BLOOMFIELD PUBLIC SCHOOLS
Department of Instruction

Curriculum Guide

Pre-Algebra Elective
Grade 7
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Introduction: Pre-Algebra Elective Grade 7 is a mathematics course designed to enhance and supplement Grade 7 CMP 3. By successfully completing both courses, students will be prepared the Algebra 1 Honors program in 8th Grade.

The New Jersey Common Core Curriculum Standards for high school specify the mathematics that all students should study in order to be college and career ready. Additional mathematics that students should learn in order to take advanced courses such as calculus, advanced statistics, or discrete mathematics is indicated by a (**+**) symbol in this guide.

This document is a tool that will provide an overview as to what to teach, when to teach it, and how to assess student progress. As well, with considerations made for altered pacing, modifications, and accommodations; this document is to be utilized for all students enrolled in this course, regardless of ability level, native language, or classification.   It is meant to be a dynamic tool that we, as educators, will revise and modify as it is used during the course of the school year.

Mapping/Sequence: The Curriculum is written following the parameters of *Understanding by Design*. The document is written as a series of units containing established transfer goals, enduring understandings, essential questions, and the necessary skills and knowledge a student must attain in a school year. Each unit also stipulates both required and suggested activities and assessments. Teachers are expected to design lessons that will meet the requirements within the curriculum; however, there is flexibility allowed in how they choose to meet these demands.

Title of Unit	Ratios and Proportional Relationships	Grade Level	7
Curriculum Area	Mathematics	Time Frame	20-22 days
Developed By	Marc Kessler		

Desired Results (Stage 1)

Established Goals/Standards

7.RP.1 Compute unit rates associated with ratios of fractions, including ratios of lengths, areas and other quantities measured in like or different units. *For example, if a person walks 1/2 mile in each 1/4 hour, compute the unit rate as the complex fraction $^{1/2}/_{1/4}$ miles per hour, equivalently 2 miles per hour.*

7.RP.2 Recognize and represent proportional relationships between quantities.
  a. Decide whether two quantities are in a proportional relationship, e.g., by testing for equivalent ratios in a table or graphing on a coordinate plane and observing whether the graph is a straight line through the origin.
  b. Identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
  c. Represent proportional relationships by equations. *For example, if total cost t is proportional to the number n of items purchased at a constant price p, the relationship between the total cost and the number of items can be expressed as t = pn.*
  d. 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.

7.RP.3 Use proportional relationships to solve multistep ratio and percent problems. Examples: simple interest, tax, markups and markdowns, gratuities and commissions, fees, percent increase and decrease, percent error.

Primary Interdisciplinary Connections

LAL: Connect math and literacy through reading books

21st Century Interdisciplinary Themes:

      _X_ Global Awareness   **_X_ Financial, economic, business, and entrepreneurial literacy**
      ___Civic Literacy   **___Health Literacy**

Transfer

Students will be able to independently use their learning to analyze proportional relationships and use them to solve real-world and mathematical problems.

Meaning

Understandings
Students will understand that...

U1 - the two measurements that create a unit rate are always different, e.g., miles per gallon, dollars per hour.
U2 - ratios and percent represent the same information in different formats.
U3 - unit rates allow for comparison of proportional relationships.

Essential Questions
Students will keep considering...

Q1 - What is the purpose of finding a unit rate?
Q2 - Why are the two measurements in a unit rate different?

Knowledge
Students will know...

K1 - a unit rate is a ratio with a denominator of 1.
K2 - a rate is a ratio that is used to compare different kinds of quantities.
K3 - when a graph on a coordinate plane is a line, it indicates a proportional relationship.

K4 - the equation $\dfrac{a}{b} = c$ can be rewritten as $a = bc$.
K5 - in a proportional relationship, when connecting the points (0, 0) and (1, r), r is the unit rate.

Skills
Students will be able to...

S1 - compute unit rates associated with ratios of fractional
  - lengths.
  - areas.
  - quantities measured in like or different units.

S2 - determine whether two ratios are equivalent.
S3 - decide whether two quantities are in a proportional relationship.
S4 - identify the constant of proportionality (unit rate) in tables, graphs, equations, diagrams, and verbal descriptions of proportional relationships.
S5 - represent proportional relationships by equations.
S6 - explain what a point (x, y) on the graph of a proportional relationship means in terms of the situation.
S7 - use proportional relationships to solve multistep ratio problems.
S8 - use proportional relationships to solve multistep percent problems.

