the factors of this number?
- Can you add or subtract them the way they are right now?
- What should it look like in order to add or subtract?

**Essential S-VE Exit Behaviors**: social responsibility

**Skills needed for mastery (& possible teaching strategies)**:
1. simplify radicals
   - factor tree
   - circle doubles and pull one out
   - cross both out
   - multiply everything together
2. adding & subtracting
   - must have the same radicand in order to add/subtract
   - simplify first then add/subtract
   - add/subtract coefficients, keep the radicand
3. multiply & divide
   - mult/divide outside (coefficient)
   - mult/divide inside (radicand)
   - simplify

**Key Terms:** radical, radicand, square root, like terms, simplify, factors, perfect squares, coefficient

**Mastery checks/culminating assessments:** Quiz on radicals

---

**Unit: 8a Basic operations of Polynomials**

**Grade:** Integrated Algebra

**Performance Indicators to be mastered in this unit:**

<table>
<thead>
<tr>
<th>Number</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.A.13</td>
<td>Add, subtract, and multiply monomials and polynomials</td>
</tr>
<tr>
<td>A.A.12</td>
<td>Multiply and divide monomial expressions with a common base, using the properties of exponents. <strong>Note: Use integral exponents only.</strong></td>
</tr>
<tr>
<td>A.N.6</td>
<td>Evaluate expressions involving factorial(s), absolute value(s), and <strong>exponential expression(s)</strong></td>
</tr>
<tr>
<td>A.A.14</td>
<td>Divide a polynomial by a monomial or binomial, where the quotient has no remainder</td>
</tr>
<tr>
<td>A.A.15</td>
<td>Find values of a variable for which an algebraic fraction is undefined</td>
</tr>
<tr>
<td>7.N.5</td>
<td>Write numbers in scientific notation</td>
</tr>
<tr>
<td>A.N.4</td>
<td>Understand and use scientific notation to compute products and quotients of numbers</td>
</tr>
</tbody>
</table>

**Major Concepts:**

- Understand what it means for a number to be raised to a power
- Understand movement of the decimal point in scientific notation
- Perform the four operations on monomials and polynomials

**Essential Understandings:**

- Know the rules of exponents
- Recognize like terms
- Movement of decimal point left or right depending on sign of the exponent
- Distributing the negative sign when subtracting polynomials
- Know the rules of integers

**Essential Questions:**

- What is the relationship between the exponent and the movement of the decimal point?
- What are the steps to multiplying polynomials? What happens to the coefficient? Etc. (with all basic operations)
- How do you evaluate the exponents?
- How would you express an exponent in expanded form?
### Essential S-VE Exit Behaviors: independent thinker effective communicator

#### Skills needed for mastery (& possible teaching strategies):

1. **adding/subtracting polynomials**
   - like terms have the same variable with the same exponent
   - distribute the sign or change, change (spread the disease)
   - add the coefficients, keep the variable with its exponent

2. **evaluate expressions with exponents**
   - follow order of operations

3. **laws of exponents**
   - multiply with the same base; you multiply the coefficient and add exponent
   - raise a monomial to a power; raise the coefficient to the power and multiply the exponents
   - divide monomials with same base; divide the coefficients and subtract the exponents
   - anything raised to the power of zero = one

4. **multiply/divide polynomials**
   - mult. Monomials by monomials using laws of exponents
   - mono times poly
   - bi - times poly-
   - divide mono- by mono-
   - poly - by mono-

5. **scientific notation**
   - multiply & divide in sci notation - final answer should be in sci. notation
   - mult/divide the decimals
   - move the decimal for a number between 1-10
   - if move to the left - exponent gets larger
   - if move to the right - exponent gets smaller

---

**Key Terms:** polynomials, monomials, binomials, trinomials, exponents, coefficients, scientific notation, product, sum, quotient, difference, expression, evaluate, equivalent,

**Mastery checks/culminating assessments:**
- Homework
- quizzes
- Test
## Unit: 8b Factoring Polynomials
### Grade: Integrated Algebra

### Performance Indicators to be mastered in this unit:

<table>
<thead>
<tr>
<th>Number</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.A.19</td>
<td>Identify and factor the difference of two perfect squares</td>
</tr>
<tr>
<td>A.A.20</td>
<td>Factor algebraic expressions completely, including trinomials with a lead coefficient of one (after factoring a GCF)</td>
</tr>
<tr>
<td>A.A.16</td>
<td>Simplify fractions with polynomials in the numerator and denominator by factoring both and renaming them to lowest terms</td>
</tr>
<tr>
<td>A.A.18</td>
<td>Multiply and divide algebraic fractions and express the product or quotient in simplest form</td>
</tr>
<tr>
<td>A.A.17</td>
<td>Add or subtract fractional expressions with monomial or like binomial denominators</td>
</tr>
</tbody>
</table>

### Major Concepts:
- Understand what it means to factor a polynomial.
- Understand what it means to simplify a rational expression.
- Recognize rational expressions/algebraic fractions.

