Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **1-Foundations** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results	
Established Goals	**Enduring Understandings/Transfer**
1. What 21st Century Essentials included in the mission statement will this unit address? *Transfer of Learning* *Career Planning and Life-Long Learning* *Problem-solving* 2. What content standards will this unit address? • 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	**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.** 3. List the Enduring Understanding(s): *a. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.* *b. Mathematical relationships among numbers can be represented, compared, estimated, and communicated.* *c. Real number properties apply to numbers and variables in all situations.* *d. Mathematical relationships can be represented as expressions, equation, and inequalities in mathematical situations.* *e. Numerical quantities and calculations an be estimated or analzyed by using appropriate startegies and tools.* *f. Matrices are a way to show data and operations can be performed on them (add, subtract, scalar multiples)* 4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer? *a. Students will make sense of and persevere in solving complex and novel mathematical problems.* *b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.* *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.* *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.* *e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies* *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.*

rational and irrational numbers to solve real - world or mathematical problems.

- PA Content Standards

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. How are properties of real numbers used to simplify expressions?
   b. How can you represent quantities, patterns, and relationships?
   c. How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?

Acquisition

Students will know...

6. What facts should students know and be able to use to gain further knowledge?
   Integer operations

7. What vocabulary should students know and be able to recall?
   Tier 2:
   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

   Tier 3:
   additive inverse, algebraic expression, coefficient, evaluate expressions, integers, like terms, order of operations, real numbers, simplify, term, variable, compare

8. What basic concepts should students know and be able to recall and apply?
   Recognize like terms, evaluate and write variable expressions and equations,

Students will be skilled at... (be able to do)

9. What discrete skill and processes should students be able to demonstrate?
   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
   M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.
   (Only If taught in 7th grade)M07.A-N.1.1.2 Represent addition and subtraction on a horizontal or vertical number line.
   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.
   M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients.
   M07.B-E.2.1.1 Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate.
   M07.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem.
   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)..

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *Participate in Discussion Board responding to teacher created prompts* *Generate equations and representations that can be used to solve word problems and check for reasonableness of solutions.*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
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. *Critical Thinking* *Technology Operations*	Questions to consider while planning: • 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?	• **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 x^2 are not like terms Adding like terms -- keeping the signs with • **How will students get the feedback they need?** Graded assessment, teacher observation immediate

			feedback, peer feedback, mid-chapter quiz
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: 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. worksheets, homework from textbook, Study Island, interactive textbook quizzes	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **2-Equations and Inequalities** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results	
Established Goals	**Enduring Understandings/Transfer**
1. What 21st Century Essentials included in the mission statement will this unit address? *Transfer of Learning* *Career Planning and Life-Long Learning* *Problem-solving* 2. What content standards will this unit address? • 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.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions. CC.2.2.8.B.2 Understand the connections between proportional relationships, lines, and linear equations. CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous	**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.** 3. List the Enduring Understanding(s): *a. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.* *b. Obtaining a solution to an equation no matter how complex, always involves the process of undoing operations.* *c. Real World situations can be modeled and solved by using equations and inequalities.* *d. Equations may have one solution, no solution, or infinitely many solutions.* *e. Inequalities have a set of solutions, which are sometimes graphed on a number line. Inequalities can also have no solution.* *f. Compound inequalities and absolute value inequalities can be solved by graphing each simple inequality that is represented.* *g. Literal equations are solved just like regular algebraic equations, isolating the desired variable.* 4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer? *a. Students will make sense of and persevere in solving complex and novel mathematical problems.* *b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.* *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.* *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.* *e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies* *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.*

linear equations.
CC.2.2.8.C.1 Define, evaluate, and compare functions.
CC.2.2.8.C.2 Use concepts of functions to model relationships between quantities.
CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems
CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable.
CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method.
CC.2.2.HS.D.10 Represent, solve, and interpret equations/inequalities and systems of equations algebraically and graphically.
CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real-world or mathematical problems.

- PA Content Standards

g. Students will recognize and solve real life problems with a given unit rate and fixed cost.
h. 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.

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. What kind of relationships can proportions represent?
   b. How can equations or inequalities that appear to be different be equivalent?
   c. How can you solve equations and inequalities?

Acquisition

Students will know...

6. What facts should students know and be able to use to gain further knowledge?
   When you divide or multiply by a negative number, the inequality sign switches directions

7. What vocabulary should students know and be able to recall?
   Tier 2:
   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

   Tier 3:
   distribute, combine like terms, simplify, variable,conversion factor, cross products, equivalent equations, formula, inverse operations, literal equation, percent change, proportion, rate, ratio, scale, unit analysis, compound inequality, disjoint sets, empty set, equivalent inequalities, intersection, interval notation, roster form, set-builder notation, union, universal set,equal sign,

Students will be skilled at... (be able to do)