Evidence (Stage 2)

Checks for Alignment	Evaluation Criteria Performance is judged in terms of…	Assessment Evidence
U1 – U3 **Q1 – Q2** **K1 – K5**	Formative ● question-answer in class ● homework ● do now ● exit pass	## Transfer Task(s) Analyze proportional relationships and use them to solve real-world and mathematical problems.
	Summative ● projects ● periodic assessment tasks	**S1 – S8**

Learning Plan (Stage 3)

Checks for alignment and best practice	Summary of Key Learning Events and Instruction *The teaching and learning needed to achieve the unit goals.*	
	Required Activities	Required Resources
	Student groups will be formed to examine the Looking Back problems in the text.	Comparing and Scaling

	Suggested Activities	Suggested Resources
	Unit Project ● Students collaborate to complete the Paper Pool project	Comparing and Scaling
	Hands on Activities ● What is the Unit Rate? ● Proportions Scavenger Hunt ● Gifts for the Holidays ● Very Interesting	Teaching the Common Core Math Standards (with Hands-On Activities)
	2-6 Ratios, Rates, and Conversions ● Think About a Plan ● Standardized Test Prep ● Activity: "Everyday Ratios and Rates"	Prentice Hall Algebra 1 Text
	2-7 Solving Proportions ● Think About a Plan ● Standardized Test Prep ● Game: Climb the Ladder	Prentice Hall Algebra 1 Text
	2-8 Proportions and Similar Figures ● Think About a Plan ● Standardized Test Prep ● Puzzle: Constitution Math	Prentice Hall Algebra 1 Text
	2-9 Percents ● Think About a Plan ● Standardized Test Prep ● Game: Greater Than or Less Than	Prentice Hall Algebra 1 Text
	Virtual Classroom ● Students learn at their own pace using online tutorials	http://math.rice.edu http://www.arcademicskillbuilders.com http://www.themathpage.com http://www.onlinemathlearning.com http://www.quia.com

Title of Unit	The Number System	Grade Level	7
Curriculum Area	Mathematics	Time Frame	13-15 days
Developed By	Marc Kessler		

Desired Results (Stage 1)

Established Goals/Standards

7.NS.1 Apply and extend previous understandings of addition and subtraction to add and subtract rational numbers; represent addition and subtraction on a horizontal or vertical number line diagram.
  a. Describe situations in which opposite quantities combine to make 0. *For example, In the first round of a game, Maria scored 20 points. In the second round of the same game, she lost 20 points. What is her score at the end of the second round?*
  b. Understand $p + q$ as the number located a distance $|q|$ from p, in the positive or negative direction depending on whether q is positive or negative. Show that a number and its opposite have a sum of 0 (are additive inverses). Interpret sums of rational numbers by describing real-world contexts.
  c. Understand subtraction of rational numbers as adding the additive inverse, $p - q = p + (-q)$. Show that the distance between two rational numbers on the number line is the absolute value of their difference, and apply this principle in real-world contexts.
  d. Apply properties of operations as strategies to add and subtract rational numbers.

7.NS.2 Apply and extend previous understandings of multiplication and division and of fractions to multiply and divide rational numbers.
  a. Understand that multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. Interpret products of rational numbers by describing real-world contexts.
  b. Understand that integers can be divided, provided that the divisor is not zero, and every quotient of integers (with non-zero divisor) is a rational number. If p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. Interpret quotients of rational numbers by describing real-world contexts.
  c. Apply properties of operations as strategies to multiply and divide rational numbers.
  d. Convert a rational number to a decimal using long division; know that the decimal form of a rational number terminates in 0s or eventually repeats.

7.NS.3 Solve real-world and mathematical problems involving the four operations with rational numbers.

Primary Interdisciplinary Connections

LAL: Connect math and literacy through reading books

21st Century Interdisciplinary Themes:
          _X_ **Global Awareness**   _X_ **Financial, economic, business, and entrepreneurial literacy**
          ___ **Civic Literacy**   ___ **Health Literacy**

Transfer
Students will be able to independently use their learning to apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.