### Essential Understandings:
- Understand adding, subtracting, multiplying, dividing fractions.
- Factor out a GCF
- Factor the difference of perfect squares
- Factor trinomials (trial & error)
- Reduce fractions by cancelling common factors
- Find common monomial denominators

### Essential Questions:
- Can this be simplified?
- What are the steps for factoring (GCF, perfect squares, trial & error)
- What do I need to do to be able to add/subtract this (can I add/subtract this now)?
- How do I multiply/divide fractions?
- How are multiplying and dividing related?

### Essential S-VE Exit Behaviors: Independent thinker/Effective Communicator

### Skills needed for mastery (& possible teaching strategies):
- Identify factors/common factors
- Finding GCF
- Factor out GCF
- Identify perfect squares
- Factor the difference of perfect squares
- Factor by trial and error
- Multi-step factoring
- Review adding, subtracting, multiplying, dividing fractions
• Introduce rational expressions/algebraic fractions
• Simplify algebraic fractions
• Multiply/divide fractions and simplify
• Add/subtract fractions and simplify

Key Terms: numerator, denominator, quotient, difference, product, factor, rational expression, undefined, least common denominator, lowest terms, algebraic fractions, perfect squares, factor completely, GCF, simplify, reciprocal

Unit: 9 Quadratics
Grade: Integrated Algebra

Performance indicators to be mastered in this unit:

<table>
<thead>
<tr>
<th>Code</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.A.41</td>
<td>Determine the vertex and axis of symmetry of a parabola, given its equation (See A.G.10) – includes max/min point</td>
</tr>
<tr>
<td>A.A.27</td>
<td>Understand and apply the multiplication property of zero to solve quadratic equations with integral coefficients and integral roots</td>
</tr>
<tr>
<td>A.A.28</td>
<td>Understand the difference and connection between roots of a quadratic equation and factors of a quadratic expression</td>
</tr>
<tr>
<td>A.G.8</td>
<td>Find the roots of a parabolic function graphically  Note: Only quadratic equations with integral solutions.</td>
</tr>
<tr>
<td>A.G.10</td>
<td>Determine the vertex and axis of symmetry of a parabola, given its graph (See A.A.41)  Note: The vertex will have an ordered pair of integers and the axis of symmetry will have an integral value.</td>
</tr>
<tr>
<td>A.A.8</td>
<td>Analyze and solve verbal problems that involve quadratic equations</td>
</tr>
<tr>
<td>A.A.26</td>
<td>Solve algebraic proportions in one variable which result in linear or quadratic equations</td>
</tr>
<tr>
<td>A.A.11</td>
<td>Solve a system of one linear and one quadratic equation in two variables, where only factoring is required  Note: The quadratic equation should represent a parabola and the solution(s) should be integers.</td>
</tr>
<tr>
<td>A.G.9</td>
<td>Solve systems of linear and quadratic equations graphically  Note: Only use systems of linear and quadratic equations that lead to solutions whose coordinates are integers.</td>
</tr>
</tbody>
</table>

Major Concepts:
• Understand the Quadratic function graphically and algebraically

Essential Understandings:
• ID parts of a parabola (vertex, axis of symmetry, max/min roots/zeros/x-intercepts, y-intercept)
• Parabola is the graphical representation of the quadratic function
• ID the roots algebraically (Setting the quadratic equal to zero, Factor, Zero property)
• Solving systems of equations (quadratic & linear) algebraically & graphically
• Use quadratic equations to solve word problems
• Solve algebraic proportions involving quadratics
**Essential Questions:**

- What is the solution set for a given equation/graph? (roots)
- What is the vertex and axis of symmetry for a given equation/graph?
- How many solutions are there for a given system of equations?
- What is the solution set for a system of equations?
- What equation represents the given situation?
- How do you solve a proportion?

