



Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1A**
Teacher Team: **Mays, Baranek**

Unit: **1-Foundations-Numbers, Operations, Expressions**

Grades: **8**
Date: **January, 2016**

Stage 1 – Desired Results

Established Goals	Enduring Understandings/Transfer
<p>1. What 21st Century Essentials included in the mission statement will this unit address? <i>Transfer of Learning</i> <i>Career Planning and Life-Long Learning</i> <i>Problem-solving</i></p> <p>2. What content standards will this unit address?</p> <ul style="list-style-type: none"> • ELA PA Core State Standards • Math PA Core State Standards CC.2.1.6.E.3 Develop and/or apply number theory concepts to find common factors and multiples. CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers. CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions. CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties. CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers. CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve 	<p>Written as a declarative statement, an enduring understanding is a “big idea” that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.</p> <p>3. List the Enduring Understanding(s):</p> <ul style="list-style-type: none"> <i>a. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.</i> <i>b. Mathematical relationships among numbers can be represented, compared, estimated, and communicated</i> <i>c. Real number properties apply to numbers and variables in all situations</i> <i>d. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.</i> <i>e. Numerical quantities and calculations can be estimated or analyzed by using appropriate strategies and tools</i> <i>f. Values can be expressed as positive as well as negative and operations with those numbers can be calculated</i> <p>4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?</p> <ul style="list-style-type: none"> <i>a. Students will make sense of and persevere in solving complex and novel mathematical problems.</i> <i>b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.</i> <i>c. Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.</i> <i>d. Students will apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions.</i> <i>e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies</i> <i>f. Given a word problem, students will solve the word problem using an appropriate strategy or strategies and will share and compare the use of multiple strategies leading to the same answer.</i>
Essential Questions	

<p>real - world or mathematical problems</p> <ul style="list-style-type: none"> • PA Content Standards 	<p>What thought-provoking questions will foster inquiry, meaning-making, and transfer?</p> <p>5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:</p> <ol style="list-style-type: none"> <i>How are properties of real numbers used to simplify expressions?</i> <i>How can you represent quantities, patterns, and relationships?</i> <i>How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?</i> 	
Acquisition		
<p>Students will know...</p> <p>6. What facts should students know and be able to use to gain further knowledge? <i>Integer operations</i></p> <p>7. What vocabulary should students know and be able to recall? <i>Tier 2:</i> <i>apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model</i></p> <p><i>Tier 3:</i> <i>additive inverse, algebraic expression, coefficient, evaluate expressions, integers, like terms, order of operations, real numbers, simplify, term, variable, compare, associative property, commutative property, distributive property</i></p> <p>8. What basic concepts should students know and be able to recall and apply? <i>Recognize like terms, evaluate and write variable expressions and equations,</i></p>	<p>Students will be skilled at... (be able to do)</p> <p>9. What discrete skill and processes should students be able to demonstrate? <i>M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.</i> <i>M07.A-N.1.1.3 Apply properties of operations to multiply and divide rational numbers, including real-world contexts; demonstrate that the decimal form of a rational number terminates or eventually repeats.</i> <i>M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients.</i> <i>M07.B-E.2.1.1 Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate.</i> <i>M07.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem.</i> <i>M08.A-N.1.1.1 Determine whether a number is rational or irrational. For rational numbers, show that the decimal expansion terminates or repeats (limit repeating decimals to thousandths).</i> <i>A1.1.1.1.1 Compare and/or order any real numbers. Note: Rational and irrational may be mixed. properties/laws of exponents, roots, and/or absolute values to solve problems. Note: Exponents should be integers from -10 to 10</i></p>	

Stage 2 – Evidence	
NETS for Students	PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p><i>Examples include but are not limited to:</i> <i>Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)</i></p> <p>List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4): <i>Participate in Discussion board responding to teacher created prompts</i> <i>Generate equations and representations that can be used to solve word problems and check for reasonableness of solutions.</i></p>
	<p>OTHER SUMMATIVE ASSESSMENTS—can include factual recall</p> <p><i>Examples include but are not limited to final projects, research papers, quizzes and tests.</i></p> <p>List the assessments: <i>Quizzes and Tests</i></p>

Stage 3 – Learning Plan		
NETS for Students	Learning Activities	Progress Monitoring/Formative Assessment
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>Questions to consider while planning:</p> <ul style="list-style-type: none"> • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students? 	<ul style="list-style-type: none"> • How will you monitor students’ progress toward acquisition, meaning, and transfer during learning activities? Daily assessments, teacher observation of students in-class performance, teacher observation during peer share-out sessions • What are potential rough spots and student misunderstandings? Distributing -- remember to distribute to everything in the parentheses and remembering to distribute the negative signs x and x² are not like terms Adding like terms -- keeping the signs with the term • How will students get the feedback they need? Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz

	<p>List planned activities <i>(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):</i></p> <p>Combining Like Terms Index Card Activity. As an icebreaker, students are given cards with terms on them (ex: $7x$, $4xy$, -8). They search the class for a partner(s) with like termed cards. They then attempt to combine the like terms.</p> <p>worksheets, homework from textbook, Study Island, interactive textbook quizzes</p>	<p>List resources required <i>(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)</i></p> <p>Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software</p>	<p>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.</p> <p><i>Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb</i></p> <p>interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative</p>
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Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1A**
Teacher Team: **Mays, Baranek**

Unit: **2-Equations and Inequalities**

Grades: **8**
Date: **January, 2016**

Stage 1 – Desired Results

Established Goals	Enduring Understandings/Transfer
<p>1. What 21st Century Essentials included in the mission statement will this unit address? <i>Transfer of Learning</i> <i>Career Planning and Life-Long Learning</i> <i>Problem-solving</i></p> <p>2. What content standards will this unit address?</p> <ul style="list-style-type: none"> • ELA PA Core State Standards • Math PA Core State Standards <p>CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems.</p> <p>CC.2.2.7.B.3 Model and solve real world and mathematical problems by using and connecting numerical, algebraic, and/or graphical</p> <p>CC.2.2.8.B.2 Understand the connections between proportional relationships, lines, and linear equations.</p> <p>CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous linear equations.</p> <p>CC.2.2.8.C.1 Define, evaluate, and compare functions.</p>	<p>Written as a declarative statement, an enduring understanding is a “big idea” that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.</p> <p>3. List the Enduring Understanding(s):</p> <ol style="list-style-type: none"> a. <i>Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.</i> b. <i>Obtaining a solution to an equation no matter how complex, always involves the process of undoing operations.</i> c. <i>Real World situations can be modeled and solved by using equations and inequalities.</i> d. <i>Equations may have one solution, no solution, or infinitely many solutions.</i> e. <i>Inequalities have a set of solutions, which are sometimes graphed on a number line. Inequalities can also have no solution.</i> <p>4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?</p> <ol style="list-style-type: none"> a. <i>Students will make sense of and persevere in solving complex and novel mathematical problems.</i> b. <i>Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.</i> c. <i>Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.</i> d. <i>Students will apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions.</i> e. <i>Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies</i> f. <i>Given a word problem, students will solve the word problem using an appropriate strategy or strategies and will share and compare the use of multiple strategies leading to the same answer.</i> g. <i>Students will recognize and solve real life problems with a given unit rate and fixed cost.</i> h. <i>Students will recognize what an equation/inequality with no solution means in real life; they also will recognize what an equation/inequality with an infinite number of solutions means.</i>

