Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **1: Number Sense** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.1 Apply and extend previous understandings of multiplication and division to divide fractions by fractions. CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers. CC.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers. CC.2.1.6.E.3 Develop and/or apply number theory concepts to find common factors and multiples. CC.2.1.6.E.4 Apply and extend previous understandings of numbers to the system of rational numbers.	**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, and communicated.* *c. Values can be expressed as positive as well as negative and operations with those numbers can be calculated.* *d. Real Number Properties apply to numbers and variables in all situations.* *e. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.* *f. Numerical quantities and calculations can be estimated or analyzed by using appropriate strategies and tools* 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.*

CC.2.2.6.B.1 Apply and extend previous understandings of arithmetic to algebraic expressions.
CC.2.2.7.B.1
Apply properties of operations to generate equivalent expressions.
CC.2.2.6.B.2 Understand the process of solving a one-variable equation or inequality and apply it to real-world and 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 can you model integer and/or fraction operations?
   b. How can you use a model to support your answer?
   c. How do you use the properties of real numbers to simplify expressions?
   d. How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?
   e. What makes a tool and/or strategy appropriate for a given task? ?

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? *practice of integer operations* 7. What vocabulary should students know and be able to recall? *integer, substitution, evaluate, expression* 8. What basic concepts should students know and be able to recall and apply? *Compare and order integers* *Integer operations*	9. What discrete skill and processes should students be able to demonstrate? *M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.* *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* *M06.A-N.3.1.1 Represent quantities in real-world contexts using positive and negative numbers, explaining the meaning of 0 in each situation (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge).* *M06.A-N.3.1.2 Determine the opposite of a number and recognize that the opposite of the opposite of a number is the number itself (e.g., –(–3) = 3; 0 is its own opposite).* *M06.A-N.3.2.1 Write, interpret, and explain statements of order for rational numbers in real-world contexts. Example: Write – 3°C > – 7°C to express the fact that – 3°C is warmer than – 7°C.*

		M06.A-N.3.2.2 Interpret the absolute value of a rational number as its distance from 0 on the number line and as a magnitude for a positive or negative quantity in a real-world situation. *M06.B-E.1.1.3 Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, quantity).* *M06.B-E.2.1.2 Write algebraic expressions to represent real-world or mathematical problems.*

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): *Use models to demonstrate algorithm for integers (3a,3b,3c,3e,3f,4a, 4b,4c,4e4d, 4e, 4f,5a,5b,5c, 5d, 5e).* *Participate in discussion board responding to teacher created prompts.(4a, 4b,4d, 4f, 5d)*
	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 (3a, 3b, 3c, 3d, 3e, 3r, 4a, 4b, 4d, 4e,4f, 5a, 5b, 5c, 5d)*

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 students?	• **How will you monitor students' progress toward acquisition, meaning, and transfer during learning activities?** Daily assessments, teacher observation of student in-class performance, teacher observation during peer share-out sessions • **What are potential rough spots and student misunderstandings?**

<table>
<tr><td rowspan="2">Critical Thinking
Technology Operations</td><td colspan="2"></td><td>Remembering rules for adding and multiplying negatives

• 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):

Modeling integer operations and fraction operations-using multiple representations,
Hot Air Balloon activity-real world application,
Counting and Building Rectangles--multiple representations and communicating,
Discovering Algorithms for Dividing Fractions,
Show Me the Sign,
Class notes,
Video lessons with textbook</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, whiteboards, document cameras, calculators, colored math counters, Google Classroom</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, Padlet, Socrative, Kahoot</td></tr>
</table>

Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **2: Data Analysis** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representation. CC.2.4.6.B.1 Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions. CC.2.4.7.B.1 Draw inferences about populations based on random sampling concepts. CC.2.4.7.B.2 Draw informal comparative inferences	**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. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.* *b. Data can be modeled and used to make inferences.* *c. Mathematical relations and functions can be modeled through multiple representations and analyzed to raise and answer questions.* *d Mathematical relationships among numbers can be represented, compared, and communicated.* 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. 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.* *f. Students will make sense of the data distributions by interpreting the measures of center and variability in the context of the situations they represent.* *g. Students will use measures of center and variability and data displays (i.e. box plots and histograms) to draw inferences about and make comparisons between data sets.* *h. Students will understand how and why data can be manipulated.*

about two populations.

- 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. When is it appropriate to use certain measures of central tendency?
   b. How does the type of data influence the choice of display?
   c. How can data be manipulated to convey an intentional message?

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? *a. How to calculate measures of central tendency* *b. How to create and interpret:* *c. Back-to-back Stem-and-Leaf Plot, Double Box-and-Whisker Plot, Frequency Tables, and Histograms* 7. What vocabulary should students know and be able to recall? *a. mean* *b. median* *c. mode* *d. range* *e. box-and-whisker plot* *f. upper extreme* *g. lower extreme* *h. upper quartile* *i. lower quartile* *j. interquartile range* *k. stem-and-leaf plot* *l. histogram* *m. frequency table* *n. tally* 8. What basic concepts should students know and be able to recall and apply? *Understanding which measure of central tendency is most appropriate for a given situation*	9. What discrete skill and processes should students be able to demonstrate? *M06.A-N.3.1.1 Represent quantities in real-world contexts using positive and negative numbers, explaining the meaning of 0 in each situation* *M06.A-N.3.2.1 Write, interpret, and explain statements of order for rational numbers in real-world contexts.* *M06.D-S.1.1.1 Display numerical data in plots on a number line, including line plots, histograms, and box-and whisker plots.* *M06.D-S.1.1.2 Determine quantitative measures of center (e.g., median, mean, mode) and variability (e.g., range, interquartile range, mean absolute deviation).* *M07.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem.* *M07.D-S.2.1.1 Compare two numerical data distributions using measures of center and variability.*

	How to construct and interpret stem-and-leaf plots, box-and-whisker plots, frequency tables, and histograms.	