**Essential S-VE Exit Behaviors:** life long love of learning

**Skills needed for mastery (and possible teaching strategies):**

<table>
<thead>
<tr>
<th>1.</th>
<th>Introduce a quadratic</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Definition (linear vs. quadratic)</td>
</tr>
<tr>
<td></td>
<td>Characteristics of the equation format</td>
</tr>
<tr>
<td>2.</td>
<td>solve quadratic equations</td>
</tr>
<tr>
<td></td>
<td>set equal to zero</td>
</tr>
<tr>
<td></td>
<td>factoring</td>
</tr>
<tr>
<td></td>
<td>zero property</td>
</tr>
<tr>
<td>3.</td>
<td>solve proportions involving quadratic equations</td>
</tr>
<tr>
<td>4.</td>
<td>word problems</td>
</tr>
<tr>
<td>5.</td>
<td>solve a system algebraically</td>
</tr>
<tr>
<td></td>
<td>linear &amp; quadratic</td>
</tr>
<tr>
<td></td>
<td>one or two solutions</td>
</tr>
<tr>
<td>6.</td>
<td>graphing quadratic equations (parabola)</td>
</tr>
<tr>
<td></td>
<td>vertex</td>
</tr>
<tr>
<td></td>
<td>axis of symmetry</td>
</tr>
<tr>
<td></td>
<td>max/min (concave up or down)</td>
</tr>
<tr>
<td></td>
<td>x &amp; y intercepts</td>
</tr>
<tr>
<td></td>
<td>roots (solutions/zeros)</td>
</tr>
<tr>
<td>7.</td>
<td>solve a system graphically</td>
</tr>
<tr>
<td></td>
<td>linear &amp; quadratic</td>
</tr>
<tr>
<td></td>
<td>zero, one or two solutions</td>
</tr>
</tbody>
</table>

**Key Terms:** quadratics, parabola, tangent, roots, solution, solution set, zero property, linear, concave, vertex, axis of symmetry, coordinates, min/max

**Mastery checks/culminating assessments:**

**Comments/reflections:** **remember that the order can be done either by following the algebra theme then go into graphing or can algebraically & graphically for each topic.**
**Unit: 10 Introduction to Functions**  
**Grade: 9 - Integrated Algebra**

Performance Indicators to be mastered in this unit:

<table>
<thead>
<tr>
<th>Number</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.G.3</td>
<td>Determine when a relation is a function, by examining ordered pairs and inspecting graphs of relations</td>
</tr>
<tr>
<td>A.G.4</td>
<td>Identify and graph linear, quadratic (parabolic), absolute value, and exponential functions</td>
</tr>
<tr>
<td>A.G.5</td>
<td>Investigate and generalize how changing the coefficients of a function affects its graph</td>
</tr>
</tbody>
</table>

**Major Concepts:**  
Understand what a function is  
Functions can be represented in 3 different ways – graph, equation, & table  
Be able to work with functions in the graphs, equations & tables  
Different types of functions – linear, quadratic, absolute value, exponential

**Essential Understandings:**  
For every input there is only one output  
Functions indicate a relationship between variables  
How to fill in an input/output table  
Graphing points  
Identify the 4 types of graphs – linear, quadratic, absolute value, exponential

**Essential Questions:**  
What is a function?  
Given ... (chart, graph) is the following a function?  
Name the four types of functions that we studied and give examples.  
Given input- create outputs, given the output-create inputs  
Graph the following equations on a single set of axes and describe how the changes in the coefficient affect the graphs

**Essential S-VE Exit Behaviors:** independent thinker/effective communicator & self-discipline

**Skills needed for mastery on performance indicators(& possible teaching strategies):**  
1. Discuss relations; review of what it means to be an ordered pair  
2. Definition of function; vertical line test, input vs. output, (independent vs. dependent)  
3. Determine if item is a function  
   - tables; points, and ordered pairs  
   - different types of graphs: (general – circles just state if a function or not)  
4. How to graph absolute value and exponential functions  
5. Graphing calculator  
6. Changing the graphs by changing coefficients

**Key Terms:** range, domain, exponential, absolute value, relation, function, linear, quadratic, coefficient
Unit 11 measurement  
Grade: Integrated Algebra

Performance Indicators to be mastered in this unit:

<table>
<thead>
<tr>
<th>Number</th>
<th>Performance Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.G.1</td>
<td>Find the area and/or perimeter of figures composed of polygons and circles or sectors of a circle. Note: Figures may include triangles, rectangles, squares, parallelograms, rhombuses, trapezoids, circles, semi-circles, and regular polygons (perimeter only)</td>
</tr>
<tr>
<td>A.G.2</td>
<td>Use formulas to calculate volume and surface area of rectangular solids and cylinders</td>
</tr>
<tr>
<td>A.M.3</td>
<td>Calculate the relative error in measuring square and cubic units, when there is an error in the linear measure</td>
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</tbody>
</table>