<p>CC.2.2.8.C.2 Use concepts of functions to model relationships between quantities.</p> <p>CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real - world or mathematical problems.</p> <p>CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.</p> <p>CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems</p> <p>CC.2.2.HS.D.6 Extend the knowledge of rational functions to rewrite in equivalent forms</p> <p>CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.</p> <p>CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.</p> <p>CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations algebraically and graphically.</p> <ul style="list-style-type: none"> • PA Content Standards 	Essential Questions	
	<p>What thought-provoking questions will foster inquiry, meaning-making, and transfer?</p> <p>5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:</p> <ol style="list-style-type: none"> <i>What kind of relationships can proportions represent?</i> <i>How can equations and inequalities that appear to be different be equivalent?</i> <i>How can you solve equations and inequalities?</i> 	
	Acquisition	
	<p>Students will know...</p> <p>6. What facts should students know and be able to use to gain further knowledge? <i>When you divide or multiply by a negative number, the inequality sign switches directions</i></p> <p>7. What vocabulary should students know and be able to recall? <i>Tier 2:</i> <i>apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model</i></p> <p><i>Tier 3:</i> <i>distribute, combine like terms, simplify, variable, cross products, equivalent equations, formula, inverse operations, literal equation, percent change, proportion, rate, ratio, scale, empty set, equivalent inequalities, equal sign, expression, identity, inequality signs, expressions, less than, greater than, less than or equal to, greater than or equal to, check process, express variable by itself</i></p> <p>8. What basic concepts should students know and be able to recall and apply?</p>	<p>Students will be skilled at... (be able to do)</p> <p>9. What discrete skill and processes should students be able to demonstrate?</p> <p><i>M07.A-R.1.1.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas, and other quantities measured in like or different units.</i></p> <p><i>M07.A-R.1.1.2 Determine whether two quantities are proportionally related (e.g., by testing for equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin).</i></p> <p><i>M07.A-R.1.1.3 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.</i></p> <p><i>M07.A-R.1.1.4 Represent proportional relationships by equations.</i></p> <p><i>M07.A-R.1.1.6 Use proportional relationships to solve multi-step ratio and percent problems.</i></p> <p><i>M07.B-E.2.2.1 Solve word problems leading to equations of the form $px + q = r$ and $p(x + q) = r$, where p, q, and r are specific rational numbers.</i></p> <p><i>M07.B-E.2.2.2 Solve word problems leading to inequalities of the form $px + q > r$ or $px + q < r$, where p, q, and r are specific rational numbers, and graph the solution set of the inequality.</i></p> <p><i>M08.B-E.3.1.1 Write and identify linear equations in</i></p>

	<p><i>If there are variables on both sides, you must move one of the variable to the other side.</i></p> <p><i>When graphing inequalities with less than or equal to OR greater than or equal to you must fill in the circle; otherwise the circle is left open.</i></p>	<p><i>one variable\ with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).</i></p> <p><i>MO8.B-E.3.1.2 Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.</i></p> <p><i>A1.1.2.1.1 Write, solve, and/or apply a linear equation (including problem situations).</i></p> <p><i>A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation-solving process.</i></p> <p><i>Note: Linear equations only.</i></p> <p><i>A1.1.3.1.2 Identify or graph the solution set to a linear inequality on a number line.</i></p> <p><i>A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear inequalities only.</i></p>
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Stage 2 – Evidence	
NETS for Students	PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p><i>Examples include but are not limited to:</i></p> <p><i>Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)</i></p> <p>List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4):</p> <p><i>Participate in Discussion board responding to teacher created prompts</i></p> <p><i>Students sort equations into 3 categories -- one solution, no solution, or infinitely many solutions. They show work and then critique others work</i></p> <p><i>Students will write and solve equations from word problems and then test for reasonableness of answers, including rounding up or down, as appropriate</i></p> <p><i>Checks and Balances project (HS)</i></p>

	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	<i>Examples include but are not limited to final projects, research papers, quizzes and tests.</i>
	List the assessments: <i>Quizzes and Tests</i>

Stage 3 – Learning Plan		
<u>NETS for Students</u>	Learning Activities	Progress Monitoring/Formative Assessment
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>Questions to consider while planning:</p> <ul style="list-style-type: none"> • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students? 	<ul style="list-style-type: none"> • How will you monitor students’ progress toward acquisition, meaning, and transfer during learning activities? Daily assessments, teacher observation of students in-class performance, teacher observation during peer share-out sessions • What are potential rough spots and student misunderstandings? Distributing -- remember to distribute to everything in the parentheses and remembering to distribute the negative signs When multiplying or dividing by a negative number, the inequality sign switches, x and x² are not like terms Adding like terms -- keeping the signs with each term Calculation errors at the beginning of a problem will give an incorrect answer Students don't choose the easiest way to solve the problem which created more difficult arithmetic Students forget that they must move variables to the same side of the equation Students forget that they must do the same thing to both sides of the equation, which should be the inverse operation of the original equation • How will students get the feedback they need? Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz

	<p>List planned activities <i>(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):</i></p> <p>Gym membership activity (no graphing) –What is a better bet; joining a gym paying a larger upfront cost but paying cheaper each month OR paying less up front and paying more each month? Students will determine if joining a gym for \$25 a month with a \$100 enrollment fee, is better than a membership that costs nothing upfront, but is \$3 each visit.</p> <p>worksheets, homework from textbook, Study Island, interactive textbook quizzes</p>	<p>List resources required <i>(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)</i></p> <p>Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software</p>	<p>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.</p> <p><i>Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb</i></p> <p>interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative</p>
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Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1A**
Teacher Team: **Mays, Baranek**

Unit: **3- Linear Functions**

Grades: **8**
Date: **January, 2016**

Stage 1 – Desired Results

Established Goals	Enduring Understandings/Transfer
<p>1. What 21st Century Essentials included in the mission statement will this unit address? <i>Transfer of Learning</i> <i>Career Planning and Life-Long Learning</i> <i>Problem-solving</i></p> <p>2. What content standards will this unit address?</p> <ul style="list-style-type: none"> • ELA PA Core State Standards • Math PA Core State Standards CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems. CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers. CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions. CC.2.2.7.B.3 Model and solve real world and mathematical problems by using and connecting numerical, algebraic, and/or graphical CC.2.2.8.B.2 Understand the connections 	<p>Written as a declarative statement, an enduring understanding is a “big idea” that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.</p> <p>3. List the Enduring Understanding(s):</p> <ol style="list-style-type: none"> a. <i>How can you represent and describe functions?</i> b. <i>Can functions describe real-world situations?</i> c. <i>How can you make predictions based on a scatter plot?</i> d. <i>What information does the equation of a line give you?</i> e. <i>What does the slope of a line indicate about the line?</i> f. <i>A line on a graph can be represented by a linear equation.</i> g. <i>The equation of a line can be written in multiple forms.</i> h. <i>The relationship between two lines can be determined by comparing their slopes and y-intercepts.</i> <p>4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?</p> <ol style="list-style-type: none"> a. <i>Students will make sense of and persevere in solving complex and novel mathematical problems.</i> b. <i>Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.</i> c. <i>Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.</i> d. <i>Students will apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions.</i> e. <i>Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies</i> f. <i>Given a word problem, students will solve the word problem using an appropriate strategy or strategies and will share and compare the use of multiple strategies leading to the same answer.</i> g. <i>Students will recognize and solve real life problems with a given unit rate and fixed cost.</i>
Essential Questions	