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): *Students will take part in the annual 7th grade trip to Putt U Miniature Golf Course. While at the course, students will golf and collect their scores, along with three teammates. Students will then return to school to begin the large class data collection piece. After collecting and comparing data from other groups, students input their information and are able to create computer generated graphs, tables, and charts that are an effective means of data display. (3a, 3b, 3c, 3d, 4b, 4c, 4d, 4f, 4g, 4h, 5a, 5b, 5c).*
	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 (3a, 3b, 4a, 4d, 4e, 4f, 4g,)*

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 student in-class performance, teacher observation during peer share-out sessions • **What are potential rough spots and student misunderstandings?** Understanding that mean is not always the most effective or useful measure of central tendency. Knowledge of box-and-whisker plots and how a quartile relates.

			Determining the proper table, chart, or graph to create for a given situation. • **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)*: Coin drop experiment, 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, whiteboards, document cameras, calculators, hands on equations, computers -- Excel and/or graphing software, Google Classroom	**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, Padlet, Socrative, Kahoot

Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **3: Algebra Sense** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.1 Apply and extend previous understandings of multiplication and division to divide fractions by fractions. CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers. CC.2.1.6.E.2 Identify and choose appropriate processess to compute fluently with multi-digit numbers. CC.2.1.6.E.3 Develop and/or apply number theory concepts to find common factors and multiples. CC.2.1.6.E.4 Apply and extend previous understandings of numbers to the system of rational numbers.	**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. Values can be expressed as positive as well as negative and operations with those numbers can be calculated.(also used in Unit 1)* *b. Real Number Properties apply to numbers and variables in all situations.* *c. Mathematical relationships can be represented as expressions, equations, and inequalities in mathematical situations.* *d. Numerical quantities and calculations can be estimated or analyzed by using appropriate strategies and tools* *e. Obtaining a solution to an equation, no matter how complex, always involves the process of undoing operations.* *f. Real world situations can be modeled and solved by using equations and inequalities.* *g. Equations may have one solution, no solution, or infinitely many solutions.* *h. Inequalities have a set of solutions, which are sometimes graphed on a number line. Inequalities can also have no solution* 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*

CC.2.2.6.B.1 Apply and extend previous understandings of arithmetic to algebraic expressions.
CC.2.2.7.B.1
Apply properties of operations to generate equivalent expressions.
CC.2.2.6.B.2 Understand the process of solving a one-variable equation or inequality and apply it to 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.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/inequalities algebraically and graphically.

- PA Content Standards

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.
g. Students will apply integer concepts to real life situations.
h. Students recognize and solve real life problems with a given unit rate and fixed cost.
i. Students recognize what an equation/inequality with no solution means in real life; they also 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. How can you use a model to support your answer?
   b. How do you use the properties of real numbers to simplify expressions and why is that important?
   c. How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?
   d. What makes a tool and/or strategy appropriate for a given task?
   e. How can writing an equation for a real-world situation make you a better problem solver?

Acquisition

Students will know...

6. What facts should students know and be able to use to gain further knowledge?
   practice of integer operations
   When you divide or multiply by a negative number, the inequality sign changes direction

7. What vocabulary should students know and be able to recall?
   Associative Property, Commutative Property, Distributive Property, Like terms, integer, substitution, like term, inequality, equation, reasonable, no solution, infinitely many solutions
8. What basic concepts should students know and be able to recall and apply?
   Recognize like terms
   Solve one-step and two-step equations
   Evaluate and write variable expressions

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

9. What discrete skill and processes should students be able to demonstrate?
   M06.B-E.2.1.1 Use substitution to determine whether a given number in a specified set makes an equation or inequality true.
   M06.B-E.2.1.2 Write algebraic expressions to represent real-world or mathematical problems.
   M06.B-E.2.1.3 Solve real-world and mathematical problems by writing and solving equations of the form $x + p = q$ and $px = q$ for cases in which p, q, and x are all non-negative rational numbers.
   M06.B-E.2.1.4 Write an inequality of the form $x > c$ or $x < c$ to represent a constraint or condition in a real-world or mathematical problem and/or represent solutions of such inequalities on number lines.
   M07.B-E.1.1.1 Apply properties of operations to

	Apply real number properties to expressions *Distribute first* *If there are variables on both sides, you must move one of the variables 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*	*add, subtract, factor, and expand linear expressions with rational coefficients.* *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.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem.* *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.* *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.*

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): *Use models to demonstrate algorithm for solving equations and inequalities (3c,3d, 3f, 3g, 4b, 4d, 4e, 4f, 5a, 5c).*