9. What discrete skill and processes should students be able to demonstrate?
   A1.1.2.1.1 Write, solve, and/or apply a linear equation (including problem situations).
   A1.1.2.1.2 Use and/or identify an algebraic property to justify any step in an equation - solving process. Note: Linear equations only.
   A1.1.3.1.1 Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities).
   A1.1.3.1.2 Identify or graph the solution set to a linear inequality on a number line.
   A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear inequalities only.
   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.
   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.
   M07.A-R.1.1.2 Determine whether two quantities are proportionally related (e.g., by testing for

	expression, left side, right side, identify variable, plan algebraic moves, arrive at a solution with the variable by itself, inequality signs, expressions, left side, right side, less than, greater than, less than or equal to, greater than or equal to, check process, express variable by itself 8. What basic concepts should students know and be able to recall and apply? *If there are variables on both sides, you must move one of the variable to the other side.* *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.* *An absolute value inequality should be split into a compound inequality*	*equivalent ratios in a table, graphing on a coordinate plane and observing whether the graph is a straight line through the origin).* *M07.A-R.1.1.3 Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.* *M07.A-R.1.1.4 Represent proportional relationships by equations.* *M07.A-R.1.1.5 Explain what a point (x,y) on the graph of a proportional relationship means in terms of the situation, with special attention to the points (0,0) and (1,r), where r is the unit rate.* *M07.A-R.1.1.6 Use proportional relationships to solve multi-step ratio and percent problems.* *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.* *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.* *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.* *(Only if taught in 7th grade) M07.C-G.1.1.3 Use and apply the triangle inequality theorem.* *(Only if taught in 7th grade) M07.C-G.1.1.4 Describe the two-dimensional figures that result from slicing three-dimensional figures. Example: Describe plane sections of right rectangular prisms and right rectangular pyramids.* *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.* *(Only if taught in 7th grade) 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.*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): ** Participate in Discussion board responding to teacher created prompts* ** Students sort equations into 3 categories -- one solution, no solution, or infinitely many solutions. They show work and then critique others work* ** Students will write and solve equations from word problems and then test for reasonableness of answers, including rounding up or down, as appropriate* ** Checks and Balances project (HS)*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
NETS—National Educational	Questions to consider while planning:	• **How will you monitor students' progress toward**

<table>
<tr>
<td rowspan="2">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.

Critical Thinking
Technology Operations</td>
<td colspan="2">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?</td>
<td>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 x^2 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 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</td>
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<td>List planned activities
(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):

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</td>
<td>List resources required
(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)
Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document</td>
<td>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.

Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb

interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative</td>
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</table>

	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. Students will need to plan a party inviting a set number of people and setting up a budget. Each student will need to determine how many people they can invite to the party. There will be a limit, as the budget itself is limited. worksheets, homework from textbook, Study Island, interactive textbook quizzes	camera, calculators, Grapher software	

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **3- Linear Functions** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results	
Established Goals	**Enduring Understandings/Transfer**
1. What 21st Century Essentials included in the mission statement will this unit address? *Transfer of Learning* *Career Planning and Life-Long Learning* *Problem-solving* 2. What content standards will this unit address? • 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.2.2.8.B.2 Understand the connections between proportional relationships, lines, and linear equations. CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous	**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.** 3. List the Enduring Understanding(s): *a. How can you represent and describe functions?* *b. Can functions describe real-world situations?* *c. How can you make predictions based on a scatter plot?* *d. What information does the equation of a line give you?* *e. What does the slope of a line indicate about the line?* *f. A line on a graph can be represented by a linear equation.* *g. The equation of a line can be written in multiple forms.* *h. The relationship between two lines can be determined by comparing their slopes and y-intercepts.* 4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer? *a. Students will make sense of and persevere in solving complex and novel mathematical problems.* *b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.* *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.* *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.* *e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies*

linear.
CC.2.2.8.C.1 Define, evaluate, and compare functions.
CC.2.2.8.C.2 Use concepts of functions to model relationships between quantities.
CC.2.2.HS.C.1 Use the concept and notation of functions to interpret and apply them in terms of their context.
CC.2.2.HS.C.2 Graph and analyze functions and use their properties to make connections between the different representations.
CC.2.2.HS.C.3 Write functions or sequences that model relationships between two quantities.
CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.
CC.2.1.HS.F.3 Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
CC.2.1.HS.F.4 Use units as a way to understand problems and to guide the solution of multi‐step problems.
CC.2.2.HS.C.6 Interpret functions in terms of the situations they model.
CC.2.2.HS.C.5 Construct and compare linear, quadratic, and exponential models to solve problems.

- PA Content Standards

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. *How can you represent and describe functions?*
   b. *How can functions describe real-world situations?*
   c. *How can you make predictions based on a scatter plot?*
   d. *How does the shape of a graph and the manipulation of a parameter represent the real world situation?*

Acquisition

Students will know...

6. What facts should students know and be able to use to gain further knowledge?
   Lines can have a positive slope /
   *Lines can have a negative slope *
   Lines can have a slope of zero (horizontal line)
   Lines can have no slope (vertical line)
   The best way to graph a line is using slope-intercept form
   f(x) is the same as y

7. What vocabulary should students know and be able to recall?
   Tier 2:
   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

   Tier 3:
   translate, derive the equation, continuous graph, dependent variable, independent variable, discrete graph, domain, range, function notation, linear, non-linear, relation, sequence, direct variation, linear equation, parallel lines, perpendicular lines, point-slope form, rate of change, slope, slope-intercept form, standard form, trend line, x-

Students will be skilled at... (be able to do)

9. What discrete skill and processes should students be able to demonstrate?
   A1.1.2.1.1 Write, solve, and/or apply a linear equation (including problem situations).
   A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear equations only.
   A1.1.2.2.2 Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear equations.
   A1.2.1.1.2 Determine whether a relation is a function, given a set of points or a graph.
   A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table)
   A1.2.1.2.1 Create, interpret, and/or use the equation, graph, or table of a linear function.
   A1.2.1.2.2 Translate from one representation of a linear function to another (i.e., graph, table, and equation).
   A1.2.2.1.1 Identify, describe, and/or use constant rates of change.
   A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems.
   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:

	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? *Students will graph a line in standard and slope-intercept form* *Students will calculate the equation of a line given appropriate information* *Students will check to see if a solution is valid* *Students will calculate intercepts* *Students will recognize the difference between linear and non-linear equations* *Students will create a line of best fit* *Students will calculate parallel and perpendicular lines*	*Linear equation may be in point ‑ slope, standard, and/or slope ‑ intercept form.* *A1.2.2.1.4 Determine the slope and/or y ‑ intercept represented by a linear equation or graph* *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.* *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.* *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.* *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).* *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.* *M08.B-E.3.1.3 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.* *M08.B-F.1.1.1 Determine whether a relation is a function.* *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 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.*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *a. Participate in discussion boards* *b. Students explain how to verify that a relationship is a function* *c. 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.* *d. Students translate functions numerically, graphically, verbally, and algebraically* *e. Students gather their own data or graphs in context they understand and interpret the data and graphs in terms of equations, using correct terminology*

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

Stage 3 – Learning Plan			
NETS for Students	**Learning Activities**		**Progress Monitoring/Formative Assessment**
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. *Critical Thinking* *Technology Operations*	Questions to consider while planning: • 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?		• **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 • **How will students get the feedback they need?** Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: 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.	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

	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. worksheets, homework from textbook, Study Island, interactive textbook quizzes		

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **4-Systems of Equations & Inequalities** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Transfer of Learning
   Career Planning and Life-Long Learning
   Problem-solving

2. What content standards will this unit address?

   - 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.2.2.8.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 systems of equations/inequalities algebraically and graphically.

Enduring Understandings/Transfer

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.

3. List the Enduring Understanding(s):
   a. *Systems of linear equations and inequalities can be used to model problems.*
   b. *Systems of equations can be solved by graphing, substitution, or elimination.*
   c. *Solutions to systems of equations can vary from no solution to infinite solutions.*
   d. *Solutions to systems of inequalities must be graphed.*
   e. *Solutions to systems of equations and inequalities must be interpreted within the context of the problem.*

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   a. *Students will make sense of and persevere in solving complex and novel mathematical problems.*
   b. *Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.*
   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.*
   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.*
   e. *Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies*
   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.*

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. *How can you solve a system of equations or inequalities?*
   b. *How can systems of equations or inequalities model real-world situations?*
   c. *How do you decide which method would be easier to solve a particular system of equations?*

CC.2.1.HS.F.5 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.
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.

- PA Content Standards

Acquisition

Students will know...

6. What facts should students know and be able to use to gain further knowledge?
   How to graph a line
   LCM in order to use elimination

7. What vocabulary should students know and be able to recall?
   Tier 2:
   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

   Tier 3:
   elimination method, substitution method, inconsistent, independent, dependent, linear inequality, solution of a system of linear equations/inequalities, mixture, break-even point, table of x and y values, ordered pairs of coordinates, changes in x and y values, points plotted in a line, sections on coordinate plane created by intersecting lines, test points from each section

8. What basic concepts should students know and be able to recall and apply?
   Solve a system using elimination, substitution, and graphing
   Students will know how to choose which method to use

Students will be skilled at... (be able to do)

9. What discrete skill and processes should students be able to demonstrate?
   A1.1.2.1.1 Write, solve, and/or apply a linear equation (including problem situations).
   A1.1.2.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear equations only.
   A1.1.2.2.1 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.
   A1.1.2.2.2 Interpret solutions to problems in the context of the problem situation. Note: Limit systems to two linear equations.
   A1.1.3.1.1 Write or solve compound inequalities and/or graph their solution sets on a number line (may include absolute value inequalities).
   A1.1.3.1.3 Interpret solutions to problems in the context of the problem situation. Note: Linear inequalities only.
   A1.1.3.2.1 Write and/or solve a system of linear inequalities using graphing. Note: Limit systems to two linear inequalities.
   A1.1.3.2.2 Interpret solutions to problems in the context of the problem situation.
   Note: Limit systems to two linear inequalities.
   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).
   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.

		M08.B-E.3.1.3 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. *M08.B-E.3.1.4 Solve systems of two linear equations in two variables algebraically and estimate solutions by graphing the equations. Solve simple cases by inspection* *M08.B-E.3.1.5 Solve real-world and mathematical problems leading to two linear equations in two variables.*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *a. Participate in Discussion board responding to teacher created prompts* *b. Generate equations and representations that can be used to solve word problems and check for resonableness of solutions.* *c. 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*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
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.	Questions to consider while planning: • 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	• **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**

Critical Thinking *Technology Operations*	students?		**misunderstandings?** f students try to subtract the equations for elimination, they lose negative signs Some students struggle to find the LCM for elimination 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 • **How will students get the feedback they need?** Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: 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. worksheets, homework from textbook, Study Island, interactive textbook quizzes	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **5-Exponents** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Transfer of Learning
   Career Planning and Life-Long Learning
   Problem-solving

2. What content standards will this unit address?

   - ELA PA Core State Standards

   - Math PA Core State Standards
     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.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations.
     CC.2.3.7.A.1 Solve read-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
     CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties.
     CC.2.1.8.E.4 Estimate irrational numbers

Enduring Understandings/Transfer

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.