Major Concepts:
- Finding area and perimeter of different polygons
- Finding surface area and volume of different solids
- Understanding relative error

Essential Understandings:
- Know how to find the perimeter of a polygon and the circumference of a circle
- Know the area formulas for triangles, quadrilaterals, circles
- Know the volume formulas for prisms and cylinders
- Know the definition of relative error and the procedure to find it

Essential Questions:
- What is the perimeter of a given polygon?
- What is the circumference of a circle?
- What is the area of the following triangle? Quadrilateral? Circle?
- What is the volume of the cylinder? Rectangular prism? Cube? Triangular Prism?
- What is the surface area of the solid?
- What is the relative error in the following situation?

Essential S-VE Exit Behaviors: Life long love of learning/ Independent thinker

Skills needed for mastery on performance indicators (& possible teaching strategies):

- Area & Perimeter
  - Review finding perimeter of simple polygons & circumference of circles
  - Find perimeter of figures composed of multiple polygons
  - Review finding area of simple polygons & circles
  - Find shaded area of figures composed of polygons and circles, or sectors of a circle.
- Volume & Surface Area
  - Use the formulas to find the volume of rectangular solids and cylinders
  - Use the formulas to find the surface area of rectangular solids and cylinders
- Relative Error
  - Review changing decimals to percents
  - Use the formula to calculate relative error (decimal) and percent error
  - Expand the formula to calculate relative error when calculating area and/or volume.
Unit 12: Trigonometry
Grade: 9 - Integrated Algebra

Performance Indicators to be mastered in this unit:

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>A.A.42</td>
<td>Find the sine, cosine, and tangent ratios of an angle of a right triangle, given the lengths of the sides</td>
</tr>
<tr>
<td>A.A.43</td>
<td>Determine the measure of an angle of a right triangle, given the length of any two sides of the triangle</td>
</tr>
<tr>
<td>A.A.44</td>
<td>Find the measure of a side of a right triangle, given an acute angle and the length of another side</td>
</tr>
<tr>
<td>A.A.45</td>
<td>Determine the measure of a third side of a right triangle using the Pythagorean theorem, given the lengths of any two sides</td>
</tr>
</tbody>
</table>

Major Concepts:
Trig ratios and their relationship to a right triangle.
Pythagorean Theorem and its relationship to a right triangle.

Essential Understandings:
Determine correct trig ratios, given the sides of a right triangle (based on $\angle \theta$ and labeling sides opposite, hypotenuse, adjacent).
Use trig ratios to determine the value of a missing angle, given any two sides.
Use trig ratios to determine the value of a missing side, given a side and an angle (not $90^\circ$)
Understand that if the angles remain unchanged, the sides change in the same proportion and maintain equivalent trig ratios.
Know and apply the Pythagorean Theorem to right triangles.
Understand that when using trig functions an angle must accompany it.

Essential Questions:
Given the labeled diagram of a right triangle, write the trig ratios using select angles in the
- Find the value of the trig ratios and work backwards to find the angle.
Given the sides of a right triangle (no diagram), draw, label and write the trig ratios.
Given the angle measure and sides, draw, label, write the trig ratios and solve
Given one angle and one side of a right triangle, find all remaining components of the triangle (either trig & Pythagorean or 2 trigs)

Essential S-VE Exit Behaviors: Independent Thinker/Effective Communicator

Skills needed for mastery on performance indicators (& possible teaching strategies):
- Observing right triangles
  - Locating sides, opposite, adjacent, and hypotenuse of a given angle
• Introduce trig ratios
  - Fill in the information correctly for varying trig ratios
  - Solving ratios (cross multiply)
• Trig functions of angles
  - Backwards and forwards using the calculator
  - Check final results
• Set up trig ratios to solve for an unknown
  - Determine the trig function that should be used
  - Cross multiply to solve for unknown
  - If solving for an angle, use inverse trig functions
• Pythagorean Theorem
  - Use it if know 2 sides and need to find 3rd.
  - Review radicals
• Solving Word problems
  - Finding an angle
  - Finding a side
  - Angle of depression and angle of elevation

Key Terms: right triangle, opposite, adjacent, Pythagorean, hypotenuse, theta, measure, leg, ratio, sine, cosine, tangent,