Critical Thinking *Technology Operations*	*Generate equations and representations that can be used to solve word problems and check for reasonability of solutions. (3c, 3d, 3f, 3g, 4b, 4d, 4e, 4f, 4h, 4i,5a, 5c)* *Participate in discussion board responding to teacher created prompts.(3e,3g, 3h, 4c, 4e, 4f, 5c)* *Mathematical Design Collaborative activity -- Students are paired with a peer and given a set of equations. The students then sort the equations into 3 categories -- one solution, no solution, or infinitely many solutions showing work and explaining. Then the students go around and critique each other's work, explaining)(3g, 4a, 4b, 4d,4c, 4f)* *Students will write and solve equations from word problems and then test for reasonableness of answer, including rounding up or down, as appropriate (3c, 3d, 3f, 3g, 3h, 4f, 4g, hc, 4i, 5a, 5b, 5c, 5d, 5e)*
	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(3a, 3b, 3c, 3e, 3g, 3h, 4c, 4d, 4d, 4e, 4f, 4g, 4h, 4i, 5b, 5c))*

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 student in-class performance, teacher observation during peer share-out sessions • **What are potential rough spots and student misunderstandings?** Remembering rules for adding and multiplying negatives Distributing -- remember to distribute to EVERYTHING in the parentheses Know difference between associative and commutative properties Difference between GCF and LCM x and x^2 are NOT like terms Dividing fraction -- you multiply by the reciprocal of the SECOND fraction

			Difference between expression and equation • **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 need to plan on how they will be spending their allowance for a year. They will need to set and follow a budget. Each student will need to determine if it is reasonable to purchase an expensive item(s), and what variables and obstacles can get in their way towards reaching their goal. There will be a limit, as the budget itself is limited. Students will then be instructed on how to write an equation based on their situation. worksheets, homework from textbook, Study Island, interactive textbook quizzes Class notes, Video lessons with textbook	**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, whiteboards, document cameras, calculators, colored math counters, Google Classroom	**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, Padlet, Socrative, Kahoot

Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **4: Rational Numbers and Operations** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.1 Apply and extend previous understandings of multiplication and division to divide fractions by fractions. CC.2.1.7.E.1 Apply and extend previous understandings of operations with fractions to operations with rational numbers. CC.2.1.6.E.2 Identify and choose appropriate processess to compute fluently with multi-digit numbers. CC.2.1.6.E.3 Develop and/or apply number theory concepts to find common factors and multiples. CC.2.1.6.E.4 Apply and extend previous understandings of numbers to the system of rational numbers.	**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 Rational numbers can be represented as decimals and fractions, which can be compared, ordered, and operations can be performed.* *b. Mathematical relationships among numbers can be represented, compared, and communicated.* *c. Real Number Properties apply to numbers in all situations.* *d. Numerical quantities and calculations can be estimated or analyzed by using appropriate strategies and tools* 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.* *g. Students will apply rational number concepts to real life situations.*

CC.2.2.6.B.1 Apply and extend previous understandings of arithmetic to algebraic expressions.
CC.2.2.7.B.1
Apply properties of operations to generate equivalent expressions.
CC.2.2.6.B.2 Understand the process of solving a one-variable equation or inequality and apply it to real-world and 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 can you model fraction operations?
   b. How can you use a model to support your answer?
   c. How do you use the properties of real numbers to simplify expressions?
   d. How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situations?
   e. What makes a tool and/or strategy appropriate for a given task?

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? *practice of integer operations and other elementary math fact fluency* 7. What vocabulary should students know and be able to recall? *Associative Property, Commutative Property, Distributive Property, Like terms, integer, rational number, substitution, evaluate, expression* 8. What basic concepts should students know and be able to recall and apply? *Compare and order rational numbers* *Integer operations* *Apply real number properties to expressions*	9. What discrete skill and processes should students be able to demonstrate? *M07.A-N.1.1.1 Apply properties of operations to add and subtract rational numbers, including real-world contexts.* *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* *M06.A-N.1.1.1 Interpret and compute quotients of fractions (including mixed numbers), and solve word problems involving division of fractions by fractions.* *M06.A-N.2.1.1 Solve problems involving operations (+, –, ×, and ÷) with whole numbers, decimals (through thousandths), straight computation, or word problems.* *M06.A-N.2.2.1 Find the greatest common factor of two whole numbers less than or equal to 100 and the least common multiple of two whole numbers less than or equal to 12.* *M06.A-N.2.2.2 Apply the distributive property to express a sum of two whole numbers, 1 through 100, with a common factor as a multiple of a sum of*

		two whole numbers with no common factor. *M06.A-N.3.1.1 Represent quantities in real-world contexts using positive and negative numbers, explaining the meaning of 0 in each situation (e.g., temperature above/below zero, elevation above/below sea level, credits/debits, positive/negative electric charge).* *M06.A-N.3.1.2 Determine the opposite of a number and recognize that the opposite of the opposite of a number is the number itself (e.g., –(–3) = 3; 0 is its own opposite).* *M06.A-N.3.2.1 Write, interpret, and explain statements of order for rational numbers in real-world contexts. Example: Write – 3°C > – 7°C to express the fact that – 3°C is warmer than – 7°C.* *M06.A-N.3.2.2 Interpret the absolute value of a rational number as its distance from 0 on the number line and as a magnitude for a positive or negative quantity in a real-world situation. Example: For an account balance of – 30 dollars, write |– 30| = 30 to describe the size of the debt in dollars, and recognize that an account balance less than – 30 dollars represents a debt greater than 30 dollars.* *M06.B-E.1.1.1 Write and evaluate numerical expressions involving whole-number exponents* *M06.B-E.1.1.3 Identify parts of an expression using mathematical terms (e.g., sum, term, product, factor, quotient, coefficient, quantity).* *M06.B-E.2.1.2 Write algebraic expressions to represent real-world or mathematical problems.*