3. List the Enduring Understanding(s):
   a. Squaring a number and finding the square root are inverse operations. Likewise, cubing and cube rooting are inverse operations
   b. The square root of a non-perfect square is an irrational number
   c. In scientific notation, f the exponent increases by one, the value increases by ten.

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   a. Students will make sense of and persevere in solving complex and novel mathematical problems.
   b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.
   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.
   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.
   e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies
   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.

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. How do you compare numbers in scientific notation -- with and without calculators?
   b. How does the use of exponents make representing quantities more efficient?

	Acquisition	
by comparing them to rational numbers. CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions. CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real world and mathematical problems. CC.2.3.8.A.3 Understand and apply the Pythagorean Theorem to solve problems. 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. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method. • PA Content Standards	**Students will know...** 6. What facts should students know and be able to use to gain further knowledge? *a. Numbers between 0 and 1 have a negative exponent* *b. Numbers greater than one have a positive exponent* *c. To multiply numbers with the same base, add the exponents* *d. To divide numbers with the same base, subtract the exponents* 7. What vocabulary should students know and be able to recall? *Tier 2:* *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* *Tier 3:* *scientific notation, exponent, square root, cube root, rational, irrational,* 8. What basic concepts should students know and be able to recall and apply? *a. Change numbers from scientific notation to regular form and vice versa* *b. Convert a repeating number into a fraction* *c. Multiply and divide expressions in exponent form* *d. Simplify square roots* *e. Estimate square roots and cube roots and compare them*	**Students will be skilled at... (be able to do)** 9. What discrete skill and processes should students be able to demonstrate? *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* *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.* *M08.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.* *M08.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 × 109)..*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *a. Participate in Discussion board responding to teacher created prompts* *b. Students will represent positive and negative exponents in a table to find patterns and relationships.* *c. Students will apply exponential skills to solve problems such as bacteria growth, radioactive decay, population growth, and compound interest*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
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. *Critical Thinking* *Technology Operations*	Questions to consider while planning: • 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?	• **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

			Not converting an answer to proper scientific notation • **How will students get the feedback they need?** Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: Penny problem. Students will begin to understand how exponential growth works in the real world, and see how quickly doubling something over time can greatly increase its value. (Ex: Save one penny day one, twice as many day two, twice as many on day three as day two, etc.) worksheets, homework from textbook, Study Island, interactive textbook quizzes	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **6 Radicals** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Transfer of Learning
   Career Planning and Life-Long Learning
   Problem-solving

2. What content standards will this unit address?

   - ELA PA Core State Standards

   - Math PA Core State Standards
     CC.2.3.7.A.1 Solve real-world and mathematical problems involving angle measure, area, surface area, circumference, and volume.
     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.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers.
     CC.2.1.8.E.1 Distinguish between rational and irrational numbers using their properties.

Enduring Understandings/Transfer

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.

3. List the Enduring Understanding(s):
   a. Radicals can be Simplified
   b. Operations can performed on radicals (addition, subtraction, multiplication, division)
   c. The Pythagorean theorem is used to find the missing portion of a right triangle.

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   a. Students will make sense of and persevere in solving complex and novel mathematical problems.
   b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.
   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.
   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.
   e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies
   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.

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. How and why do you simplify radicals?
   b. How can you solve a radical equation?

	Acquisition	
CC.2.1.8.E.4 Estimate irrational numbers by comparing them to rational numbers. CC.2.2.8.B.1 Apply concepts of radicals and integer exponents to generate equivalent expressions. CC.2.3.8.A.1 Apply the concepts of volume of cylinders, cones, and spheres to solve real world and mathematical problems. CC.2.3.8.A.3 Understand and apply the Pythagorean Theorem to solve problems. CC.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real-world or mathematical problems. CC.2.1.HS.F.1 Apply and extend the properties of exponents to solve problems with rational exponents. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method. • PA Content Standards	**Students will know...** 6. What facts should students know and be able to use to gain further knowledge? *a. Multiplication facts,* *b. Squares* 7. What vocabulary should students know and be able to recall? *Tier 2:* *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* *Tier 3:* *conditional, conjugates, extraneous solution, hypotenuse, Pythagorean Theorem, radical expression, like radicals, square root functions, trigonometric ratios, square numbers, cube numbers, integer square roots, integer cube roots,* 8. What basic concepts should students know and be able to recall and apply? *Recognize like terms, evaluate and write variable expressions and equations,*	**Students will be skilled at... (be able to do)** 9. What discrete skill and processes should students be able to demonstrate? *A1.1.1.1.2 Simplify square roots (e.g., $\sqrt{24} = 2\sqrt{6}$).* *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* *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).* *M08.A-N.1.1.2 Convert a terminating or repeating decimal to a rational number (limit repeating decimals to thousandths).* *M08.A-N.1.1.3 Estimate the value of irrational numbers without a calculator (limit whole number radicand to less than 144).* *M08.A-N.1.1.4 Use rational approximations of irrational numbers to compare and order irrational numbers.* *M08.A-N.1.1.5 Locate/identify rational and irrational numbers at their approximate locations on a number line.* *M08.B-E.1.1.2 Use square root and cube root symbols to represent solutions to equations of the form x2 = p and x3 = p, where p is a positive rational number. Evaluate square roots of perfect squares (up to and including 122).* *(Only in 8^{th} grade) M08.C-G.2.1.1 Apply the converse of the Pythagorean theorem to show a triangle is a right triangle.* *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.) *M08.C-G.2.1.3 Apply the Pythagorean theorem to find the distance between two points in a coordinate system.*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *a. Participate in Discussion board responding to teacher created prompts* *b Generate equations and representations that can be used to solve word problems and check for resonableness of solutions* *c Use the Pythagorean Theorem to solve real life problems.*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
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. *Critical Thinking* *Technology Operations*	Questions to consider while planning: • 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?	• **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?** Silly factoring mistakes (example 6 = 3*3 intead of 2*3) Adding instead of multiplying **How will students get the feedback they need?**

			Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: a Students will create a plan to tile a rectangular room in their house. The tiles in the room will be angled at 45 degrees so that the hypotenuse will form the perimeter of the room. b Students will need to calculate the amount of tile needed to complete the job based on the size of the room, and their tile preference. c. Students will come up with a plan to support a newly planted tree. Three strings will be stretched from the middle of the trunk down to a wooden support which is staked into the ground. d. Students will need to calculate how much string will be needed in total to support the newly planted tree. worksheets, homework from textbook, Study Island, interactive textbook quizzes	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **7-Polynomials** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Transfer of Learning
   Career Planning and Life-Long Learning
   Problem-solving

2. What content standards will this unit address?

   - ELA PA Core State Standards

   - Math PA Core State Standards
     CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
     CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
     CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
     CC.2.2.HS.D.5 Use polynomial identities to solve problems.
     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.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous linear equations.

Enduring Understandings/Transfer

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.

3. List the Enduring Understanding(s):
   a. *Polynomials can be added, subtracted, multiplied and divided.*
   b. *Polynomials can be named according to number of terms and degree.*

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   a. *Students will make sense of and persevere in solving complex and novel mathematical problems.*
   b. *Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.*
   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.*
   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.*
   e. *Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies*
   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.*

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. *How can two algebraic expressions that appear to be different be equivalent?*
   b. *How are the properties of real numbers related to polynomials?*

Acquisition

CC.2.2.8.C.1 Define, evaluate, and compare functions. CC.2.2.8.C.2 Use concepts of functions to model relationships between quantities. • PA Content Standards	**Students will know...** 6. What facts should students know and be able to use to gain further knowledge? *how to find the degree of a polynomial* *what is a term and how do I count them* 7. What vocabulary should students know and be able to recall? *Tier 2:* *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* *Tier 3:* *monomial, binomial, trinomial, polynomial, perfect square trinomial, standard form, degree of monomial/polynomial, perfect square trinomials, terms, like terms, positive, negative, simplify, add, subtract* 8. What basic concepts should students know and be able to recall and apply? *adding like terms, how to multiply monomials*	**Students will be skilled at... (be able to do)** 9. What discrete skill and processes should students be able to demonstrate? *A1.1.1.5.1 Add, subtract, and/or multiply polynomial expressions (express answers in simplest form).*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *Participate in Discussion board responding to teacher created prompts* *Generate equations and representations that can be used to solve word problems and check for reasonableness of solutions.*

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

Stage 3 – Learning Plan			
NETS for Students	**Learning Activities**		**Progress Monitoring/Formative Assessment**
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. *Critical Thinking* *Technology Operations*	Questions to consider while planning: • 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?		• **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?** forgetting to multiply each term of the polynomial by each term of the second polynomial • **How will students get the feedback they need?** Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: RONNETTE'S BALLOON ACTIVITY worksheets, homework from textbook, Study Island, interactive textbook quizzes	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **8- Quadratics** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Transfer of Learning
   Career Planning and Life-Long Learning
   Problem-solving

2. What content standards will this unit address?

   - ELA PA Core State Standards

   - Math PA Core State Standards
     CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
     CC.2.2.HS.D.5 Use polynomial identities to solve problems.
     CC.2.2.HS.D.1
     Interpret the structure of expressions to represent a
     quantity in terms of its context.

     CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.

     PA Content Standards

Enduring Understandings/Transfer

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.

3. List the Enduring Understanding(s):
   a. *Factoring quadratics when a=1 (a not equal to zero is optional)*
   b. *Find the GCF of a polynomial*
   c. *Find the zeros of a quadratic function*
   d. *Factoring special cases such as difference of squares and perfect squares*

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   a. *Students will make sense of and persevere in solving complex and novel mathematical problems.*
   b. *Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.*
   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.*
   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.*
   e. *Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies*
   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.*

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. *How can you solve a quadratic equation?*
   b. *How can you use functions to model real-world situations?*

	c. Why do we need to learn how to factor?	
	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? *GCF of numbers* 7. What vocabulary should students know and be able to recall? *Tier 2:* *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* *Tier 3:* *maximum, minimum, vertex, parabola, discriminant, quadratic equation, quadratic formula, quadratic function, root of an equation, completing the square, axis of symmetry, factoring, FOIL, zero product concept, parabola* 8. What basic concepts should students know and be able to recall and apply? *Find the GCF of a polynomial*	9. What discrete skill and processes should students be able to demonstrate? *A1.1.1.2.1 Find the Greatest Common Factor (GCF) and/or the Least Common Multiple (LCM) for sets of Monomials.* *A1.1.1.5.1 Add, subtract, and/or multiply polynomial expressions (express answers in simplest form).* *Note: Nothing larger than a binomial Multiplied by a trinomial.* *A1.1.1.5.2 Factor algebraic expressions, including difference of squares and trinomials. Note: Trinomials are limited to the form ax2 + bx + c where a is equal to 1 after factoring out all monomial factors*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world.	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *Participate in Discussion board responding to teacher created prompts*

