

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

Marking Period: 1

Days: 3

Reporting Category/Strand: NUMBER AND NUMBER SENSE

SOL 8.1a	The student will a) simplify numerical expressions involving positive exponents, using rational numbers, order of operations, and properties of operations with real numbers.
Essential Knowledge/Skills/Understandings	The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to: <ul style="list-style-type: none"> • Simplify numerical expressions containing: <ol style="list-style-type: none"> 1) exponents (where the base is a rational number and the exponent is a positive whole number); 2) fractions, decimals, integers and square roots of perfect squares; and 3) grouping symbols (no more than 2 embedded grouping symbols). Order of operations and properties of operations with real numbers should be used. <u>ESSENTIAL UNDERSTANDINGS</u> <ul style="list-style-type: none"> • The order of operations prescribes the order to use to simplify a numerical expression.
Essential Questions	<ul style="list-style-type: none"> • What is the role of the order of operations when simplifying numerical expressions?
Primary Resources	Order of Operations ESS , Guided Notes: Order of Operations (doc) , Group Activity: Order of Operations/Properties (doc) , Stations Activity: Order of Operations/Justification (doc) , Activity: Order of Operations with Dice (doc) , Notes: Exponents with Negative Bases (doc) , Activity: Around the Room Review (doc) , Worksheet: Order of Operations #1 (doc) , Worksheet: Order of Operations #2 (doc) , Worksheet: Order of Operations with Justifications (doc) , Quiz: Exponents (doc) , Henrico County Math 8 Website
Essential Vocabulary	

Marking Period: 1

Days: 2

Reporting Category/Strand: NUMBER AND NUMBER SENSE

SOL 8.4	The student will apply the order of operations to evaluate algebraic expressions for given
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**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

	replacement values of the variables.
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Substitute numbers for variables in algebraic expressions and simplify the expressions by using the order of operations. Exponents are positive and limited to whole numbers less than 4. Square roots are limited to perfect squares. • Apply the order of operations to evaluate formulas. Problems will be limited to positive exponents. Square roots may be included in the expressions but limited to perfect squares. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • Using the order of operations assures only one correct answer for an expression.
Essential Questions	<ul style="list-style-type: none"> • What is the role of the order of operations when evaluating expressions?
Primary Resources	Replacement Values ESS
Essential Vocabulary	

Marking Period: 1

Days: 20

Reporting Category/Strand: PATTERNS, FUNCTIONS, AND ALGEBRA

SOL 8.15abc	<p>The student will</p> <ul style="list-style-type: none"> a) solve multistep linear equations in one variable on one and two sides of the equation; b) solve two-step linear inequalities and graph the results on a number line; and c) identify properties of operations used to solve an equation.
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Solve two- to four-step linear equations in one variable using concrete materials, pictorial

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

	<p>representations, and paper and pencil illustrating the steps performed.</p> <ul style="list-style-type: none"> • Solve two-step inequalities in one variable by showing the steps and using algebraic sentences. • Graph solutions to two-step linear inequalities on a number line. • Identify properties of operations used to solve an equation from among: <ul style="list-style-type: none"> - the commutative properties of addition and multiplication; - the associative properties of addition and multiplication; - the distributive property; - the identity properties of addition and multiplication; - the zero property of multiplication; - the additive inverse property; and - the multiplicative inverse property. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • While a linear equation has only one replacement value for the variable that makes the equation true, an inequality can have more than one.
Essential Questions	<ul style="list-style-type: none"> • How does the solution to an equation differ from the solution to an inequality?
Primary Resources	8.15a Multi-Step Equations ESS , 8.15b 2-Step Inequalities ESS , 8.15c Properties ESS
Essential Vocabulary	

Marking Period: 1

Days: 10

Reporting Category/Strand: PATTERNS, FUNCTIONS, AND ALGEBRA

<p>SOL 8.14</p> <p>8.16</p> <p>8.17</p>	<p>8.14 The student will make connections between any two representations (tables, graphs, words, and rules) of a given relationship.</p> <p>8.16 The student will graph a linear equation in two variables.</p> <p>8.17 The student will identify the domain, range, independent variable or dependent variable in a given situation.</p>
Essential	8.14: The student will use problem solving, mathematical communication, mathematical