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	*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)*

learn effectively and live productively in an increasingly global and digital world. *Critical Thinking* *Technology Operations*	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): *Use models to demonstrate algorithm for integers and fractions (3b,3d,4a,4b,4d,4e,5a,5b,5c,5d,5e)* *Participate in discussion board responding to teacher created prompts (4b,4c, 4g)* *Perform real life problems both exact and estimated answer (3b, 3d, 4a, 4b,4e, 4g)*
	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 (3a,3b,3c,4f, 4g)*

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 student in-class performance, teacher observation during peer share-out sessions • **What are potential rough spots and student misunderstandings?** Common denominators are needed when adding and subtracting fractions but NOT multiplying and dividing. Know difference between associative and commutative property Difference between GCF and LCM Dividing fraction -- you multiply by the reciprocal of the SECOND fraction Multiplying mixed numbers -- students want to multiply the whole number and the fraction and then add them instead of making them improper fractions Moving decimal the wrong number of places when converting between numbers and percents

			• **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)*: World Series Activity with batting averages (fraction decimal-percent), Modeling fraction operations-using multiple representations, Discovering Algorithms for Dividing Fractions, Show Me the Sign, Class notes, Video lessons with textbook	**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, whiteboards, document cameras, calculators, colored math counters, Google Classroom	**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, Padlet, Socrative, Kahoot

Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **5: Proportional Relationships** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.2.1.6.D.1
     Understand ratio concepts and use ratio reasoning to solve problems.
     CC.2.1.7.D.1
     Analyze proportional relationships and use them to model and solve real-world and mathematical 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. There is a direct relationship between similar figures and scale drawings.
   b. When values are proportional, they are equivalent to each other.
   c. Ratios set equal to each other are referred to as a proportion.
   d. Congruent figures have sides equal to each other.

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. 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. What information do I get when I compare two numbers using a ratio?
   b. What kind of problems can I solve by using ratios?
   c. How do you find and compare unit rates?
   d. How do ratios and rates help you describe real-life problems?
   e. How do you compare rates graphically?

f. How can proportions help you decide when things are fair?
g. What conditions help to recognize and represent proportional relationships between quantities?
h. How can you use tables and equations to identify and describe proportional relationships?
i. How can you write a proportion that solves a problem in real-life?
j. What are the steps for computing actual lengths and areas from a scale drawing?

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? *How to simplify fractions* *How to change between fractions, decimals and percents* *Understand the difference between multiples and factors and their purpose* *Divisibility rules* 7. What vocabulary should students know and be able to recall? *Ratio* *Rate* *Unit rate* *Proportion* *Percent* *Rational number* *Similar* *Congruent* *Unit ratio* *Part-to-whole* *Part-to-part* 8. What basic concepts should students know and be able to recall and apply? *Identify proportional relationships* *How to solve proportions and percent word problems* *How to choose the best unit rate*	9. What discrete skill and processes should students be able to demonstrate? *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 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.*

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): *Students will write and solve proportions from word problems and then test for reasonableness of answer. (4a, 4b, 4c, 4d, 4e, 5a, 5b, 5c, 5d, 5e, 5f, 5h 5i)* *Students will be given a unit long project comparing unit rates, and determine which product(s) would be the best buys, and why. Students will model mathematics in their presentation, and explain the real-life value of understanding the importance of unit rate.* *(3b, 3c, 4a, 4b, 4c, 4d, 4e, 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h 5i)* *Students will compare objects around the middle school campus, and calculate to see if they are "similar" or "congruent". (3a, 3b, 3c, 3d, 4a, 4c, 4d, 5a, 5b, 5g, 5h 5i, 5j* *SuperBowl Commercials -- cost per minute and evaluate worth* *Ferris Wheel scale models*
	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 (3a, 3b, 3c, 3d, 4a, 4c, 4d, 4e, 5a, 5b, 5c, 5d, 5e, 5f, 5g, 5h 5i, 5j*

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 student in-class performance, teacher observation during peer share-out sessions • **What are potential rough spots and student misunderstandings?** Choosing lowest price, not necessarily the best value when concerned with unit rate Learning an algorithm as opposed to understanding how and why a proportion works Proper application of a proportion

			Understanding the percent proportion, and the fact that a percent is out of 100 • **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)*: As a lead in to our Dorney Park trip, students will investigate ratio, proportion and measurement. Students will research a select number of unique Ferris wheels from across the world. While using their laptops, partners will find important information such as height, location, cost to build, cost to ride, and length of ride, among other things. Once students completed appropriate conversions they created scale models of each Ferris wheel. We will then compare models from around the world. 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, whiteboards, document cameras, calculators, hands on equations, computers -- Excel and/or graphing software, Google Classroom	**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, Padlet, Socrative, Kahoot

Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **6: Percent Number and Operations** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.2.1.6.E.2 Identify and choose appropriate processes to compute fluently with multi-digit numbers. CC.2.1.6.E.4 Apply and extend previous understandings of numbers to the system of rational numbers.	**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. A percent is a proportion out of 100, the part compared to the whole.* *b. Percents and percent change are used in many real life applications.* *c. Percents can be estimated using various techniques.* 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.* *g. Students will recognize and apply percents to real-world situation*
	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 are the different ways to solve percent problems?*

CC.2.2.6.B.1 Apply and extend previous understandings of arithmetic to algebraic expressions.
CC.2.2.7.B.1
Apply properties of operations to generate equivalent expressions.
CC.2.2.6.B.2 Understand the process of solving a one-variable equation or inequality and apply it to real-world and mathematical problems.
CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numberical, algebraic, and/or graphical representations.

- PA Content Standards

b. How do I estimate percents without a calculator?
c. What are ways we use percentages in everyday life?

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? *simplify fractions, converting fractions, decimals and percent,solving proportions* 7. What vocabulary should students know and be able to recall? *ratio, proportion, rate, percent, percent change, compare, analyze, simplify, rational number* 8. What basic concepts should students know and be able to recall and apply? *identify proportional relationships, solving proportions and percent problems, recognize percent increase or decrease*	9. What discrete skill and processes should students be able to demonstrate? *M06.A-R.1.1.3: Construct tables of equivalent ratios relating quantities with whole-number measurements, find missing values in the tables, and/or plot the pairs of values on the coordinate plane. Use tables to compare ratios.* *M06.A-R.1.1.4: Solve unit rate problems including those involving unit pricing and constant speed.* *M06.A-R.1.1.5: Find a percent of a quantity as a rate per 100 (e.g., 30% of a quantity means 30/100 times the quantity); solve problems involving finding the whole, given a part and the percentage.* *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 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.2.1.1 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.* *M07.B-E.2.1.1 Apply properties of operations to calculate with* *numbers in any form; convert between forms as appropriate*

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): *1. Make sense of ratio and unit rates in real-world contexts (3a,3b,3d,4c, 4e, 4f, 5c,5d)* *2. Use arguments to justify their reasoning when creating and solving percent used in real-world contexts. (4b, 4c, 4d, 5b, 5c)* *3. Create models of percents using manipulatives, tables and graphs to represent real-world and mathematical situations involving ratios and proportions and percents.(4a, 4b, 4c, 4d, 4e, 5a, 5b)* *4.Participate in discussion board responding to teacher created prompts(4b, 4c, 5a, 5b)*
	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 (3a, 3b, 3c, 4a, 4f, 4g, 5b)*

Stage 3 – Learning Plan		
NETS for Students	**Learning Activities**	**Progress Monitoring/Formative Assessment**
NETS—National Educational Technology Standards; i.e., the	Questions to consider while planning: • Are transfer and acquisition addressed in the learning	• **How will you monitor students' progress toward acquisition, meaning, and transfer during learning**

<table>
<tr>
<td rowspan="2">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">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>activities?
Daily assessments, teacher observation of student in-class performance, teacher observation during peer share-out sessions
• What are potential rough spots and student misunderstandings?
Percent change is compared to the starting value, not the smaller value.
Regarding percents, often there is a misunderstanding that a percent is always a natural number
less than or equal to 100.

• How will students get the feedback they need?
Graded assessment, teacher observation immediate feedback, peer feedback, mid-chapter quiz</td>
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<tr>
<td>List planned activities
(examples include but are not limited to: experiments, guided reading, worksheets, discussions, note-taking, research, games):

Students will be instructed to search newspaper fliers and online advertisements to find the best unit rate of a product. They can determine if a product is a “good buy”, and also if a sale price of an item is really worth it. Students will determine the percent change of sale items, and what “mark-up” means when shopping around. They will also learn about sales tax. This can help students to make worthwhile financial decision.</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, whiteboards, document cameras, calculators, colored math counters, Google Classroom</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, Padlet, Socrative, Kahoot</td>
</tr>
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	Class notes, class discussions of percent, worksheets, homework from textbook, Study Island, interactive textbook quizzes Class notes, Video lessons with textbook		

Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **7: Probability** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. CC.2.4.6.B.1 Demonstrate an understanding of statistical variability by displaying, analyzing, and summarizing distributions. CC.2.4.7.B.1 Draw inferences about populations based on random sampling concepts. CC.2.4.7.B.2 Draw informal comparative inferences	**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. Numerical quantities, calculations, and measurements can be estimated or analyzed by using appropriate strategies and tools.* *b. Data can be modeled and used to make inferences.* *c. Mathematical relationships among numbers can be represented, compared, and communicated.* *d. Patterns exhibit relationships that can be extended, described, and generalized.* 4. What do you want students to do with this knowledge or skill beyond this course? What is Transfer? *a. Students will use effective mathematical reasoning to construct viable arguments and critique the reasoning of others.* *b. Students will communicate precisely when making mathematical statements and express answers with a degree of precision appropriate for the context of the problem/situation.* *c. 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.* *d. Students will make use of structure and repeated reasoning to gain a mathematical perspective and formulate generalized problem solving strategies* *e. Students will make sense of the data distributions by interpreting the measures of center and variability in the context of the situations they represent.* *f. Students will understand how and why data can be manipulated.* **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 tell if a sample is random?*

about two populations.
CC.2.4.7.B.3
Investigate chance processes and develop, use, and evaluate probability models.
CC.2.4.8.B.1
Analyze and/or interpret bivariate data displayed in multiple representations.
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

- PA Content Standards

b. How can you predict possible outcomes of an event?
c. What is the difference between theoretical and experimental probability?
d. What is the difference between dependent and independent data?
e. What is the difference between a simple and a compound event?