Meaning	
Understandings Students will understand that…	**Essential Questions** Students will keep considering…
U1 - $p + q$ is the number located a distance $\|q\|$ from p, in the positive or negative direction depending on whether q is positive or negative. **U2 -** subtraction of rational numbers is the same as adding the additive inverse, $p - q = p + (-q)$. **U3 -** properties of operations. **U4 -** if a factor is multiplied by a number greater than one, the answer is larger than that factor. **U5 -** if a factor is multiplied by a number between 0 and 1, the answer is smaller than that factor. **U6 -** multiplication is extended from fractions to rational numbers by requiring that operations continue to satisfy the properties of operations, particularly the distributive property, leading to products such as $(-1)(-1) = 1$ and the rules for multiplying signed numbers. **U7 -** integers can be divided, provided that the divisor is not zero.	**Q1 -** Why does one need rational numbers? **Q2 -** When does one use decimal forms versus fractional forms of rational numbers? **Q3 -** In what real world contexts would negative numbers be used?
Knowledge Students will know…	**Skills** Students will be able to…
K1 - a number and its opposite have a sum of 0. **K2 -** a number and its opposite are called additive inverses. **K3 -** properties of operations. **K4 -** absolute value represents distance on a number line, therefore it is always non-negative. **K5 -** every quotient of integers (with non-zero divisor) is a rational number. **K6 -** if p and q are integers, then $-(p/q) = (-p)/q = p/(-q)$. **K7 -** the decimal form of a rational number terminates in 0s or eventually repeats.	**S1 -** add rational numbers. **S2 -** subtract rational numbers. **S3 -** represent addition on a number line diagram. **S4 -** represent subtraction on a number line diagram. **S5 -** describe situations in which opposite quantities combine to make 0. **S6 -** find the opposite of a number. **S7 -** interpret sums of rational numbers by describing real-world contexts. **S8 -** show that the distance between two rational numbers on the number line is the absolute value of their difference. **S9 -** use absolute value in real-world contexts involving distances. **S10 -** multiply divide rational numbers.

		S11 - divide rational numbers. **S12 -** interpret products of rational numbers by describing real-world contexts. **S13 -** interpret quotients of rational numbers by describing real-world contexts. **S14 -** convert a rational number to a decimal using long division. **S15 -** solve real-world and mathematical problems involving the four operations with rational numbers.

Evidence (Stage 2)

Checks for Alignment	_Evaluation Criteria_ **Performance is judged in terms of…**	_Assessment Evidence_
U1 - U7 **Q1- Q3** **K1 – K7**	Formative • question-answer in class • homework • do now • exit pass Summative • projects • periodic assessment tasks	**Transfer Task(s)** Apply and extend previous understandings of operations with fractions to add, subtract, multiply, and divide rational numbers.
		S1 – S15

Learning Plan (Stage 3)		
Checks for alignment and best practice	**Summary of Key Learning Events and Instruction** _The teaching and learning needed to achieve the unit goals._	
	Required Activities	Required Resources
	Student groups will be formed to examine the Looking Back problems in the text.	Accentuate the Negative
	Suggested Activities	Suggested Resources
	Unit Project ● Students collaborate to complete the Dealing Down project Hands on Activities ● The Distributive Property War ● Which One Should Be Excluded? Additional Hands-on Lessons ● Adding Integers ● What's Your Sign? ● Zero Pairs, Manipulatives, and a Real World Scenario 1-5 Adding and Subtracting Real Numbers ● Think About a Plan: 1-5 ● Concept Byte: "Always Sometimes or Never" (p37) ● Puzzle: "That's Sum Puzzle!" 1-6 Multiplying and Dividing Real Numbers ● Think About a Plan ● Standardized Test Prep ● Activity: "A Class Divided" Virtual Classroom ● Students learn at their own pace using online tutorials	Accentuate the Negative Teaching the Common Core Math Standards (with Hands-On Activities) TeachingChannel.org Prentice Hall Algebra 1 Text Prentice Hall Algebra 1 Text http://www.ixl.com http://www.winpossible.com http://kidsknowit.com

Title of Unit	Expressions and Equations	Grade Level	7
Curriculum Area	Mathematics	Time Frame	18-20 days
Developed By	Marc Kessler		

Desired Results (Stage 1)

Established Goals/Standards

7.EE.1 Apply properties of operations as strategies to add, subtract, factor, and expand linear expressions with rational coefficients.

7.EE.2 Understand that rewriting an expression in different forms in a problem context can shed light on the problem and how the quantities in it are related. *For example, a + 0.05a = 1.05a means that "increase by 5%" is the same as "multiply by 1.05."*

Primary Interdisciplinary Connections

LAL: Connect math and literacy through reading books

21st Century Interdisciplinary Themes:
      _X_ Global Awareness   **_X_ Financial, economic, business, and entrepreneurial literacy**
      ___ Civic Literacy   **___ Health Literacy**

Transfer

Students will be able to independently use their learning to use properties of operations to generate equivalent expressions.

Meaning

Understandings Students will understand that…	Essential Questions Students will keep considering…
U1 - only like terms can be combined, e.g., $x + y = x + y$ but $x + x = 2x$. **U2 -** to factor an expression, one must factor out the greatest common factor. **U3 -** rewriting an expression in different forms in a problem context can clarify the problem. **U4 -** rewriting an expression can clarify how the quantities in the problem are related.	**Q1 -** Why would one need to find equivalent forms of an expression?