<p>between proportional relationships, lines, and linear equations.</p> <p>CC.2.2.8.C.1 Define, evaluate, and compare functions.</p> <p>CC.2.2.8.C.2 Use concepts of functions to model relationships between quantities.</p> <p>CC.2.4.8.B.1</p> <p>Analyze and/or interpret bivariate data displayed in multiple representations</p> <p>CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.</p> <p>CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.</p> <p>CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.</p> <p>CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.</p> <p>CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.</p> <p>CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi - step problems.</p> <p>CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.</p> <p>CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.</p> <p>• PA Content Standards</p>	<p>What thought-provoking questions will foster inquiry, meaning-making, and transfer?</p> <p>5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:</p> <p><i>a. How can functions describe real-world situations and represent them?</i></p> <p><i>b. How can you make predictions based on a scatter plot?</i></p> <p><i>c. How does the shape of a graph and the manipulation of a parameter represent the real world situation?</i></p>	
	<p>Acquisition</p>	
	<p>Students will know...</p> <p>6. What facts should students know and be able to use to gain further knowledge?</p> <p><i>Lines can have a positive slope /</i> <i>Lines can have a negative slope \</i> <i>Lines can have a slope of zero (horizontal line)</i> <i>Lines can have no slope (vertical line)</i> <i>The best way to graph a line is using slope-intercept form</i> <i>f(x) is the same as y</i></p> <p>7. What vocabulary should students know and be able to recall?</p> <p><i>Tier 2:</i> <i>apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model</i></p> <p><i>Tier 3:</i> <i>continuous graph, dependent variable, independent variable, discrete graph, domain, range, function notation, linear, non-linear, relation, function,</i></p>	<p>Students will be skilled at... (be able to do)</p> <p>9. What discrete skill and processes should students be able to demonstrate?</p> <p><i>M08.B-E.2.1.1 Graph proportional relationships, interpreting the unit rate as the slope of the graph. Compare two different proportional relationships represented in different ways.</i></p> <p><i>M08.B-E.2.1.2 Use similar right triangles to show and explain why the slope m is the same between any two distinct points on a non-vertical line in the coordinate plane.</i></p> <p><i>M08.B-E.2.1.3 Derive the equation $y = mx$ for a line through the origin and the equation $y = mx + b$ for a line intercepting the vertical axis at b.</i></p> <p><i>M08.B-E.3.1.1 Write and identify linear equations in one variable with one solution, infinitely many solutions, or no solutions. Show which of these possibilities is the case by successively transforming the given equation into simpler forms until an equivalent equation of the form $x = a$, $a = a$, or $a = b$ results (where a and b are different numbers).</i></p> <p><i>M08.B-E.3.1.2 Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms</i></p> <p><i>M08.B-F.1.1.1 Determine whether a relation is a function.</i></p> <p><i>M08.B-F.1.1.2 Compare properties of two functions, each represented in a different way (i.e., algebraically, graphically, numerically in tables, or</i></p>

sequence, direct variation, linear equation, parallel lines, perpendicular lines, point-slope form, rate of change, slope, slope-intercept form, standard form, trend line, x-intercept, y-intercept, correlation, line of best fit, absolute value, table of x and y values, ordered pairs of coordinates, changes in x and y values, points plotted in a line,

8. What basic concepts should students know and be able to recall and apply?
- a. Students will graph a line in standard and slope-intercept form*
 - b. Students will calculate the equation of a line given appropriate information*
 - c. Students will check to see if a solution is valid*
 - d. Students will calculate intercepts*
 - e. Students will recognize the difference between linear and non-linear equations*
 - f. Students will create a line of best fit*
 - g. Students will calculate parallel and perpendicular line*
 - h. Students will calculate slope from a graph or given ordered pairs*
 - i. Students will compare functions in different forms*

by verbal descriptions). Example: Given a linear function represented by a table of values and a linear function represented by an algebraic expression, determine which function has the greater rate of change.

M08.B-F.1.1.3 Interpret the equation $y = mx + b$ as defining a linear function whose graph is a straight line; give examples of functions that are not linear.
M08.B-F.2.1.1 Construct a function to model a linear relationship between two quantities. Determine the rate of change and initial value of the function from a description of a relationship or from two (x, y) values, including reading these from a table or from a graph. Interpret the rate of change and initial value of a linear function in terms of the situation it models and in terms of its graph or a table of values.

M08.B-F.2.1.2 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear). Sketch or determine a graph that exhibits the qualitative features of a function that has been described verbally
M08.D-S.1.1.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative correlation, linear association, and nonlinear association.

M08.D-S.1.1.2 For scatter plots that suggest a linear association, identify a line of best fit by judging the closeness of the data points to the line.

M08.D-S.1.1.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept. Example: In a linear model for a biology experiment, interpret a slope of 1.5 cm/hr as meaning that an additional hour of sunlight each day is associated with an additional 1.5 cm in mature plant height.

		<p><i>A1.1.2.1.1 Write, solve, and/or apply a linear equation (including problem situations).</i></p> <p><i>A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear equations only.</i></p> <p><i>A1.1.2.2.2 Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear equations.</i></p> <p><i>A1.2.1.1.2 Determine whether a relation is a function, given a set of points or a graph.</i></p> <p><i>A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table)</i></p> <p><i>A1.2.1.2.1 Create, interpret, and/or use the equation, graph, or table of a linear function.</i></p> <p><i>A1.2.1.2.2 Translate from one representation of a linear function to another (i.e., graph, table, and equation).</i></p> <p><i>A1.2.2.1.1 Identify, describe, and/or use constant rates of change.</i></p> <p><i>A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems.</i></p> <p><i>A1.2.2.1.3 Write or identify a linear equation when given • the graph of the line, • two points on the line, or • the slope and a point on the line. Note: Linear equation may be in point-slope, standard, and/or slope-intercept form.</i></p> <p><i>A1.2.2.1.4 Determine the slope and/or y-intercept represented by a linear equation or graph</i></p>
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Stage 2 – Evidence	
<u>NETS for Students</u>	PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning
NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live	<p><i>Examples include but are not limited to:</i></p> <p><i>Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)</i></p> <p>List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s)</p>

<p>productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>(reference Stage 1, Item #4): <i>Participate in discussion boards</i> <i>Students explain how to verify that a relationship is a function</i> <i>Students form expressions, equations(in different forms), or inequalities from real world context and connect symbolic and graphical representations as they apply algebraic concepts to the context.</i> <i>Students translate functions numericalyl, graphically, verbally, and algebraically</i> <i>Students gather their own data or graphs in context they understand and interpret the data and graphs in terms of equations, using correct terminology</i></p>
<p>OTHER SUMMATIVE ASSESSMENTS—can include factual recall</p>	
<p><i>Examples include but are not limited to final projects, research papers, quizzes and tests.</i></p>	
<p>List the assessments:</p>	
<p><i>Quizzes and Tests</i></p>	

<p>Stage 3 – Learning Plan</p>		
<p><u>NETS for Students</u></p>	<p>Learning Activities</p>	<p>Progress Monitoring/Formative Assessment</p>
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>Questions to consider while planning:</p> <ul style="list-style-type: none"> • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students? 	<ul style="list-style-type: none"> • How will you monitor students’ progress toward acquisition, meaning, and transfer during learning activities? Daily assessments, teacher observation of students in-class performance, teacher observation during peer share-out sessions • What are potential rough spots and student misunderstandings? Algebraic errors when manipulating the equation Errors when graphing linear equations, especially slope Calculating slope upside down (change of x's on top instead of change of y's) Incorrect arithmetic when calculating slope (especially with negative numbers involved) • How will students get the feedback they need? Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz

	<p>List planned activities <i>(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):</i></p> <p>Comparison of price of products over time. Finding the rate of change of an item over time – the price of milk increasing over a 50 year period. Is this constant? This can also help students with creating a scatter plot and writing a line of best fit.</p> <p>Stock Market Activity – Find the closing price of a stock at the end of each month over a period of time. Using desmos (or another appropriate graphing software) students will create a line of best fit finding slope, y-intercept, etc. Students will make predictions based on their research.</p> <p>worksheets, homework from textbook, Study Island, interactive textbook quizzes</p>	<p>List resources required <i>(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)</i></p> <p>Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software</p>	<p>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.</p> <p><i>Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb</i></p> <p>interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative</p>
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Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1A**
Teacher Team: **Mays, Baranek**

Unit: **4-Systems of Equations**

Grades: **8**
Date: **January, 2016**

Stage 1 – Desired Results

Established Goals	Enduring Understandings/Transfer
<p>1. What 21st Century Essentials included in the mission statement will this unit address? <i>Transfer of Learning</i> <i>Career Planning and Life-Long Learning</i> <i>Problem-solving</i></p> <p>2. What content standards will this unit address?</p> <ul style="list-style-type: none"> • ELA PA Core State Standards • Math PA Core State Standards <p>CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions. CC.2.1.7.D.1 Analyze proportional relationships and use them to model and solve real-world and mathematical problems. CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers. CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous linear equations. CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and</p>	<p>Written as a declarative statement, an enduring understanding is a “big idea” that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.</p> <p>3. List the Enduring Understanding(s):</p> <ol style="list-style-type: none"> a. <i>Systems of linear equations can be used to model problems.</i> b. <i>Systems of equations can be solved by graphing, substitution, or elimination.</i> c. <i>Solutions to systems of equations can vary from no solution to infinite solutions.</i> d. <i>Solutions to systems of equations must be interpreted within the context of the problem.</i> <p>4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?</p> <ol style="list-style-type: none"> a. <i>Students will make sense of and persevere in solving complex and novel mathematical problems.</i> b. <i>Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.</i> c. <i>Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.</i> d. <i>Students will apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions.</i> e. <i>Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies</i> f. <i>Given a word problem, students will solve the word problem using an appropriate strategy or strategies and will share and compare the use of multiple strategies leading to the same answer.</i>
	<p style="text-align: center;">Essential Questions</p> <p>What thought-provoking questions will foster inquiry, meaning-making, and transfer?</p> <p>5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:</p> <ol style="list-style-type: none"> a. <i>How can you solve a system of equations or inequalities?</i> b. <i>How can systems of equations or inequalities model real-world situations?</i>

<p>systems of equations/inequalities algebraically and graphically. CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method. CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> <ul style="list-style-type: none"> • PA Content Standards 	<p>c. How do you decide which method would be easier to solve a particular system of equations?</p>	
	<p>Acquisition</p>	
	<p>Students will know...</p> <p>6. What facts should students know and be able to use to gain further knowledge? <i>How to graph a line</i> <i>LCM in order to use elimination</i></p> <p>7. What vocabulary should students know and be able to recall? Tier 2: <i>apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model</i></p> <p>Tier 3: <i>elimination method, substitution method, inconsistent, independent, dependent, solution of a system of linear equations, break-even point, table of x and y values, ordered pairs of coordinates, changes in x and y values, points plotted in a line</i></p> <p>8. What basic concepts should students know and be able to recall and apply? <i>Solve a system using elimination, substitution, and graphing</i> <i>Students will know how to choose which method to use</i></p>	<p>Students will be skilled at... (be able to do)</p> <p>9. What discrete skill and processes should students be able to demonstrate? M08.B-E.3.1.2 <i>Solve linear equations that have rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms.</i> M08.B-E.3.1.3 <i>Interpret solutions to a system of two linear equations in two variables as points of intersection of their graphs because points of intersection satisfy both equations simultaneously.</i> M08.B-E.3.1.4 <i>Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection</i> M08.B-E.3.1.5 <i>Solve real-world and mathematical problems leading to two linear equations in two variables.</i> A1.1.2.1.1 <i>Write, solve, and/or apply a linear equation (including problem situations).</i> A1.1.2.1.3 <i>Interpret solutions to problems in the context of the problem situation. Note: Linear equations only.</i> A1.1.2.2.1 <i>Write and/or solve a system of linear equations (including problem situations) using graphing, substitution, and/or elimination. Note: Limit systems to two linear equations.</i> A1.1.2.2.2 <i>Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear equations.</i> A1.1.3.1.1 <i>Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities).</i> A1.1.3.1.3 <i>Interpret solutions to problems in the context of the problem situation. Note: Linear</i></p>

		<p><i>inequalities only.</i></p> <p><i>A1.1.3.2 Interpret solutions to problems in the context of the problem situation.</i></p> <p><i>Note: Limit systems to two linear inequalities.</i></p>
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Stage 2 – Evidence	
<u>NETS for Students</u>	PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p><i>Examples include but are not limited to:</i></p> <p><i>Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)</i></p> <p>List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4):</p> <p><i>Participate in Discussion board responding to teacher created prompts</i></p> <p><i>Generate equations and representations that can be used to solve word problems and check for reasonableness of solutions.</i></p> <p><i>Making choices to know when to: buy annual pass or pay daily, buy refillable cup or pay daily, drive to airport and park or take shuttle, etc</i></p>
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	<p><i>Examples include but are not limited to final projects, research papers, quizzes and tests.</i></p> <p>List the assessments:</p> <p><i>Quizzes and Tests</i></p>

Stage 3 – Learning Plan		
<u>NETS for Students</u>	Learning Activities	Progress Monitoring/Formative Assessment
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>Questions to consider while planning:</p> <ul style="list-style-type: none"> • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students? 	<ul style="list-style-type: none"> • How will you monitor students’ progress toward acquisition, meaning, and transfer during learning activities? Daily assessments, teacher observation of students in-class performance, teacher observation during peer share-out sessions • What are potential rough spots and student misunderstandings? f students try to subtract the equations for elimination, they lose negative signs Some students struggle to find the LCM for elimination

		<p>For substitution, students struggle to solve for x instead of y If solving algebraically, systems with no solution or infinitely many solutions are difficult to interpret</p> <ul style="list-style-type: none"> • How will students get the feedback they need? Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	<p>List planned activities <i>(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):</i></p> <p>Cell phone plan. Similar to the gym membership activity, students will determine the better offer, but use graphing to compare. What is a better bet; enrolling in a cell phone plan that is a flat \$70 a month OR paying \$40 a month for unlimited calling, but \$0.10 per text and \$0.25 an hour for data? Students will graph each line and see where the two lines meet.</p> <p>worksheets, homework from textbook, Study Island, interactive textbook quizzes</p>	<p>List resources required <i>(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)</i></p> <p>Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software</p> <p>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.</p> <p><i>Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb</i></p> <p>interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative</p>



Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1A**
Teacher Team: **Mays, Baranek**

Unit: **5-Exponents, Radicals, and Number Sets**

Grades: **8**
Date: **January, 2016**

Stage 1 – Desired Results

Established Goals	Enduring Understandings/Transfer
<p>1. What 21st Century Essentials included in the mission statement will this unit address? <i>Transfer of Learning</i> <i>Career Planning and Life-Long Learning</i> <i>Problem-solving</i></p> <p>2. What content standards will this unit address?</p> <ul style="list-style-type: none"> • ELA PA Core State Standards • Math PA Core State Standards <p>CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers.</p> <p>CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.</p> <p>CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties.</p> <p>CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers.</p> <p>CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate</p>	<p>Written as a declarative statement, an enduring understanding is a “big idea” that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.</p> <p>3. List the Enduring Understanding(s):</p> <ol style="list-style-type: none"> a. <i>Squaring a number and finding the square root are inverse operations. Likewise, cubing and cube rooting are inverse operations</i> b. <i>The square root of a non-perfect square is an irrational number</i> c. <i>In scientific notation, if the exponent increases by one, the value increases by ten.</i> d. <i>The number in proper scientific notation must be between 1 and 9.999999.</i> e. <i>To compare numbers in scientific notation, put them back to regular notation.</i> f. <i>To compare numbers with squares and square roots (and cubes and cube roots), you must estimate their values by comparing to known squares and square roots (and cubes and cube roots)</i> g. <i>Radicals can be Simplified</i> h. <i>The Pythagorean theorem is used to find the missing portion of a right triangle and the distance between two points in the coordinate plane</i> <p>4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?</p> <ol style="list-style-type: none"> a. <i>Students will make sense of and persevere in solving complex and novel mathematical problems.</i> b. <i>Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.</i> c. <i>Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.</i> d. <i>Students will apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions.</i> e. <i>Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies</i> f. <i>Given a word problem, students will solve the word problem using an appropriate strategy or strategies</i>