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? *Why is it important to determine if a sample is random or not?* *What is simple and compound probability?* *What are independent and dependent events?* 7. What vocabulary should students know and be able to recall? *random sample* *probability* *experimental probability* *theoretical probability* *event* *simple event* *compound event* *independent* *dependent* *likelihood* 8. What basic concepts should students know and be able to recall and apply? *Predict the likelihood of an event occuring* *Know if an event is independent.*	9. What discrete skill and processes should students be able to demonstrate? *M07.D-S.1.1.1 Determine whether a sample is a random sample given a real-world situation.* *M07.D-S.1.1.2 Use data from a random sample to draw inferences about a population with an unknown* *Characteristic of interest.* *M07.D-S.2.1.1 Compare two numerical data distributions using measures of center and variability.* *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.*

		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.

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): *Using flip chart paper, student groups of three will create a questionnaire and survey a group of 25 peers. They will record their data and make a determination of what their data currently displays. They will then be asked to survey 10 non-students throughout the week, and see if their new surveyed data matches their original. This will fuel the discussion of theoretical/experimental, as well as what a random survey truly means. Students will then share their data displays with the class. (3a, 3b, 3c, 3d, 4a, 4b, 4c, 4f, 5a, 5b, 5c).* *NCAA March Madness research records and league records and make predictions*
	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 (3a, 3b, 4c, 4d, 4e, 5d, 5e)*

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 students?	• **How will you monitor students' progress toward acquisition, meaning, and transfer during learning activities?** Daily assessments, teacher observation of student in-class performance, teacher observation during peer share-out sessions • **What are potential rough spots and student misunderstandings?**

<table>
<tr><td rowspan="2">Critical Thinking
Technology Operations</td><td colspan="2"></td><td>Understanding the difference between independent vs. dependent events.
Understanding the difference between experiemental and theoretical probability.
Conditional Probability and how it relates to real-world events.
Understanding what makes a sample random.

• 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):

Students will create compound probability games in class with manipulatives that will be provided to them (chips, number cubes, spinners, and marbles). They will split into groups, and their classmates will play a few rounds of the game. They will then determine the likelihood of potential outcomes, and if the game is considered “fair” or not.

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, whiteboards, document cameras, calculators, Hands-On Equations, computers -- Excel and/or graphing software, Google Classroom</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, Padlet, Socrative, Kahoot</td></tr>
</table>

Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **8: Geometry** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.2.3.6.A.1 Apply appropriate tools to solve real-world and mathematical problems involving area, surface area, and volume. CC.2.3.7.A.1 Solve real - world and mathematical problems involving angle measure, area, surface area, circumference, and volume CC.2.3.7.A.2 Visualize and represent geometric figures and describe the relationships between them.	**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. Surface area is the space covered on the exterior of a 3-dimensional figure.* *b. Volume is the amount of space inside of a 3-dimentional figure.* *c. Pi is the ratio of a circle's circumference to its diameter.* *d. The measures of geometric figures can be calculated and analyzed using a variety of strategies, tools, and technologies.* *e. A constant ratio exists between corresponding lengths of sides of similar figures* 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. Students will communicate precisely when describing geometric relationships.* *g. Students will apply the geometric concepts they know to solve problems arising in everyday life, society, and the workplace.*

- 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 use angle pairs to solve problems?*
   b. *How can the formulas for the area of plane figures be used to solve problems?*
   c. *What types of problems can be solved using surface area of right rectangular prisms?*
   d. *What is the importance of finding the volume of a 3-D figure or the area of a 2-D figure?*

Acquisition

Students will know...

6. What facts should students know and be able to use to gain further knowledge?
   Formulas can be applied to find area, surface area, volume of geometric figures.
   Nets can be used to help find surface area.
   Similar figures have the same shape, but a different size.
   Characteristics of geometric figure angles and sides.
   Identification of cross sections of three-dimensional figures.

7. What vocabulary should students know and be able to recall?
   similar figure, congruent, transversal, complimentary, supplementary, adjacent, vertical, interior, exterior, surface area, volume, point, line, plane, composite, dimension, net, cross-section, prism, cylinder, circumference

8. What basic concepts should students know and be able to recall and apply?
   Application of area and volume to real-life examples.
   Determine if figures are congruent or similar.
   Calculate volumes of prisms, cylinders, and pyramids.
   Differentiate between adjacent, vertical, interior and exterior angles.