Knowledge Students will know…	Skills Students will be able to…
K1 - how to add, subtract, multiply, and divide rational numbers. **K2 -** $a(b + c) = ab + ac$. **K3 -** how to find the greatest common factor of two or more terms.	**S1 -** apply properties of operations as strategies to add and subtract linear expressions with rational coefficients. **S2 -** apply properties of operations as strategies to factor linear expressions with rational coefficients. **S3 -** apply properties of operations as strategies to expand linear expressions with rational coefficients.

Evidence (Stage 2)

Checks for Alignment	*Evaluation Criteria* **Performance is judged in terms of…**	*Assessment Evidence*
U1 – U4 Q1 K1 – K3	Formative ● question-answer in class ● homework ● do now ● exit pass Summative ● projects ● periodic assessment tasks	**Transfer Task(s)** Use properties of operations to generate equivalent expressions. **S1- S3**

Learning Plan (Stage 3)

Checks for alignment and best practice	Summary of Key Learning Events and Instruction *The teaching and learning needed to achieve the unit goals.*	
	Required Activities	Required Resources
	Student groups are formed to examine the Looking Back problems in the text.	Moving Straight Ahead
	Suggested Activities	Suggested Resources
	Unit Project ● Students collaborate to complete the Wasted Water Experiment	Moving Straight Ahead
	Teaching the CCSS: Hands-On Activities ● Algebraic Expressions Jigsaw ● Rewriting Expressions	Teaching the Common Core Math Standards (with Hands-On Activities)
	1-1 Variables and Expressions ● Think About a Plan ● Game: Matching Expressions ● Standardized Test Prep	Prentice Hall Algebra 1 Text
	1-2 Order of Operations and Evaluating Expressions ● Think About a Plan ● Puzzle: Calc-Words	Prentice Hall Algebra 1 Text
	1-4 Properties of Real Numbers ● Think About a Plan ● Game: You've Got My Property	Prentice Hall Algebra 1 Text
	1-7 Distributive Property ● Think About a Plan ● Game: Algebra Baseball ● Standardized Test Prep	Prentice Hall Algebra 1 Text
	Virtual Classroom ● Students learn at their own pace using online tutorials	https://www.hstutorials.net https://www.khanacademy.org http://www.ixl.com http://freemathhelp.com

Title of Unit	Expressions and Equations	Grade Level	7
Curriculum Area	Mathematics	Time Frame	16-18 days
Developed By	Marc Kessler		

Desired Results (Stage 1)

Established Goals/Standards

7.EE.3 Solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals), using tools strategically. Apply properties of operations to calculate with numbers in any form; convert between forms as appropriate; and assess the reasonableness of answers using mental computation and estimation strategies. *For example: If a woman making $25 an hour gets a 10% raise, she will make an additional 1/10 of her salary an hour, or $2.50, for a new salary of $27.50. If you want to place a towel bar 9 3/4 inches long in the center of a door that is 27 1/2 inches wide, you will need to place the bar about 9 inches from each edge; this estimate can be used as a check on the exact computation.*

7.EE.4 Use variables to represent quantities in a real-world or mathematical problem, and construct simple equations and inequalities to solve problems by reasoning about the quantities.
  a. 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. Solve equations of these forms fluently. Compare an algebraic solution to an arithmetic solution, identifying the sequence of the operations used in each approach. *For example, the perimeter of a rectangle is 54 cm. Its length is 6 cm. What is its width?*
  b. 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. Graph the solution set of the inequality and interpret it in the context of the problem. *For example: As a salesperson, you are paid $50 per week plus $3 per sale. This week you want your pay to be at least $100. Write an inequality for the number of sales you need to make, and describe the solutions.*

Primary Interdisciplinary Connections

LAL: Connect math and literacy through reading books

21st Century Interdisciplinary Themes:
  _X_ Global Awareness   **_X_ Financial, economic, business, and entrepreneurial literacy**
  ___ Civic Literacy   **___ Health Literacy**

Transfer

Students will be able to independently use their learning to solve real-life and mathematical problems using numerical and algebraic expressions and equations.

Meaning

Understandings
Students will understand that…

U1 - one form of a number may be more advantageous to use in a problem context than another form.
U2 - using estimation strategies helps to determine the reasonableness of answers.
U3 - finding one percent or ten percent of a number can facilitate solving percent problems.
U4 - why the inequality symbol reverses when multiplying or dividing both sides of an inequality by a negative number.