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

<p>Knowledge/Skills/Understandings</p>	<p>reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Graph in a coordinate plane ordered pairs that represent a relation. • Describe and represent relations and functions, using tables, graphs, words, and rules. Given one representation, students will be able to represent the relation in another form. • Relate and compare different representations for the same relation. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • Any given relationship can be represented by all four. <p>8.16: The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Construct a table of ordered pairs by substituting values for x in a linear equation to find values for y. • Plot in the coordinate plane ordered pairs (x, y) from a table. • Connect the ordered pairs to form a straight line (a continuous function). • Interpret the unit rate of the proportional relationship graphed as the slope of the graph, and compare two different proportional relationships represented in different ways. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • Any situation with a constant rate can be represented by a linear equation. <p>8.17: The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Apply the following algebraic terms appropriately: domain, range, independent variable, and dependent variable. • Identify examples of domain, range, independent variable, and dependent variable. • Determine the domain of a function. • Determine the range of a function. • Determine the independent variable of a relationship. • Determine the dependent variable of a relationship. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • The value of the dependent variable changes as the independent variable changes. The domain is the set of all input values for the independent variable. The range is the set of all possible values for the dependent variable.
<p>Essential Questions</p>	<ul style="list-style-type: none"> • 8.14-What is the relationship among tables, graphs, words, and rules in modeling a given

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

	<p>situation?</p> <ul style="list-style-type: none"> • 8.16- What types of real life situations can be represented with linear equations? • 8.17-What are the similarities and differences among the terms domain, range, independent variable and dependent variable?
Primary Resources	8.14 Connecting Tables, Graphs, Words, & Rules ESS , 8.16 Graphing Linear Equations ESS , 8.17 Domain, Range, Independent, & Dependent ESS
Essential Vocabulary	

Marking Period: 2

Days: 3

Reporting Category/Strand: COMPUTATION AND ESTIMATION

SOL 8.5ab	<p>The student will</p> <p>a) determine whether a given number is a perfect square; and</p> <p>b) find the two consecutive whole numbers between which a square root lies.</p>
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Identify the perfect squares from 0 to 400. • Identify the two consecutive whole numbers between which the square root of a given whole number from 0 to 400 lies (e.g., 57 lies between 7 and 8 since $7^2 = 49$ and $8^2 = 64$). • Define a perfect square. • Find the positive or positive and negative square roots of a given whole number from 0 to 400. (Use the symbol to ask for the positive root $\sqrt{\quad}$ and $-\sqrt{\quad}$ when asking for the negative root.) <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> •The area determines the perfect square number. If it is not a perfect square, the area provides a means for estimation. • The square root of a number is any number which when multiplied by itself equals the number. <p>A product, when multiplying two positive factors, is always the same as the product when multiplying</p>

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

	their opposites (e.g., $7 \cdot 7 = 49$ and $-7 \cdot -7 = 49$).
Essential Questions	<ul style="list-style-type: none"> • How does the area of a square relate to the square of a number? • Why do numbers have both positive and negative roots?
Primary Resources	8.5 Perfect Squares & Square Roots ESS
Essential Vocabulary	

Marking Period: 2

Days: 10

Reporting Category/Strand: GEOMETRY

SOL 8.10ab	<p>The student will</p> <p>a) verify the Pythagorean Theorem; and</p> <p>b) apply the Pythagorean Theorem.</p>
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Identify the parts of a right triangle (the hypotenuse and the legs). • Verify a triangle is a right triangle given the measures of its three sides. • Verify the Pythagorean Theorem, using diagrams, concrete materials, and measurement. • Find the measure of a side of a right triangle, given the measures of the other two sides. • Solve practical problems involving right triangles by using the Pythagorean Theorem. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • For a right triangle, the area of a square with one side equal to the measure of the hypotenuse equals the sum of the areas of the squares with one side each equal to the measures of the legs of the triangle.
Essential Questions	<ul style="list-style-type: none"> • How can the area of squares generated by the legs and the hypotenuse of a right triangle be used to verify the Pythagorean Theorem?