Critical Thinking *Technology Operations*	*Generate equations and representations that can be used to solve word problems and check for reasonableness of solutions (sides of a rectangle are bi/trinomials).*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

Stage 3 – Learning Plan			
NETS for Students	**Learning Activities**		**Progress Monitoring/Formative Assessment**
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. *Critical Thinking* *Technology Operations*	Questions to consider while planning: • 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?		• **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?** Finding a common factor instead of the GCF, Forgetting to find the GCF before trying to factor a quadratic Trying to solve a quadratic without using factoring • **How will students get the feedback they need?** Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: Students will observe a ball in flight in the classroom. They will track the ball's travel on a coordinate plane. Using desmos (or another	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

	appropriate graphing software), students will be able to identify the equation that represents the path of the flight of the ball. This activity will be used at the end of a lesson to reinforce how a quadratic equation can be applied to the real world. worksheets, homework from textbook, Study Island, interactive textbook quizzes	book/answer key, document camera, calculators, Grapher software	

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **9 - Rational Expressions** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Transfer of Learning
   Career Planning and Life-Long Learning
   Problem-solving

2. What content standards will this unit address?

   - ELA PA Core State Standards

   - Math PA Core State Standards
     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
     CC.2.2.HS.D.1 Interpret the structure of expressions to represent a quantity in terms of its context.
     CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
     CC.2.2.HS.D.3 Extend the knowledge of arithmetic operations and apply to polynomials.
     CC.2.2.HS.D.5 Use polynomial identities to solve problems.
     CC.2.2.HS.D.6 Extend the knowledge of

Enduring Understandings/Transfer

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.

3. List the Enduring Understanding(s):
   a. simplify/reduce rational algebraic expressions .

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   a. Students will make sense of and persevere in solving complex and novel mathematical problems.
   b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.
   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.
   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.
   e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies
   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.

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. How are rational expressions represented?
   b. How can you solve a rational equation?

	Acquisition	
rational functions to rewrite in equivalent forms. • PA Content Standards	**Students will know...** 6. What facts should students know and be able to use to gain further knowledge? *Finding GCF of numbers* 7. What vocabulary should students know and be able to recall? *Tier 2:* *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* *Tier 3:* *rational function, rational expression, rational equation, inverse variation, asymptote, extended value, common factor, reduce, lowest terms, simplify, common denominator, rename, equivalent, term* 8. What basic concepts should students know and be able to recall and apply? *Finding GCF of a polynomial, factoring quadratics, know difference between a factor and a term*	**Students will be skilled at... (be able to do)** 9. What discrete skill and processes should students be able to demonstrate? *A1.1.1.2.1 Find the Greatest Common Factor (GCF) and/or the Least Common Multiple (LCM) for sets of monomials.* *A1.1.1.5.2 Factor algebraic expressions, including difference of squares and trinomials. Note: Trinomials are limited to the form ax2 + bx + c where a is equal to 1 after factoring out all monomial factors.* *A1.1.1.5.3 Simplify/reduce a rational algebraic expression.*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *Participate in Discussion board responding to teacher created prompts* *Generate equations and representations that can be used to solve word problems and check for resonableness of solutions.*

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

Stage 3 – Learning Plan			
NETS for Students	**Learning Activities**		**Progress Monitoring/Formative Assessment**
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. *Critical Thinking* *Technology Operations*	Questions to consider while planning: • 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?		• **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?** Cancelling terms instead of factors, factoring improperly, forgetting to eliminate answers which are domain exclusions • **How will students get the feedback they need?** Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz
	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: worksheets, homework from textbook, Study Island, interactive textbook quizzes	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **Unit 10-Data Analysis** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Transfer of Learning
   Career Planning and Life-Long Learning
   Problem-solving

2. What content standards will this unit address?

   - 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.HS.B.1 Summarize, represent, and interpret data on a single count or measurement variable.
     CC.2.4.HS.B.2 Summarize, represent, and interpret data on two categorical and quantitative variables.
     CC.2.4.HS.B.3 Analyze linear models to make interpretations based on the data.

Enduring Understandings/Transfer

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.

3. List the Enduring Understanding(s):
   a. Students will make prediction based on linear models
   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
   c. Students will be able to create and understand the significance of a line of best fit.

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   a. Students will make sense of and persevere in solving complex and novel mathematical problems.
   b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.
   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.
   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.
   e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies
   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.

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. How can collecting and analyzing data help you make decisions or predictions?
   b. How can you make and interpret different presentations of data?