Essential Questions
Students will keep considering…

Q1 - What real world problems could be represented by equations?
Q2 - What real world problems could be represented by inequalities?

Knowledge
Students will know…

K1 - how to convert between fractions, decimals, and percents.

K2 – $10\% = 0.1 = \dfrac{1}{10}$.

K3 - since multiplying by 0.1 is the same as multiplying by $\dfrac{1}{10}$, the value of 10 percent can also be found by simply dividing by 10.

K4 - $1\% = 0.01 = \dfrac{1}{100}$.

K5 - since multiplying by 0.01 is the same as multiplying by $\dfrac{1}{100}$, the value of 1 percent can also be found by simply dividing by 100.
K6 - adding a percent of a number onto the original number is the same thing as adding that percent to 100 and then finding that new percent of the number, *e.g., The total cost of an item with 7% tax can be found in two ways: a) find 7% and add that to the original cost of the item; b) find 107% of the number.*
K7 - finding more than 100% of a number must yield an answer that is larger than the original number.
K8 - $p(x + q) = px + pq$, where p and q are specific rational numbers.

Skills
Students will be able to…

S1 - solve multi-step real-life and mathematical problems posed with positive and negative rational numbers in any form (whole numbers, fractions, and decimals).
S2 - convert between different forms of a number.
S3 - assess the reasonableness of answers using mental computation and estimation strategies.
S4 - use variables to represent quantities in a real-world or mathematical problem.
S5 - construct simple equations ($px + q = r$ and $p(x + q) = r$) to solve problems by reasoning about the quantities.
S6 - construct simple inequalities ($px + q > r$ or $px + q < r$) to solve problems by reasoning about the quantities.
S7 - formulate mathematical equations (or inequalities) from words.
S8 - graph the solution set of an inequality.
S9 - interpret the solution set of an inequality in the context of a problem.

K9 - when multiplying or dividing both sides of an inequality by a negative number, every term must change signs and the inequality symbol reverses.
K10 - the graph of the solution set of a single variable inequality will be a ray on a number line.
K11 - in the graph of an inequality, the endpoint will be a closed circle indicating the number is included in the solution set ($\leq or \geq$) or an open circle indicating the number is not included in the solution set ($< or >$).

Evidence (Stage 2)

Checks for Alignment	*Evaluation Criteria* **Performance is judged in terms of...**	*Assessment Evidence*
U1- U4 **Q1- Q2** **K1- K11**	Formative ● question-answer in class ● homework ● do now ● exit pass Summative ● projects ● periodic assessment tasks	## Transfer Task(s) Solve real-life and mathematical problems using numerical and algebraic expressions and equations. **S1 – S9**

Learning Plan (Stage 3)		
Checks for alignment and best practice	**Summary of Key Learning Events and Instruction** *The teaching and learning needed to achieve the unit goals.*	
	Required Activities	Required Resources
	Student groups are formed to examine the Looking Back problems in the text.	Moving Straight Ahead
	Suggested Activities	Suggested Resources
	Unit Project ● Students will collaborate to complete the Ball Bounce Experiment Teaching the CCSS: Hands-On Activities ● Estimation Game ● Writing Equations ● Solving Inequalities 1-8 An Introduction to Equations ● Think About a Plan ● Puzzle: "Algebra Connections" ● Standardized Test Prep ● Concept Byte: "Using Tables to Solve Equations" (p59) Mathematics Performance Task Bank ● Sink or Swim ● The Double Scoop Dilemma Virtual Classroom ● Students learn at their own pace using online tutorials	Moving Straight Ahead Teaching the Common Core Math Standards (with Hands-On Activities) Prentice Hall Algebra 1 Text Up-to-Speed Math Story Problems Mathematics Problems Solving Coach www.rda.aps.edu https://www.hstutorials.net http://www.algebrahelp.com http://www.freemathhelp.com https://www.purplemath.com

Title of Unit	Geometry	Grade Level	7
Curriculum Area	Mathematics	Time Frame	3-4 days
Developed By	Marc Kessler		

Desired Results (Stage 1)

Established Goals/Standards

7.G.1 Solve problems involving scale drawings of geometric figures, including computing actual lengths and areas from a scale drawing and reproducing a scale drawing at a different scale.

7.G.2 Draw (with technology, with ruler and protractor as well as freehand) geometric shapes with given conditions. Focus on constructing triangles from three measures of angles or sides, noticing when the conditions determine a unique triangle, more than one triangle, or no triangle.