<p>equivalent expressions. CC.2.3.8.A.3 Understand and apply the Pythagorean Theorem to solve problems. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method. CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents. CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real - world or mathematical problems.</p> <p>• PA Content Standards</p>	<p><i>and will share and compare the use of multiple strategies leading to the same answer.</i></p>	
	<p style="text-align: center;">Essential Questions</p>	
	<p>What thought-provoking questions will foster inquiry, meaning-making, and transfer?</p> <p>5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:</p> <ol style="list-style-type: none"> <i>How do you compare numbers in scientific notation -- with and without calculators?</i> <i>How does the use of exponents make representing quantities more efficient?</i> <i>How do you compare numbers in various forms -- with exponents, with roots, fractions, decimals, etc?</i> 	
	<p style="text-align: center;">Acquisition</p>	
<p>Students will know...</p> <p>6. What facts should students know and be able to use to gain further knowledge? <i>Numbers between 0 and 1 have a negative exponent</i> <i>Numbers greater than one have a positive exponent</i> <i>To multiply numbers with the same base, add the exponents</i> <i>To divide numbers with the same base, subtract the exponents</i> <i>Perfect squares and cubes</i></p> <p>7. What vocabulary should students know and be able to recall? <i>Tier 2:</i> <i>apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model</i></p> <p><i>Tier 3:</i> <i>scientific notation, exponent, square root, cube root, rational, irrational</i></p>	<p>Students will be skilled at... (be able to do)</p> <p>9. What discrete skill and processes should students be able to demonstrate? <i>M08.A-N.1.1.2 Convert a terminating or repeating decimal to a rational number (limit repeating decimals to thousandths).</i> <i>M08.A-N.1.1.3 Estimate the value of irrational numbers without a calculator (limit whole number radicand to less than 144). Example: $\sqrt{5}$ is between 2 and 3 but closer to 2.</i> <i>M08.A-N.1.1.4 Use rational approximations of irrational numbers to compare and order irrational numbers.</i> <i>M08.A-N.1.1.5 Locate/identify rational and irrational numbers at their approximate locations on a number line.</i> <i>M08.B-E.1.1.1 Apply one or more properties of integer exponents to generate equivalent numerical expressions without a calculator (with final answers expressed in exponential form with positive exponents). Properties will be provided.</i> <i>M08.B-E.1.1.2 Use square root and cube root symbols to represent solutions to equations of the form $x^2 = p$ and $x^3 = p$, where p is a positive rational number. Evaluate square roots of perfect squares (up to and including 122) and cube roots of perfect cubes (up to and including 53) without a calculator.</i></p>	

	<p>8. What basic concepts should students know and be able to recall and apply? <i>Change numbers from scientific notation to regular form and vice versa</i> <i>Perform mathematical operations with numbers in scientific notation with and without calculators</i> <i>Convert a repeating number into a fraction</i> <i>Multiply and divide expressions in exponent form</i> <i>Simplify square roots</i> <i>Estimate square roots and cube roots and compare them</i> <i>Solve problems such as $x^2 = 25$ as $x = 5$ and -5, but $x^3 = 8$ is $x = 2$.</i></p>	<p><i>Example: If $x^2 = 25$ then $x = \pm\sqrt{25}$.</i> <i>MO8.B-E.1.1.3 Estimate very large or very small quantities by using numbers expressed in the form of a single digit times an integer power of 10 and express how many times larger or smaller one number is than another.</i> <i>MO8.B-E.1.1.4 Perform operations with numbers expressed in scientific notation, including problems where both decimal and scientific notation are used. Express answers in scientific notation and choose units of appropriate size for measurements of very large or very small quantities (e.g., use millimeters per year for seafloor spreading). Interpret scientific notation that has been generated by technology (e.g., interpret 4.7EE9 displayed on a calculator as 4.7×10^9).</i> <i>A1.1.1.3.1 Simplify/evaluate expressions involving properties/laws of exponents, roots, and/or absolute values to solve problems. Note: Exponents should be integers from -10 to 10</i></p>
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Stage 2 – Evidence	
NETS for Students	PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p><i>Examples include but are not limited to:</i> <i>Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)</i></p> <p>List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4): <i>Participate in Discussion board responding to teacher created prompts</i> <i>Students will represent positive and negative exponents in a table to find patterns and relationships.</i> <i>Students will apply exponential skills to solve problems such as bacteria growth, radioactive decay, population growth, and compound interest</i> <i>Students will solve real life Pythagorean Theorem problems</i></p>

	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	<i>Examples include but are not limited to final projects, research papers, quizzes and tests.</i>
	List the assessments: <i>Quizzes and Tests</i>

Stage 3 – Learning Plan		
<u>NETS for Students</u>	Learning Activities	Progress Monitoring/Formative Assessment
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>Questions to consider while planning:</p> <ul style="list-style-type: none"> • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students? 	<ul style="list-style-type: none"> • How will you monitor students’ progress toward acquisition, meaning, and transfer during learning activities? Daily assessments, teacher observation of students in-class performance, teacher observation during peer share-out sessions • What are potential rough spots and student misunderstandings? Students mistakenly multiply the numerical bases when calculating the product of two or more exponential expressions with numerical Failure to perform the correct operation of coefficients and/or exponents. Students incorrectly convert between standard and scientific notation by mistakenly counting zeros rather than place value When dividing numbers in scientific notation, they take a fraction and divide denominator by numerator instead of vice versa Not converting an answer to proper scientific notation Silly factoring mistakes $6 = 3*3$ Adding instead of multiplying when simplifying radicals • How will students get the feedback they need? Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz

	<p>List planned activities <i>(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):</i></p> <p>worksheets, homework from textbook, Study Island, interactive textbook quizzes</p>	<p>List resources required <i>(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)</i></p> <p>Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software</p>	<p>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.</p> <p><i>Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb</i></p> <p>interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative</p>
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Southern Lehigh School District