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

9. What discrete skill and processes should students be able to demonstrate?
   M06.C-G.1.1.1 Determine the area of triangles and special quadrilaterals (i.e., square, rectangle, parallelogram, rhombus, and trapezoid). Formulas will be provided.
   M06.C-G.1.1.2 Determine the area of irregular or compound
   polygons. Example: Find the area of a room in the shape of an irregular polygon by composing and/or decomposing.
   M06.C-G.1.1.3 Determine the volume of right rectangular prisms with fractional edge lengths. Formulas will be provided.
   M06.C-G.1.1.4 Given coordinates for the vertices of a polygon in the plane, use the coordinates to find side lengths and area of the polygon (limited to triangles and special quadrilaterals). Formulas will be provided.
   M06.C-G.1.1.5 Represent three-dimensional figures using nets made of rectangles and triangles.
   M06.C-G.1.1.6 Determine the surface area of triangular and rectangular prisms (including cubes). Formulas will be provided.
   M07.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem.
   M07.C-G.1.1.1 Solve problems involving scale

	Determine when finding area and circumference of a circle is appropriate. *Understand Pi and how it relates to the circumference and diameter of a circle.* *How to calculate the circumference and area of a circle.* *Finding the surface area of a figure made of prisms.* *Use of a net to determine the surface area of a prism or cylinder.* *Determine volume of a figure.* *Calculating the area of a composite figure.*	*drawings of geometric figures, including finding length and area.* *M07.C-G.1.1.2 Identify or describe the properties of all types of triangles based on angle and side measures.* *M07.C-G.1.1.3 Use and apply the triangle inequality theorem.* *M07.C-G.1.1.4 Describe the two-dimensional figures that result from slicing three-dimensional figures.* *M07.C-G.2.1.1 Identify and use properties of supplementary, complementary, and adjacent angles in a multistep problem to write and solve simple equations for an unknown angle in a figure.* *M07.C-G.2.1.2 Identify and use properties of angles formed when two parallel lines are cut by a transversal (e.g., angles may include alternate interior, alternate exterior, vertical, corresponding).* *M07.C-G.2.2.1 Find the area and circumference of a circle. Solve problems involving area and circumference of a circle(s). Formulas will be provided.* *M07.C-G.2.2.2 Solve real-world and mathematical problems involving area, volume, and surface area of two and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms. Formulas will be provided.*

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): *Students will use clear three dimensional geometric figures to understand volume and the capacity a figure can hold (3b, 3d, 4a, 4b, 5f, 5j, 5k)*

Technology Operations	*Students will use manipulatives to find patterns and relationships of two-dimensional figures (3d, 3e, 4c, 4d, 5a, 5d, 5e, 5f).* *Students will find the surface area by converting three-dimensional shapes into two dimensional representations (3a, 3d, 3e, 4a, 4b, 4d, 5a, 5c, 5g, 5h, 5i)* *Students can apply area and surface of 2-dimensional figures to solve interior design problems or surface area and volume of 3-dimensional figures to solve architectural problems (3a, 3b, 3d, 4a, 4b, 4d, 5a, 5c, 5f, 5g, 5h, 5i, 5j, 5k).* *Students will examine pi, and develop an understanding of its relationship to a circle, as opposed to simply repeating its digits (3a, 3c, 3d, 4a, 4b, 4c, 5b, 5c, 5h, 5j)* *Ferris Wheels -- scale models, conversions, parts of circles* *Kites -- creations and areas* *Battleship -- coordinates*
	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 (3a, 3b, 3c, 3d, 3e, 4a, 4b, 4d)*

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 student in-class performance, teacher observation during peer share-out sessions • **What are potential rough spots and student misunderstandings?** Incorrectly graphing or representing geometric figures in a coordinate plane. Using the area formula of a circle as opposed to circumference and vice versa. Applying different formulas to find surface area and volume. Choosing the correct units for final answers. Decomposing a compound figure into correct geometric shapes to find surface area and volume. Understanding the different types of angles and how they relate to each other.

			Determining if figures are similar **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 learn how to orienteer by using either a school provided plastic compass or a compass of their own (phone or other device). Each pair of students will be given instructions, and be asked what types of geometric figures that they have created. They will also be asked to create two-dimensional figures by their paces, and determine if they were "regular" polygons. 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, whiteboards, document cameras, calculators, geometric solids, geometric net figures, geoboards, rulers, Google Classroom	**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, Padlet, Socrative, Kahoot

Southern Lehigh School District

UbD Curriculum Template

Course: **PreAlgebra B** Unit: **9: Lines and Functions** Grades: **7**

Teacher Team: **Strobl, Grube** Date: **August, 2015**

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.2.2.6.B.2 Understand the process of solving a one-variable equation or inequality and apply it to real-world and mathematical problems. CC.2.2.7.B.1 Apply properties of operations to generate equivalent expressions. CC.2.2.7.B.3 Model and solve real-world and mathematical problems by using and connecting numerical, algebraic, and/or graphical representations. CC.2.2.8.B.3 Analyze and solve linear equations and pairs of simultaneous linear equations.	**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. Obtaining a solution to an equation, no matter how complex, always involves the process of undoing operations.* *b. Real world situations can be modeled and solved by using equations and inequalities.* *c. Equations may have one solution, no solution, or infinitely many solutions.* *d. Inequalities have a set of solutions, which are sometimes graphed on a number line. Inequalities can also have no solution.* *e. Ratios can be used to show a relationship between changing quantities, such as vertical and horizontal change.* *f. A line on a graph can be represented by a linear equation.* *g. The relationship between two lines can be determined by comparing their slopes and y-intercepts.* *h. The equation of a line can be written in multiple forms.* 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*