7.G.3 Describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

Primary Interdisciplinary Connections

LAL: Connect math and literacy through reading books

21st Century Interdisciplinary Themes:
        _X_ Global Awareness   _X_ Financial, economic, business, and entrepreneurial literacy
        ___ Civic Literacy   ___ Health Literacy

Transfer	
Students will be able to independently use their learning to draw, construct, and describe geometrical figures and describe the relationships between them.	

Meaning	
Understandings Students will understand that…	**Essential Questions** Students will keep considering…

U1 - figures are similar only if
  -corresponding side lengths are proportional;
  -corresponding angles are congruent.
U2 - applying a scale factor less than one will shrink a figure.
U3 - applying a scale factors greater than one will enlarge a figure.
U4 - only certain combinations of angle and side measures will create triangles.
U5 - slicing a three-dimensional figure creates a two-dimensional cross section.
	Q1 - How do certain professions utilize scale drawings?

Knowledge Students will know…	**Skills** Students will be able to…
K1 - there is a proportional relationship between the corresponding sides of similar figures. **K2 -** the corresponding angles of similar figures are congruent. **K3 -** scale factor is the number that the side lengths of one figure can be multiplied by to give the corresponding side lengths of the other figure. **K4 -** a proportion can be set up using the appropriate corresponding side lengths of two similar figures. **K5 -** if a side length is unknown, a proportion can be solved to determine the measure of it. **K6 -** the names and properties of two-dimensional shapes. **K7 -** the names and properties of three-dimensional solids.	**S1 -** solve problems involving scale drawings of geometric figures. **S2 -** compute actual lengths from a scale drawing. **S3** - compute actual areas from a scale drawing. **S4 -** reproduce a scale drawing at a different scale. **S5 -** freehand, draw geometric shapes with given conditions. **S6 -** using a ruler and protractor, draw geometric shapes with given conditions. **S7 -** using technology, draw geometric shapes with given conditions. **S8 -** construct triangles from three measures of angles or sides. **S9 -** identify the conditions that determine a unique triangle, more than one triangle, or no triangle. **S10 -** describe the two-dimensional figures that result from slicing three-dimensional figures, as in plane sections of right rectangular prisms and right rectangular pyramids.

Evidence (Stage 2)

Checks for Alignment	Evaluation Criteria Performance is judged in terms of…	Assessment Evidence
U1 – U5 Q1 K1 – K7	Formative ● question-answer in class ● homework ● do now ● exit pass	**Transfer Task(s)** Draw, construct, and describe geometrical figures and describe the relationships between them.
	Summative ● projects ● periodic assessment tasks	**S1 – S10**

Learning Plan (Stage 3)

Checks for alignment and best practice	Summary of Key Learning Events and Instruction	
	The teaching and learning needed to achieve the unit goals.	
	Required Activities	Required Resources
	Student groups are formed to examine the Looking Back problems in the text.	Stretching and Shrinking
	Suggested Activities	Suggested Resources
	Unit Project ● Students will collaborate to complete Shrinking or Enlarging Pictures Teaching the CCSS with Hands-On Activities ● Scaling Your Classroom ● Creating Triangles ● A Virtual Cube Virtual Classroom ● Students learn at their own pace using online tutorials	Stretching and Shrinking Teaching the Common Core Math Standards (with Hands-On Activities) www.ixl.com www.algebralab.org www.nctm.org www.pbskids.org http://sakharov.net/ http://www.fi.uu.nl/

Title of Unit	Geometry	Grade Level	7
Curriculum Area	Mathematics	Time Frame	5-6 days
Developed By	Marc Kessler		

Desired Results (Stage 1)

Established Goals/Standards

7.G.4 Know the formulas for the area and circumference of a circle and use them to solve problems; give an informal derivation of the relationship between the circumference and area of a circle.

7.G.5 Use facts about supplementary, complementary, vertical, and adjacent angles in a multi-step problem to write and solve simple equations for an unknown angle in a figure.

7.G.6 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.

Primary Interdisciplinary Connections

LAL: Connect math and literacy through reading books

21st Century Interdisciplinary Themes:
        _X_ Global Awareness   **_X_ Financial, economic, business, and entrepreneurial literacy**
        ___ Civic Literacy   **___ Health Literacy**

Transfer

Students will be able to independently use their learning to solve real-life and mathematical problems involving angle measure, area, surface area, and volume.

Meaning

Understandings
Students will understand that…

U1 - area is the number of square units needed to cover a two-dimensional figure.
U2 - circumference is the number of linear units needed to surround a circle.
U3 - the circumference of a circle is related to its diameter (and also its radius).
U4 - there is a relationship between the circumference and the area of a circle.
U5 - relationships between angles depends on where the angles are located.
U6 - a cube is a special case of a right rectangular prism.
U7 - volume is the number of cubic units needed to fill a three-dimensional space.
U8 - surface area is the number of square units needed to cover all faces of a three-dimensional figure.
U9 - area and volume are additive (small pieces can be found and added together to make the whole).