UbD Curriculum Template

Course: **Alg 1A**
Teacher Team: **Mays, Baranek**

Unit: **6 - Geometry**

Grades: **8**
Date: **January, 2016**

Stage 1 – Desired Results

Established Goals	Enduring Understandings/Transfer
<p>1. What 21st Century Essentials included in the mission statement will this unit address? <i>Transfer of Learning</i> <i>Career Planning and Life-Long Learning</i> <i>Problem-solving</i></p> <p>2. What content standards will this unit address?</p> <ul style="list-style-type: none"> • ELA PA Core State Standards • Math PA Core State Standards <p>CC.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume.</p> <p>CC.2.3.7.A.1 Solve real - world and mathematical problems involving angle measure, area, surface area, circumference, and volume.</p> <p>CC.2.3.7.A.2 Visualize and represent geometric figures and describe the relationships between them.</p> <p>CC.2.3.8.A.1 Apply the concepts of volume of</p>	<p>Written as a declarative statement, an enduring understanding is a “big idea” that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.</p> <p>3. List the Enduring Understanding(s):</p> <ul style="list-style-type: none"> a. <i>Geometric figures can be represented in the coordinate plane.</i> b. <i>The structure of the coordinate system can be used to calculate measures contained in geometric figures.</i> c. <i>The Distance Formula is an application of the Pythagorean Theorem.</i> d. <i>The measures of geometric figures can be calculated and analyzed using a variety of strategies, tools, and technologies.</i> e. <i>A change in one dimension of an object results in predictable changes in area and or volume.</i> f. <i>A constant ratio exists between corresponding lengths of sides of similar figures</i> g. <i>Figures can be manipulated in the coordinate plane through rotations, reflections, translations, and dilations</i> h. <i>Compound figures should be broken into small, individual figures to find areas and volumes.</i> <p>4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?</p> <ul style="list-style-type: none"> a. <i>Students will make sense of and persevere in solving complex and novel mathematical problems.</i> b. <i>Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.</i> c. <i>Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.</i> d. <i>Students will apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions.</i> e. <i>Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies</i> f. <i>Given a word problem, students will solve the word problem using an appropriate strategy or strategies and will share and compare the use of multiple strategies leading to the same answer.</i>

<p>cylinders, cones, and spheres to solve real - world and mathematical problems.</p> <p>CC.2.3.8.A.2 Understand and apply congruence, similarity, and geometric transformations using various tools.</p> <p>CC.2.3.8.A.3 Understand and apply the Pythagorean Theorem to solve problems.</p> <p>CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents.</p> <p>CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real - world or mathematical problems.</p> <p>• PA Content Standards</p>	Essential Questions	
	What thought-provoking questions will foster inquiry, meaning-making, and transfer?	
	<p>5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:</p> <p><i>a. How are spatial relationships, including shape and dimension, used to draw, construct, model, and represent real situations or solve problems?</i></p> <p><i>b. How can the application of the attributes of geometric shapes support mathematical reasoning and problem solving?</i></p> <p><i>c. How can geometric properties and theorems be used to describe, model, and analyze situations?</i></p> <p><i>d. How do you use the Pythagorean Theorem in real life?</i></p>	
	Acquisition	
	Students will know...	Students will be skilled at... (be able to do)
	<p>6. What facts should students know and be able to use to gain further knowledge?</p> <p><i>Formulas can be applied to find area, surface area, volume of geometric figures.</i></p> <p><i>Pythagorean Theorem is $a^2 + b^2 = c^2$</i></p> <p><i>Nets can be used to help find surface area.</i></p> <p><i>Applying area and volume to real-life examples.</i></p> <p><i>Similar figures have the same shape, but a different size.</i></p> <p>7. What vocabulary should students know and be able to recall?</p> <p><i>Tier 2:</i> <i>apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model</i></p> <p><i>Tier 3:</i> <i>Translation, reflection, symmetry, rotation, similar</i></p>	<p>9. What discrete skill and processes should students be able to demonstrate?</p> <p><i>M06.C-G.1.1.1 Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided.</i></p> <p><i>M06.C-G.1.1.2 Determine the area of irregular or compound polygons. Example: Find the area of a room in the shape of an irregular polygon by composing and/or decomposing.</i></p> <p><i>M06.C-G.1.1.3 Determine the volume of right rectangular prisms with fractional edge lengths. Formulas will be provided.</i></p> <p><i>M06.C-G.1.1.4 Given coordinates for the vertices of a polygon in the plane, use the coordinates to find side lengths and area of the polygon (limited to triangles and special quadrilaterals). Formulas will be provided.</i></p> <p><i>M06.C-G.1.1.5 Represent three-dimensional figures using nets made of rectangles and triangles.</i></p> <p><i>M06.C-G.1.1.6 Determine the surface area of triangular and rectangular prisms (including cubes). Formulas will be provided.</i></p> <p><i>M07.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem.</i></p>

figure, congruent, Pythagorean Theorem, prism, cylinder, sphere, cone, pyramid

8. What basic concepts should students know and be able to recall and apply?
Use the Pythagorean theorem to decide if a triangle is a right triangle.
Find the distance between 2 points.
Transform figures.
Calculate volumes of prism, cylinder, sphere, cone and pyramid.

M07.C-G.1.1.1 Solve problems involving scale drawings of geometric figures, including finding length and area.

M07.C-G.1.1.2 Identify or describe the properties of all types of triangles based on angle and side measures.

M07.C-G.1.1.3 Use and apply the triangle inequality theorem.

M07.C-G.1.1.4 Describe the two-dimensional figures that result from slicing three-dimensional figures.

M07.C-G.2.1.1 Identify and use properties of supplementary, complementary, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.

M07.C-G.2.1.2 Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding).

M07.C-G.2.2.1 Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.

M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.

M08.C-G.1.1.1 Identify and apply properties of rotations, reflections, and translations. Example: Angle measures are preserved in rotations, reflections, and translations.

M08.C-G.1.1.2 Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them.

M08.C-G.1.1.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.

M08.C-G.1.1.4 Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them.

		<p><i>M08.C-G.2.1.1 Apply the converse of the Pythagorean theorem to show a triangle is a right triangle.</i></p> <p><i>M08.C-G.2.1.2 Apply the Pythagorean theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. (Figures provided for problems in three dimensions will be consistent with Eligible Content in grade 8 and below.)</i></p> <p><i>M08.C-G.2.1.3 Apply the Pythagorean theorem to find the distance between two points in a coordinate system.</i></p> <p><i>M08.C-G.3.1.1 Apply formulas for the volumes of cones, cylinders, and spheres to solve real-world and mathematical problems. Formulas will be provided.</i></p>
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Stage 2 – Evidence	
NETS for Students	PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p><i>Examples include but are not limited to:</i> <i>Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)</i></p> <p>List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4):</p> <ul style="list-style-type: none"> <i>* Students will use manipulatives to find patterns and relationships of two-dimensional figures.</i> <i>* Students will find the surface area by converting three-dimensional shapes into two dimensional representations</i> <i>* Students can apply area and surface of 2-dimensional figures to solve interior design problems or surface area and volume of 3-dimensional figures to solve architectural problems</i> <hr/> <p>OTHER SUMMATIVE ASSESSMENTS—can include factual recall</p> <p><i>Examples include but are not limited to final projects, research papers, quizzes and tests.</i></p> <p>List the assessments: <i>Quizzes and tests</i></p> <p><i>Charitable Donations Activity. Students will be given the scenario that they are helping to send out donations to local charities. They will be given dimensions of boxes (rectangular prisms) they will use to send various items. Students will</i></p>

	<i>investigate dimensions of items to donate that are in the form of cylinders, cones and spheres (soup cans, oranges, ice cream cones, etc.) and determine how many of each item can fit in a box. This would be a summative assessment of volume of 3D figures.</i>
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Stage 3 – Learning Plan		
NETS for Students	Learning Activities	Progress Monitoring/Formative Assessment
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>Questions to consider while planning:</p> <ul style="list-style-type: none"> • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students? 	<ul style="list-style-type: none"> • How will you monitor students’ progress toward acquisition, meaning, and transfer during learning activities? Daily assessments, teacher observation of student in-class performance, teacher observation during peer share-out sessions • What are potential rough spots and student misunderstandings? Using Pythagorean Theorem to check for a right triangle using the hypotenuse and one leg. Differentiating between rotations, dilations, translations, and reflections. Applying incorrect formulas to find surface area and volume. Choosing the incorrect units for final answers. Decomposing a compound figure into correct geometric shapes to find surface area and volume. Set up incorrect proportions to determine if figures are similar • How will students get the feedback they need? Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	<p>List planned activities <i>(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):</i></p>	<p>List resources required <i>(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)</i></p>
	<p>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.</p> <p><i>Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb</i></p>	