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

Primary Resources	8.10 Pythagorean Theorem ESS
Essential Vocabulary	

Marking Period: 2

Days: 10

Reporting Category/Strand: GEOMETRY

SOL 8.11	The student will solve practical area and perimeter problems involving composite plane figures.
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Subdivide a figure into triangles, rectangles, squares, trapezoids and semicircles. Estimate the area of subdivisions and combine to determine the area of the composite figure. • Use the attributes of the subdivisions to determine the perimeter and circumference of a figure. • Apply perimeter, circumference and area formulas to solve practical problems. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • The area of a composite figure can be found by subdividing the figure into triangles, rectangles, squares, trapezoids and semi-circles, calculating their areas, and adding the areas together.
Essential Questions	<ul style="list-style-type: none"> • How does knowing the areas of polygons assist in calculating the areas of composite figures?
Primary Resources	8.11 Area & Perimeter Composite Figures ESS
Essential Vocabulary	

Marking Period: 2

Days: 15

Reporting Category/Strand: MEASUREMENT

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

SOL 8.7ab	The student will a) investigate and solve practical problems involving volume and surface area of prisms, cylinders, cones, and pyramids; and b) describe how changing one measured attribute of the figure affects the volume and surface area.
Essential Knowledge/Skills/Understandings	The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to: <ul style="list-style-type: none">• Distinguish between situations that are applications of surface area and those that are applications of volume.• Investigate and compute the surface area of a square or triangular pyramid by finding the sum of the areas of the triangular faces and the base using concrete objects, nets, diagrams and formulas.• Investigate and compute the surface area of a cone by calculating the sum of the areas of the side and the base, using concrete objects, nets, diagrams and formulas.• Investigate and compute the surface area of a right cylinder using concrete objects, nets, diagrams and formulas.• Investigate and compute the surface area of a rectangular prism using concrete objects, nets, diagrams and formulas.• Investigate and compute the volume of prisms, cylinders, cones, and pyramids, using concrete objects, nets, diagrams, and formulas.• Solve practical problems involving volume and surface area of prisms, cylinders, cones, and pyramids.• Compare and contrast the volume and surface area of a prism with a given set of attributes with the volume of a prism where one of the attributes has been increased by a factor of 2, 3, 5 or 10.• Describe the two-dimensional figures that result from slicing three-dimensional figures parallel to the base (e.g., as in plane sections of right rectangular prisms and right rectangular pyramids). <u>ESSENTIAL UNDERSTANDINGS</u> <ul style="list-style-type: none">• Volume is the amount a container holds. Surface area of a figure is the sum of the area on surfaces of the figure.• For both formulas you are finding the area of the base and multiplying that by the height.

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

	<ul style="list-style-type: none"> • For cones you are finding $\frac{1}{3}$ of the volume of the cylinder with the same size base and height. For pyramids you are finding $\frac{1}{3}$ of the volume of the prism with the same size base and height. • When you increase or decrease the length, width or height of a prism by a factor greater than 1, the volume of the prism is also increased by that factor.
Essential Questions	<ul style="list-style-type: none"> • How does the volume of a three-dimensional figure differ from its surface area? • How are the formulas for the volume of prisms and cylinders similar? • How are the formulas for the volume of cones and pyramids similar? • In general what effect does changing one attribute of a prism by a scale factor have on the volume of the prism?
Primary Resources	8.7 Volume & Surface Area ESS
Essential Vocabulary	

Marking Period: 2

Days: 2

Reporting Category/Strand: GEOMETRY

SOL 8.9	The student will construct a three-dimensional model, given the top or bottom, side, and front views.
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Construct three-dimensional models, given the top or bottom, side, and front views. • Identify three-dimensional models given a two dimensional perspective. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • It is important to know that a three-dimensional object can be represented as a two-dimensional model with views of the object from different perspectives.
Essential Questions	<ul style="list-style-type: none"> • How does knowledge of two-dimensional figures inform work with three-dimensional objects?