Essential Questions
Students will keep considering…

Q1 - When would one want to find area of a figure?
Q2 - When would one want to find surface area of a figure?
Q3 - When would one want to find volume of a figure?
Q4 - How would changing the radius or diameter of a circle affect its circumference and area?

Knowledge
Students will know…

K1 - $A=\pi r^2$
K2 - $C=\pi d=2\pi r$
K3 - supplementary angles are angles whose measures add to 180 degrees.
K4 - complementary angles are angles whose measures add to 90 degrees.
K5 - vertical angles are opposite angles formed when two lines intersect.
K6 - adjacent angles are non-overlapping angles which share a common vertex and side.
K7 - volume of a cube = s^3, where s equals the length of a side.
K8 - volume of a right prism = Bh, where B equals the area of the base and h equals the height of the prism.
K9 - an irregular two-dimensional figure can be broken apart into triangles, quadrilaterals, and other polygons whose areas are easy to find.

Skills
Students will be able to…

S1 - use the formula for area of a circle to solve problems.
S2 - use the formula(s) for circumference of a circle to solve problems.
S3 - give an informal derivation of the relationship between the circumference and area of a circle.
S4 - use facts…?
S5 - write a simple equation to find an unknown angle.
S6 - solve a solve simple equations.
S7 - solve real-world and mathematical problems involving area of two-dimensional objects composed of triangles, quadrilaterals, and polygons.

	S8 - solve real-world and mathematical problems involving volume and surface area of three-dimensional objects composed of cubes and right prisms.

Evidence (Stage 2)

**Checks for Alignment**	_**Evaluation Criteria**_ **Performance is judged in terms of...**	_**Assessment Evidence**_
U1 – U9 **Q1 – Q4** **K1 – K9**	Formative ● question-answer in class ● homework ● do now ● exit pass Summative ● projects ● periodic assessment tasks	## Transfer Task(s) Solve real-life and mathematical problems involving angle measure, area, surface area, and volume. **S1 – S8**

Learning Plan (Stage 3)

Checks for alignment and best practice	Summary of Key Learning Events and Instruction _The teaching and learning needed to achieve the unit goals._	
	Required Activities	Required Resources
	Student groups are formed to examine the Looking Back problems in the text.	Filling and Wrapping
	Suggested Activities	Suggested Resources
	Unit Project ● Students will collaborate to complete The Package Design Contest Teaching the CCSS with Hands-On Activities ● Circle Scavenger Hunt/What's the Relationship? ● What's the Angle Additional Hands-On Activities ● Table for 22 ● Discovering the Surface Area of a Cylinder Virtual Classroom	Filling and Wrapping Teaching the Common Core Math Standards (with Hands-On Activities) Teachingchannel.org http://www.coolmath.com/ http://www.gcseguide.co.uk http://www.walter-fendt.de/

	• Students learn at their own pace using online tutorials	http://www.mathopenref.com/similartriangles.html http://www.math.com/ http://www.mathsisfun.com/ http://www.haelmedia.com/

Title of Unit	Statistics and Probability	Grade Level	7
Curriculum Area	Mathematics	Time Frame	2-3 days
Developed By	Marc Kessler		

Desired Results (Stage 1)

Established Goals/Standards

7.SP.1. Understand that statistics can be used to gain information about a population by examining a sample of the population; generalizations about a population from a sample are valid only if the sample is representative of that population. Understand that random sampling tends to produce representative samples and support valid inferences.

7.SP.2. Use data from a random sample to draw inferences about a population with an unknown characteristic of interest. Generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.*

7.SP.3. Informally assess the degree of visual overlap of two numerical data distributions with similar variabilities, measuring the difference between the centers by expressing it as a multiple of a measure of variability. *For example, the mean height of players on the basketball team is 10 cm greater than the mean height of players on the soccer team, about twice the variability (mean absolute deviation) on either team; on a dot plot, the separation between the two distributions of heights is noticeable.*

7.SP.4. Use measures of center and measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. *For example, decide whether the words in a chapter of a seventh-grade science book are generally longer than the words in a chapter of a fourth-grade science book.*

Primary Interdisciplinary Connections

LAL: Connect math and literacy through reading books

21st Century Interdisciplinary Themes:
        _X_ Global Awareness   **_X_ Financial, economic, business, and entrepreneurial literacy**
        ___ Civic Literacy   **___ Health Literacy**

Transfer
Students will be able to independently use their learning to use random sampling to draw inferences about a population.