	<p>Charitable Donations Activity. Students will be given the scenario that they are helping to send out donations to local charities. They will be given dimensions of boxes (rectangular prisms) they will use to send various items. Students will investigate dimensions of items to donate that are in the form of cylinders, cones and spheres (soup cans, oranges, ice cream cones, etc.) and determine how many of each item can fit in a box. This would be a summative assessment of volume of 3D figures.</p> <p>worksheets, homework from textbook, Study Island, interactive textbook quizzes</p>	<p>Textbook, laptops, whiteboards, document cameras, calculators, geometric solids, geometric net figures, geoboards, rulers,</p>	<p>interactive textbook quizzes, Study Island, mini whiteboards</p>
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Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1A**
Teacher Team: **Mays, Baranek**

Unit: **Unit 7-Data Analysis**

Grades: **8**
Date: **January, 2016**

Stage 1 – Desired Results

Established Goals	Enduring Understandings/Transfer
<p>1. What 21st Century Essentials included in the mission statement will this unit address? <i>Transfer of Learning</i> <i>Career Planning and Life-Long Learning</i> <i>Problem-solving</i></p> <p>2. What content standards will this unit address?</p> <ul style="list-style-type: none"> • ELA PA Core State Standards • Math PA Core State Standards CC.2.4.6.B.1 Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions. CC.2.4.7.B.3 Investigate chance processes and develop, use, and evaluate probability models. CC.2.4.8.B.1 Analyze and/or interpret bivariate data displayed in multiple representations. 	<p>Written as a declarative statement, an enduring understanding is a “big idea” that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.</p> <p>3. List the Enduring Understanding(s): <i>a. Students will make prediction based on linear models</i> <i>b. Students will be able to analyze single and graph single variable data using measures of central tendency, box and whisker plots, histogram, circle graphs and stem and leaf diagrams</i> <i>c. Students will be able to create and understand the significance of a line of best fit.</i></p> <p>4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer? <i>a. Students will make sense of and persevere in solving complex and novel mathematical problems.</i> <i>b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.</i> <i>c. Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.</i> <i>d. Students will apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions.</i> <i>e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies</i> <i>f. Given a word problem, students will solve the word problem using an appropriate strategy or strategies and will share and compare the use of multiple strategies leading to the same answer.</i></p>
<p>CC.2.4.8.B.2 Understand that patterns of association can be seen in bivariate data utilizing</p>	<p style="text-align: center;">Essential Questions</p> <p>What thought-provoking questions will foster inquiry, meaning-making, and transfer?</p> <p>5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit: <i>a. How can collecting and analyzing data help you make decisions or predictions?</i> <i>b. How can you make and interpret different presentations of data?</i></p>

<p>frequencies.</p> <p>CC.2.4.HS.B.1 Summarize, represent, and interpret data on a single count or measurement variable.</p> <p>CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.</p> <p>CC.2.4.HS.B.3 Analyze linear models to make interpretations based on the data.</p> <p>CC.2.4.HS.B.4 Recognize and evaluate random processes underlying statistical experiments.</p> <p>CC.2.4.HS.B.5 Make inferences and justify conclusions based on sample surveys, experiments, and observational studies.</p> <p>CC.2.4.HS.B.7 Apply the rules of probability to compute probabilities of compound events in a uniform probability model</p> <ul style="list-style-type: none"> • PA Content Standards 	Acquisition	
<p>Students will know...</p> <p>6. What facts should students know and be able to use to gain further knowledge? <i>How to calculate measures of central tendency, what each of the types of graphs look like, how to find the equation of a line given 2 points</i></p> <p>7. What vocabulary should students know and be able to recall? <i>Tier 2:</i> <i>apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model</i></p> <p><i>Tier 3:</i> <i>mean, mode, median, range, data, outlier, analyze, predict, numeric, categorical, line of best fit</i></p> <p>8. What basic concepts should students know and be able to recall and apply? <i>How to create each of the plots -line of best fit, box and whisker, stem and leaf and histogram</i></p>	<p>Students will be skilled at... (be able to do)</p> <p>9. What discrete skill and processes should students be able to demonstrate? <i>M07.D-S.2.1.1 Compare two numerical data distributions using measures of center and variability.</i> <i>M08.D-S.1.1.1 Construct and interpret scatter plots for bivariate measurement data to investigate patterns of association between two quantities. Describe patterns such as clustering, outliers, positive or negative correlation, linear association, and nonlinear association.</i> <i>M08.D-S.1.1.2 For scatter plots that suggest a linear association, identify a line of best fit by judging the closeness of the data points to the line.</i> <i>M08.D-S.1.1.3 Use the equation of a linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.</i> <i>M08.D-S.1.2.1 Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible associations between the two variables.</i> <i>A1.1.1.4.1 Use estimation to solve problems.</i> <i>A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.</i> <i>A1.2.1.2.2 Translate from one representation of a linear function to another (i.e., graph, table, and equation).</i> <i>A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems.</i> <i>A1.2.2.2.1 Draw, identify, find, and/or write an equation for a line of best fit for a scatter plot.</i> <i>A1.2.3.1.1 Calculate and/or interpret the range,</i></p>	

		<p>quartiles, and interquartile range of data.</p> <p>A1.2.3.2.1 Estimate or calculate to make predictions based on a circle, line, bar graph, measure of central tendency, or other representation.</p> <p>A1.2.3.2.2 Analyze data, make predictions, and/or answer questions based on displayed data (box - andwhisker plots, stem - and - leaf plots, scatter plots, measures of central tendency, or other representations).</p> <p>A1.2.3.2.3 Make predictions using the equations or graphs of best - fit lines of scatter plots</p>
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Stage 2 – Evidence	
NETS for Students	PERFORMANCE TASK(S)—can include transfer tasks and Project-Based Learning
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i></p> <p><i>Technology Operations</i></p> <p><i>Select</i></p> <p><i>Select</i></p> <p><i>Select</i></p> <p><i>Select</i></p>	<p><i>Examples include but are not limited to:</i></p> <p><i>Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)</i></p> <p>List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4):</p> <p><i>Participate in Discussion board responding to teacher created prompts</i></p> <p><i>Project of real life data that require creating each of the types of graphs</i></p> <p><i>Line of best fit project using real life data to make predictions, helping students to understand what the slope and intercept mean in real life</i></p>
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	<p><i>Examples include but are not limited to final projects, research papers, quizzes and tests.</i></p> <p>List the assessments:</p> <p><i>Quizzes and Tests</i></p>

Stage 3 – Learning Plan		
NETS for Students	Learning Activities	Progress Monitoring/Formative Assessment

<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i> <i>Select</i> <i>Select</i> <i>Select</i> <i>Select</i></p>	<p>Questions to consider while planning:</p> <ul style="list-style-type: none"> • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students? 		<ul style="list-style-type: none"> • How will you monitor students’ progress toward acquisition, meaning, and transfer during learning activities? Daily assessments, teacher observation of students in-class performance, teacher observation during peer share-out sessions • What are potential rough spots and student misunderstandings? Mixing up the different types of graphs, not doing a weighted average when data isn't listed in individual units, When creating a line of best fit -- trying to read the y-intercept off the graph, when creating a line of best fit -- choosing any two points to use to calculate the line instead of the ones that the line actually goes through • How will students get the feedback they need? Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	<p>List planned activities <i>(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):</i></p> <p>Stock Market Activity – Find the closing price of a stock at the end of each month over a period of time. Students will create a line of best fit finding slope, y-intercept, etc. Students will make predictions based on their research.</p> <p>Students will create a scatter plot of values comparing the</p>	<p>List resources required <i>(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)</i></p> <p>Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software</p>	<p>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.</p> <p><i>Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb</i></p> <p>interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative</p>