CC.2.2.6.B.3
Represent and analyze quantitative relationships between dependent and independent variables.
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 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.2.4.8.B.1
Analyze and/or interpret bivariate data displayed in multiple representations.
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.3
Apply quantitative reasoning to choose and interpret units and scales in formulas, graphs, and data displays.
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.2.2.HS.C.4
Interpret the effects transformations

will share and compare the use of multiple strategies leading to the same answer.
g. Students recognize and solve real life problems with a given unit rate and fixed cost.
h. Students recognize what an equation/inequality with no solution means in real life; they also 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. How can writing an equation for a real-world situation make you a better problem solver?
   b. How can expressions, equations, and inequalities be used to quantify, solve, model, and/or analyze mathematical situation
   c. What is the importance of finding and comparing dependent and independent relationships?
   d. How does the shape of a graph and the manipulation of a parameter represent the real world situation?
   e. What can you interpret from a shape of a graph?
   f. How is a function different from a relation and why is that important?

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? *When you divide or multiply by a negative number, the inequality sign changes direction* *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? *Distributive Property, like terms, integer, substitution, inequality, equation, reasonable, no solution, infinitely many solutions, relation, function, slope, domain, range, parallel, perpendicular, linear, non-linear, standard form,*	9. What discrete skill and processes should students be able to demonstrate? *M06.B-E.2.1.1 Use substitution to determine whether a given number in a specified set makes an equation or inequality true.* *M06.B-E.2.1.2 Write algebraic expressions to represent real-world or mathematical problems.* *M06.B-E.2.1.3 Solve real-world and mathematical problems by writing and solving equations of the form x + p = q and px = q for cases in which p, q, and x are all non-negative rational numbers.* *M06.B-E.2.1.4 Write an inequality of the form x > c or x < c to represent a constraint or condition in a real-world or mathematical problem and/or represent solutions of such inequalities on number lines.* *M07.B-E.1.1.1 Apply properties of operations to add, subtract, factor, and expand linear expressions with rational coefficients.*

have on functions and find the inverses of functions. CC.2.2.HS.C.6 Interpret functions in terms of the situations they model. 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.7 Create and graph equations or inequalities to describe the numbers or relationships. 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/inequalities algebraically and graphically. 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. • PA Content Standards	*slope-intercept form, line of best fit* 8. What basic concepts should students know and be able to recall and apply? *Recognize like terms* *Distribute first* *If there are variables on both sides, you must move one of the variables 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 o* *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.* *How to represent relationships of dependent and independent variables mathematically.*	*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 rare specific rational numbers.* *Example: The perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?* *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.B-E.2.3.1 Determine the reasonableness of answer(s) or interpret the solution(s) in the context of the problem.* *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.* *M06.B-E.3.1.1 Write an equation to express the relationship between the dependent and independent variables* *M06.B-E.3.1.2 Analyze the relationship between the dependent and independent variables using graphs and tables and/or relate these to an equation.* *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.2.1.3 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-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).* *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.* *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.* *A1.2.1.1.1 Analyze a set of data for the existence of a pattern and represent the pattern algebraically and/or graphically.* *A1.2.1.1.2 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: 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.* *A1.2.2.2.1 Draw, identify, find, and/or write an equation for a line of best fit for a scatter plot.* *A1.2.3.2.3 Make predictions using the equations or graphs of best ‐ fit lines of scatter plots.*

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): *1. Mathematical Design Collaborative Activity -- Students are paired with a peer and given a set of equations. The students then sort the equations into 3 categories -- one solution, no solution, or infinitely many solutions showing work and explaining. Then the students go around and critique each other's work, explaining) (4a, 4b, 4e)*

	2. Students will write and solve equations from word problems and then test for reasonableness of answer, including rounding up or down, as appropriate (3b, 4a, 4g, 4h, 5a, 5b) *3. Students explain how to verify that a relationship is a function. (5d)* *4. Students construct arguments using verbal or written explanations accompanied by expressions, equations, Inequalities, models, and graphs, tables, and other data displays. They further refine their mathematical communication skills through mathematical discussions in which they critically evaluate their own thinking and the thinking of other students through participation in classroom discussion boards. (3a,3b,3c,4a,4b, 4c,4d,5b,5c)* *5. Students form expressions, equations (in different forms), or inequalities from real world contexts and connect symbolic (3a,3b,3c,4a,4d,4e, 4f, 4g, 4h, 5b,5c) and graphical representations as they apply algebraic concepts to the context.* *5. Students translate functions numerically, graphically, verbally, and algebraically (3b,3c,4b,4d,5b,5c)* *6. Students gather their own data or graphs in contexts they understand and interpret the data and graphs in terms of equations, using correct terminology.(5a)*
	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 (3b,3c,3d,4f, 4g, 4h,5a)*

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 student in-class performance, teacher observation during peer share-out sessions • **What are potential rough spots and student misunderstandings?** When dividing or multiplying by a negative number, the inequality sign changes direction. 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 creates more difficult arithmetic. Students forget that they must move variables to the same side of the equation Students forget that they must do the same thing to both sides of the equation.

			Algebraic errors when manipulating the equation Errors when graphing linear equations • **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)*: Class notes, 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, whiteboards, document cameras, graphing calculators, graph paper, graphing software, Google Classroom	**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, Padlet, Socrative, Kahoot