	Acquisition	
CC.2.4.HS.B.4 Recognize and evaluate random processes underlying statistical experiments. CC.2.4.HS.B.5 Make inferences and justify conclusions based on sample surveys, experiments, and observational studies. CC.2.4.HS.B.7 Apply the rules of probability to compute probabilities of compound events in a uniform probability model CC.2.4.8.B.1 Analyze and/or interpret bivariate data displayed in multiple representations. CC.2.4.8.B.2 Understand that patterns of association can be seen in bivariate data utilizing frequencies. • PA Content Standards	**Students will know...** 6. What facts should students know and be able to use to gain further knowledge? *How to calculate measures of central tendance, what each of the types of graphs look like* 7. What vocabulary should students know and be able to recall? *Tier 2:* *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* *Tier 3:* *mean, mode, median, range, data, outlier, analyze, predict, numeric ,categorical* 8. What basic concepts should students know and be able to recall and apply? *How to create each of the plots -line of best fit, box and whisker, stem and leaf and histogram*	**Students will be skilled at... (be able to do)** 9. What discrete skill and processes should students be able to demonstrate? *A1.1.1.4.1 Use estimation to solve problems.* *A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.* *A1.2.1.2.2 Translate from one representation of a linear function to another (i.e., graph, table, and equation).* *A1.2.2.1.2 Apply the concept of linear rate of change (slope) to solve problems.* *A1.2.2.2.1 Draw, identify, find, and/or write an equation for a line of best fit for a scatter plot.* *A1.2.3.1.1 Calculate and/or interpret the range, quartiles, and interquartile range of data.* *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.* *A1.2.3.2.2 Analyze data, make predictions, and/or answer questions based on displayed data (box - and whisker plots, stem - and - leaf plots, scatter plots, measures of central tendency, or other representations).* *A1.2.3.2.3 Make predictions using the equations or graphs of best - fit lines of scatter plots* *M07.D-S.2.1.1 Compare two numerical data distributions using measures of center and variability.* *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. *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.* *(Only if taught in 7th grade) M07.D-S.1.1.1 Determine whether a sample is a random sample given a real-world situation.* *(Only if taught in 7th grade) M07.D-S.1.1.2 Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Example 1: Estimate the mean word length in a book by randomly sampling words from the book. Example 2: Predict the winner of a school election based on randomly sampled survey data.*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *Participate in Discussion board responding to teacher created prompts* *Project of real life data that require creating each of the types of graphs* *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*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

<table>
<tr><th colspan="4">Stage 3 – Learning Plan</th></tr>
<tr><th>NETS for Students</th><th colspan="2">Learning Activities</th><th>Progress Monitoring/Formative Assessment</th></tr>
<tr><td rowspan="2">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.

Critical Thinking
Technology Operations</td><td colspan="2">Questions to consider while planning:
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?</td><td>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</td></tr>
<tr><td>List planned activities
(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):

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.

Students will create a scatter</td><td>List resources required
(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)
Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software</td><td>FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.

Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb

interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative</td></tr>
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	plot of values comparing the 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. worksheets, homework from textbook, Study Island, interactive textbook quizzes		

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **11--Probability** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results

Established Goals

1. What 21st Century Essentials included in the mission statement will this unit address?
   Transfer of Learning
   Career Planning and Life-Long Learning
   Problem-solving

2. What content standards will this unit address?

   - 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.2.1.HS.F.2 Apply properties of rational and irrational numbers to solve real world or mathematical problems.
     CC.2.2.HS.D.2 Write expressions in equivalent forms to solve problems.
     CC.2.4.HS.B.4 Recognize and evaluate random processes underlying statistical

Enduring Understandings/Transfer

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.

3. List the Enduring Understanding(s):
   a. Students will recognize compound and conditional probability and be able to calculate them based on various situations.
   a. Students will recognize independent versus dependent situations

4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer?
   a. Students will make sense of and persevere in solving complex and novel mathematical problems.
   b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.
   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.
   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.
   e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies
   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.

Essential Questions

What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. How do I recognize the difference between a problem with simple, compound or conditional probability?

experiments. CC.2.4.HS.B.7 Apply the rules of probability to compute probabilities. • 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? *addition and multiplication of fractions and decimals* 7. What vocabulary should students know and be able to recall? *Tier 2:* *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* *Tier 3:* *total number of outcomes, desired number of outcomes, ratios, percents, decimal, simple, compound, conditional* 8. What basic concepts should students know and be able to recall and apply?	9. What discrete skill and processes should students be able to demonstrate? *A1.1.1.4.1 Use estimation to solve problems.* *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* *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).* *M07.D-S.3.2.1 Determine the probability of a chance event given relative frequency. Predict the approximate relative frequency given the probability.* *M07.D-S.3.2.2 Find the probability of a simple event, including the probability of a simple event not occurring.* *M07.D-S.3.2.3 Find probabilities of independent compound events using organized lists, tables, tree diagrams, and simulation.* *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. .*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *Participate in Discussion board responding to teacher created prompts* *Participate in an experiment to show difference between experimental and theoretical probability*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
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. *Critical Thinking* *Technology Operations*	Questions to consider while planning: • 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?	• **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

	List planned activities *(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games)*: Students will participate in the following activity that provides learning experiences and discussions 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. worksheets, homework from textbook, Study Island, interactive textbook quizzes	**List resources required** *(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)* Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software	**FORMATIVE ASSESSMENTS—any non-graded, diagnostic assessment administered prior to or during a unit that reflects prior knowledge, skill levels, and potential misconceptions.** *Examples include but are not limited to: Pre-tests, clickers (CPS), mini whiteboards, entrance and exit tickets, CDTs, DIBELS, Aimsweb* interactive textbook quizzes , Study Island, mini whiteboards, Kahoot, Padlet, Socrative