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

Primary Resources	8.9 3D Figures ESS
Essential Vocabulary	

Marking Period: 3

Days: 5

Reporting Category/Strand: MEASUREMENT

SOL 8.6ab	<p>The student will</p> <p>a) verify by measuring and describe the relationships among vertical angles, adjacent angles, supplementary angles, and complementary angles; and</p> <p>b) measure angles of less than 360°.</p>
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Measure angles of less than 360° to the nearest degree, using appropriate tools. • Identify and describe the relationships between angles formed by two intersecting lines. • Identify and describe the relationship between pairs of angles that are vertical. • Identify and describe the relationship between pairs of angles that are supplementary. • Identify and describe the relationship between pairs of angles that are complementary. • Identify and describe the relationship between pairs of angles that are adjacent. • Use the relationships among supplementary, complementary, vertical, and adjacent angles to solve practical problems. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • Adjacent angles are any two non-overlapping angles that share a common side and a common vertex. Vertical angles will always be nonadjacent angles. Supplementary and complementary angles may or may not be adjacent.
Essential Questions	<ul style="list-style-type: none"> • How are vertical, adjacent, complementary and supplementary angles related?
Primary Resources	8.6 Angles ESS
Essential Vocabulary	

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

Marking Period: 3

Days: 5

Reporting Category/Strand: GEOMETRY

SOL 8.8ab	<p>The student will</p> <p>a) apply transformations to plane figures; and</p> <p>b) identify applications of transformations.</p>
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Demonstrate the reflection of a polygon over the vertical or horizontal axis on a coordinate grid. • Demonstrate 90°, 180°, 270°, and 360° clockwise and counterclockwise rotations of a figure on a coordinate grid. The center of rotation will be limited to the origin. • Demonstrate the translation of a polygon on a coordinate grid. • Demonstrate the dilation of a polygon from a fixed point on a coordinate grid. • Identify practical applications of transformations including, but not limited to, tiling, fabric, and wallpaper designs, art and scale drawings. • Identify the type of transformation in a given example. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • Translations, rotations and reflections maintain congruence between the preimage and image but change location. Dilations by a scale factor other than 1 produce an image that is not congruent to the preimage but is similar. Rotations and reflections change the orientation of the image.
Essential Questions	<ul style="list-style-type: none"> • How does the transformation of a figure on the coordinate grid affect the congruency, orientation, location and symmetry of an image?
Primary Resources	<p>8.8 Transformations ESS</p>
Essential Vocabulary	

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

Marking Period: 3

Days: 5

Reporting Category/Strand: NUMBER AND NUMBER SENSE

<p>SOL 8.1b</p>	<p>The student will</p> <p>a) simplify numerical expressions involving positive exponents, using rational numbers, order of operations, and properties of operations with real numbers; and</p> <p>b) compare and order decimals, fractions, percents, and numbers written in scientific notation.</p>
<p>Essential Knowledge/Skills/Understandings</p>	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Compare and order no more than five fractions, decimals, percents, and numbers written in scientific notation using positive and negative exponents. Ordering may be in ascending or descending order. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • Numbers can be represented as decimals, fractions, percents, and in scientific notation. It is often useful to convert numbers to be compared and/or ordered to one representation (e.g., fractions, decimals or percents). • A rational number is any number that can be written in fraction form. • Scientific notation is used to represent very large and very small numbers.
<p>Essential Questions</p>	<ul style="list-style-type: none"> • How does the different ways rational numbers can be represented help us compare and order rational numbers? • What is a rational number? • When are numbers written in scientific notation?
<p>Primary Resources</p>	<p><u>8.1b Ordering Numbers ESS</u></p>
<p>Essential Vocabulary</p>	

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

Marking Period: 3

Days: 5

Reporting Category/Strand: NUMBER AND NUMBER SENSE

SOL 8.2	The student will describe orally and in writing the relationships between the subsets of the real number system.
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Describe orally and in writing the relationships among the sets of natural or counting numbers, whole numbers, integers, rational numbers, irrational numbers, and real numbers. • Illustrate the relationships among the subsets of the real number system by using graphic organizers such as Venn diagrams. Subsets include rational numbers, irrational numbers, integers, whole numbers, and natural or counting numbers. • Identify the subsets of the real number system to which a given number belongs. • Determine whether a given number is a member of a particular subset of the real number system, and explain why. • Describe each subset of the set of real numbers and include examples and nonexamples. • Recognize that the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • Some numbers can appear in more than one subset, e.g., 4 is an integer, a whole number, a counting or natural number and a rational number. The attributes of one subset can be contained in whole or in part in another subset.
Essential Questions	<ul style="list-style-type: none"> • How are the real numbers related?
Primary Resources	<u>8.2 Real Number System ESS</u>
Essential Vocabulary	