	<p>average unit of measure (weight in pounds, height in inches, etc.) to the age of a species at that point (ex: a baby at 3 months, 6 months, 9 months, etc.). Each student will then describe the relationship between the values if any exists.</p> <p>worksheets, homework from textbook, Study Island, interactive textbook quizzes</p>		
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Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1A**
Teacher Team: **Mays, Baranek**

Unit: **8--Probability**

Grades: **8**
Date: **January, 2016**

Stage 1 – Desired Results	
Established Goals	Enduring Understandings/Transfer
<p>1. What 21st Century Essentials included in the mission statement will this unit address? <i>Transfer of Learning</i> <i>Career Planning and Life-Long Learning</i> <i>Problem-solving</i></p> <p>2. What content standards will this unit address?</p> <ul style="list-style-type: none"> • ELA PA Core State Standards • Math PA Core State Standards CC.2.2.7.B.3 Model and solve real - world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. CC.2.4.7.B.3 Investigate chance processes and develop, use, and evaluate probability models. CC.2.4.HS.B.4 Recognize and evaluate random processes underlying statistical experiments. CC.2.4.HS.B.7 Apply the rules of probability to compute probabilities. CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems. CC.2.1.HS.F.2 Apply properties of 	<p>Written as a declarative statement, an enduring understanding is a “big idea” that focuses on larger concepts, principles, and processes that go beyond discrete facts or skills. Enduring Understandings are applicable to new situations across content areas and TRANSFERABLE (the ability to learn in one context and apply to a new situation, particularly outside of the classroom) to the real world.</p> <p>3. List the Enduring Understanding(s):</p> <ul style="list-style-type: none"> a. <i>Students will recognize compound and conditional probability and be able to calculate them based on various situations.</i> a. <i>Students will recognize independent versus dependent situations</i> <p>4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?</p> <ul style="list-style-type: none"> a. <i>Students will make sense of and persevere in solving complex and novel mathematical problems.</i> b. <i>Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.</i> c. <i>Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.</i> d. <i>Students will apply mathematical knowledge to analyze and model situations/relationships using multiple representations and appropriate tools in order to make decisions, solve problems, and draw conclusions.</i> e. <i>Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies</i> f. <i>Given a word problem, students will solve the word problem using an appropriate strategy or strategies and will share and compare the use of multiple strategies leading to the same answer.</i>
	Essential Questions
	<p>What thought-provoking questions will foster inquiry, meaning-making, and transfer?</p> <p>5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:</p> <ul style="list-style-type: none"> a. <i>How do I recognize the difference between a problem with simple, compound or conditional probability?</i> b. <i>How is probability used in every day life?</i> c. <i>How can I distinguish between a Permutation and a Combination?</i>

rational and irrational numbers to solve real world or mathematical problems. • PA Content Standards	Acquisition	
	Students will know...	Students will be skilled at... (be able to do)
	6. What facts should students know and be able to use to gain further knowledge? <i>addition and multiplication of fractions and decimals</i> 7. What vocabulary should students know and be able to recall? <i>Tier 2:</i> <i>apply, distinguish, estimate, compare, contrast, develop, understand, analyze, define, determine, identify, perform, derive, interpret, compare, construct, describe, extend, represent, extend, explain, represent, create, relationships, display, simplify, inferences, predict, model</i> <i>Tier 3:</i> <i>total number of outcomes, desired number of outcomes, ratios, percents, decimal, simple, compound, conditional</i> 8. What basic concepts should students know and be able to recall and apply? <i>difference between conditional and compound probability, sum of all probabilities add to zero</i>	9. What discrete skill and processes should students be able to demonstrate? <i>M07.D-S.3.1.1 Predict or determine whether some outcomes are certain, more likely, less likely, equally likely, or impossible (i.e., a probability near 0 indicates an unlikely event, a probability around 1/2 indicates an event that is neither unlikely nor likely, and a probability near 1 indicates a likely event).</i> <i>M07.D-S.3.2.1 Determine the probability of a chance event given relative frequency. Predict the approximate relative frequency given the probability.</i> <i>M07.D-S.3.2.2 Find the probability of a simple event, including the probability of a simple event not occurring.</i> <i>M07.D-S.3.2.3 Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation.</i> <i>M08.D-S.1.2.1 Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies calculated for rows or columns to describe possible associations between the two variables. .</i> <i>A1.1.1.4.1 Use estimation to solve problems.</i> <i>A1.2.3.3.1 Find probabilities for compound events (e.g., find probability of red and blue, find probability of red or blue) and represent as a fraction, decimal, or percent</i>

Stage 2 – Evidence	
NETS for Students	PERFORMANCE TASK(S) —can include transfer tasks and Project-Based Learning
NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills	<i>Examples include but are not limited to:</i> <i>Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)</i>

<p>and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>List the task(s), then explain how the student will demonstrate the transfer of knowledge or skill involved in the task(s) (reference Stage 1, Item #4):</p> <p><i>Participate in Discussion board responding to teacher created prompts</i> <i>Participate in an experiment to show difference between experimental and theoretical probability</i></p>
	<p>OTHER SUMMATIVE ASSESSMENTS—can include factual recall</p>
	<p><i>Examples include but are not limited to final projects, research papers, quizzes and tests.</i></p> <p>List the assessments: <i>Quizzes and Tests</i></p>

Stage 3 – Learning Plan		
NETS for Students	Learning Activities	Progress Monitoring/Formative Assessment
<p>NETS—National Educational Technology Standards; i.e., the standards for evaluating the skills and knowledge students need to learn effectively and live productively in an increasingly global and digital world.</p> <p><i>Critical Thinking</i> <i>Technology Operations</i></p>	<p>Questions to consider while planning:</p> <ul style="list-style-type: none"> • Are transfer and acquisition addressed in the learning plan? • Does the learning plan reflect principles of learning and best practices? • Is there tight alignment with Stages 1 and 2? • Is the plan likely to be engaging and effective for all students? 	<ul style="list-style-type: none"> • How will you monitor students’ progress toward acquisition, meaning, and transfer during learning activities? Daily assessments, teacher observation of students in-class performance, teacher observation during peer share-out sessions • What are potential rough spots and student misunderstandings? Students don’t understand the difference between theoretical and experimental probability, mixing up conditional and compound probability • How will students get the feedback they need? Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	<p>List planned activities <i>(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):</i></p> <p>Students will participate in the following activity that provides learning experiences and discussions</p>	<p>List resources required <i>(examples include but are not limited to: laptops, iPads, websites, digital cameras, magazines, Blackboard, textbooks, novels, primary source documents, other non-fiction text, lab equipment, maps, translator, calculators)</i></p> <p>Textbook, laptops, whiteboard, graph paper</p>

	<p>for probability, fractions, decimals, and percents. Participants will randomly draw any two marbles from a can that contains two red and three white marbles. The marbles may be chosen one at a time, or together at the same time. If chosen one at a time, the first marble chosen may not be returned to the can before the second one is chosen. Results will be recorded by students on a data sheet. The expected probabilities and the actual results will be compared after the experiment is conducted for a generous number of times.</p> <p>worksheets, homework from textbook, Study Island, interactive textbook quizzes</p>	<p>white boards, on-line text book/answer key, document camera, calculators, Grapher software</p>	
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