Southern Lehigh School District

UbD Curriculum Template

Course: **Algebra 1** Unit: **12 - Quadratics and Families of Functions** Grades: **7,8,9**

Teacher Team: **Mays, Grube, Baranek** Date: **January, 2016**

Stage 1 – Desired Results	
Established Goals	**Enduring Understandings/Transfer**
1. What 21st Century Essentials included in the mission statement will this unit address? *Transfer of Learning* *Career Planning and Life-Long Learning* *Problem-solving* 2. What content standards will this unit address? • ELA PA Core State Standards • Math PA Core State Standards CC.2.2.HS.D.5 Use polynomial identities to solve problems. CC.2.2.HS.D.7 Create and graph equations or inequalities to describe numbers or relationships. CC.2.2.HS.D.8 Apply inverse operations to solve equations or formulas for a given variable. CC.2.2.HS.D.9 Use reasoning to solve equations and justify the solution method. • PA Content Standards	**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.** 3. List the Enduring Understanding(s): *a. Recognize a parabola function given an equation or graph and be able to create a graph given a quadratic in vertex form* *b. Understand that the vertex is the maximum or minimum of a parabola and that the range of the function is limited, even though the domain is all real numbers.* *c. Recognize an absolute value function given an equation or graph and be able to graph an absolute value function* *d Factor ax^2 polynomials and use the quadratic formula to solve quadratics; also factor by grouping* 4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer? *a. Students will make sense of and persevere in solving complex and novel mathematical problems.* *b. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.* *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.* *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.* *e. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies* *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.*
	Essential Questions
	What thought-provoking questions will foster inquiry, meaning-making, and transfer?

5. List the Essential Question(s) that students should ponder, wonder about or explain by the end of this unit:
   a. How do I solve a quadratic equation?

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? *GCF of polynomials, substitute numbers into a formula* 7. What vocabulary should students know and be able to recall? *Tier 2:* *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* *Tier 3:* *factor, GCF, quadratic, absolute value, maximum, minimum, vertex, stretch, compress* 8. What basic concepts should students know and be able to recall and apply? *Finding GCF of a polynomial, factoring quadratics,*	9. What discrete skill and processes should students be able to demonstrate? *A1.2.1.1.3 Identify the domain or range of a relation (may be presented as ordered pairs, a graph, or a table).* *A2.1.2.2.1 Factor algebraic expressions, including difference of squares and trinomials. Note: Trinomials limited to the form ax 2 +bx+c where a is not equal to 0* *A2.1.3.1.1 Write and/or solve quadratic equations (including factoring and using the Quadratic Formula).* *A2.2.1.1.3 Determine the domain, range, or inverse of a relation.* *A2.2.1.1.4 Identify and/or determine the characteristics of an exponential, quadratic, or polynomial function (e.g., intervals of increase/decrease, intercepts, zeros, and asymptotes).* *A2.2.2.1.1 Create, interpret, and/or use the equation, graph, or table of a polynomial function (including quadratics).* *A2.2.2.1.3 Determine, use, and/or interpret minimum and maximum values over a specified interval of a graph of a polynomial, exponential, or logarithmic function.* *A2.2.2.1.4 Translate a polynomial, exponential, or logarithmic function from one representation of a function to another (graph, table, and equation).* *A2.2.2.2.1 Identify or describe the effect of changing parameters within a family of functions (e.g., y = x 2 and y = x 2 + 3, or y = x 2 and y = 3x 2).* *(Only in 8th grade) 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. *(Only in 8th grade) M08.C-G.1.1.2 Given two congruent figures, describe a sequence of transformations that exhibits the congruence between them.* *(Only in 8th grade) M08.C-G.1.1.3 Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates.* *(Only in 8th grade) M08.C-G.1.1.4 Given two similar two-dimensional figures, describe a sequence of transformations that exhibits the similarity between them.* *NOT an EC but a skill: Students will be skilled at graphing absolute value functions.*

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 and knowledge students need to learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	*Examples include but are not limited to:* *Labs, open-ended essays, voice recordings, videos, presentations, discussion boards, graphic organizers, songs, skits, dioramas, visual projects (posters, dioramas)* 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): *Participate in Discussion board responding to teacher created prompts* *Generate equations and representations that can be used to solve word problems and check for resonableness of solutions-sometimes specifically looking for maximum and minimums*
	OTHER SUMMATIVE ASSESSMENTS—can include factual recall
	Examples include but are not limited to final projects, research papers, quizzes and tests. List the assessments: *Quizzes and Tests*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
NETS—National Educational	Questions to consider while planning:	• **How will you monitor students' progress toward**

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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?</td>
<td>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 choose -h instead of h in the vertex because the formula has (x - h), students confuse stretched (a>1) and compressed (0<a<1), Students think that a is a slope and they can graph using rise over run, students only graph 3 points and don't get the curve of the parabola shown when graphing, sign mistakes when using the quadratic formula,
How will students get the feedback they need?
Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz</td>
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<td>List planned activities
(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):

Students will take photographs of structures or natural occurrences that demonstrate a graph of a function and to which family it belongs. They will then share their photos with the class.

worksheets, homework from textbook, Study Island, interactive textbook quizzes</td>
<td>List resources required
(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)
Textbook, laptops, whiteboard, graph paper white boards, on-line text book/answer key, document camera, calculators, Grapher software</td>
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