Marking Period: 3

Days: 5

Reporting Category/Strand: COMPUTATION AND ESTIMATION

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

SOL 8.3a	The student will a) solve practical problems involving rational numbers, percents, ratios, and proportions.
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Write a proportion given the relationship of equality between two ratios. • Solve practical problems by using computation procedures for whole numbers, integers, fractions, percents, ratios, and proportions. Some problems may require the application of a formula. • Maintain a checkbook and check registry for five or fewer transactions. • Compute a discount or markup and the resulting sale price for one discount or markup. • Compute the sales tax or tip and resulting total. • Substitute values for variables in given formulas. For example, use the simple interest formula $I = prt$ to determine the value of any missing variable when given specific information. • Compute the simple interest and new balance earned in an investment or on a loan for a given number of years. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • A percent is a special ratio with a denominator of 100.
Essential Questions	<ul style="list-style-type: none"> • What is a percent?
Primary Resources	8.3a Discount, Markup, Checkbook, & Tax ESS , 8.3a Percent, Ratio, & Proportion ESS
Essential Vocabulary	

Marking Period: 3

Days: 2

Reporting Category/Strand: COMPUTATION AND ESTIMATION

SOL 8.3b	The student will b) determine the percent increase or decrease for a given situation.
Essential	The student will use problem solving, mathematical communication, mathematical

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

Knowledge/Skills/Understandings	<p>reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Compute the percent increase or decrease for a onestep equation found in a real life situation. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • Percent increase and percent decrease are both percents of change measuring the percent a quantity increases or decreases. Percent increase shows a growing change in the quantity while percent decrease shows a lessening change.
Essential Questions	<ul style="list-style-type: none"> • What is the difference between percent increase and percent decrease?
Primary Resources	<p>8.3b Percent of Change ESS</p>
Essential Vocabulary	

Marking Period: 3

Days: 3

Reporting Category/Strand: PROBABILITY AND STATISTICS

SOL 8.13ab	<p>The student will</p> <p>a) make comparisons, predictions, and inferences, using information displayed in graphs; and</p> <p>b) construct and analyze scatterplots.</p>
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Collect, organize, and interpret a data set of no more than 20 items using scatterplots. Predict from the trend an estimate of the line of best fit with a drawing. • Interpret a set of data points in a scatterplot as having a positive relationship, a negative relationship, or no relationship. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • A line of best fit helps in making interpretations and predictions about the situation modeled in the data set. • Sets of data points with positive relationships demonstrate that the values of the two variables

**8th Grade Curriculum Guide
Lunenburg County Public Schools
June 2014**

	are increasing. A negative relationship indicates that as the value of the independent variable increases, the value of the dependent variable decreases.
Essential Questions	<ul style="list-style-type: none"> • Why do we estimate a line of best fit for a scatterplot? • What are the inferences that can be drawn from sets of data points having a positive relationship, a negative relationship, and no relationship?
Primary Resources	8.13a Graphs ESS , 8.13b Scatterplots ESS
Essential Vocabulary	

Marking Period: 3

Days: 5

Reporting Category/Strand: PROBABILITY AND STATISTICS

SOL 8.12	The student will determine the probability of independent and dependent events with and without replacement.
Essential Knowledge/Skills/Understandings	<p>The student will use problem solving, mathematical communication, mathematical reasoning, connections, and representations to:</p> <ul style="list-style-type: none"> • Determine the probability of no more than three independent events. • Determine the probability of no more than two dependent events without replacement. • Compare the outcomes of events with and without replacement. <p><u>ESSENTIAL UNDERSTANDINGS</u></p> <ul style="list-style-type: none"> • If events are dependent then the second event is considered only if the first event has already occurred. If events are independent, then the second event occurs regardless of whether or not the first occurs.
Essential Questions	<ul style="list-style-type: none"> • How are the probabilities of dependent and independent events similar? Different?
Primary Resources	8.12 Probability ESS
Essential Vocabulary	