Students will be able to independently use their learning to draw informal comparative inferences about two populations. |

Meaning	
Understandings Students will understand that…	**Essential Questions** Students will keep considering…
U1 - statistics can be used to gain information about a population by examining a sample of the populations. **U2 -** generalizations about a population from a sample are valid only if the sample is representative of that population. **U3 -** random sampling tends to produce representative samples and support valid inferences. **U4 -** outliers skew data, which in turn affects the display. **U5 -** measures of center give information about the location of mean, median and mode, whereas measures of variability give information about how spread out the data is.	**Q1 -** What is the relationship between a sample and a population? **Q2 -** Why would one want to compare two populations? **Q3 -** What does the shape of data in a display tell one about the data?
Knowledge Students will know…	**Skills** Students will be able to…
K1 - A random sample can be found by various methods, including simulations or a random number generator (from a graphing calculator or table). **K2 -** Samples should be the same size in order to compare the variation in estimates or predictions. **K3 -** mean is the result if all of the data values are combined and then redistributed evenly among individuals so that each has the same amount. **K4 -** mean is often called the average, and is the sum of the numerical values divided by the number of values. **K5 -** median is the number that is the midpoint of an ordered set of numerical data. **K6 -** when a distribution contains an even number of data values, the median is computed by finding the average of the two middle data values in on ordered list of the data values.	**S1 -** use data from a random sample to raw inferences about a population with an unknown characteristic of interest. **S2 -** generate multiple samples (or simulated samples) of the same size to gauge the variation in estimates or predictions. *For example, estimate the mean word length in a book by randomly sampling words from the book; predict the winner of a school election based on randomly sampled survey data. Gauge how far off the estimate or prediction might be.* **S3 -** informally assess the degree of visual overlap of two numerical data distributions with similar variabilities. **S4 -** measure the difference between the centers by expressing it as a multiple of a measure of variability.

| K7 - mode is the data value or category occurring with the greatest frequency (there can be no mode, one mode, or several modes).

K8 - mean absolute deviation of a data set is found by the following steps:
   1) calculate the mean
   2) determine the deviation of each variable from the mean
   3) divide the sum of the absolute value of each deviation by the number of data points

K9 - range is a number found by subtracting the minimum value from the maximum value. | S5 - use measures of center for numerical data from random samples to draw informal comparative inferences about two populations.

S6 - use measures of variability for numerical data from random samples to draw informal comparative inferences about two populations. |

Evidence (Stage 2)

Checks for Alignment	Evaluation Criteria Performance is judged in terms of...	Assessment Evidence

U1 – U5
Q1 – Q3
K1 – K9
	Formative
	  • question-answer in class
	  • homework
	  • do now
	  • exit pass
	
	Summative
	  • projects
	  • periodic assessment tasks
		Transfer Task(s)
		Use random sampling to draw inferences about a population.
		Draw informal comparative inferences about two populations.
		
		S1 – S6

Learning Plan (Stage 3)		
Checks for alignment and best practice	**Summary of Key Learning Events and Instruction** *The teaching and learning needed to achieve the unit goals.*	
	Required Activities	Required Resources
	Student groups are formed to examine the Looking Back problems in the text.	Samples and Populations
	Suggested Activities	Suggested Resources
	Teaching the CCSS with Hands-On Activities ● Examining Samples ● How Many Cubes? ● How Well Did They Do? ● What Can We Say? ● On A Scale of One to Zero Virtual Classroom ● Students learn at their own pace using online tutorials	Teaching the Common Core Math Standards (with Hands-On Activities) http://shodor.org http://nces.ed.gov http://www.beaconlearningcenter.com http://media.emgames.com/emgames http://illuminations.nctm.org/

Title of Unit	Statistics and Probability	Grade Level	7
Curriculum Area	Mathematics	Time Frame	2-3 days
Developed By	Marc Kessler		

Desired Results (Stage 1)

Established Goals/Standards

7.SP.5. Understand that the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. Larger numbers indicate greater likelihood. 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.

7.SP.6. Approximate the probability of a chance event by collecting data on the chance process that produces it and observing its long-run relative frequency, and predict the approximate relative frequency given the probability. *For example, when rolling a number cube 600 times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.*

7.SP.7. Develop a probability model and use it to find probabilities of events. Compare probabilities from a model to observed frequencies; if the agreement is not good, explain possible sources of the discrepancy.
   a. Develop a uniform probability model by assigning equal probability to all outcomes, and use the model to determine probabilities of events. *For example, if a student is selected at random from a class, find the probability that Jane will be selected and the probability that a girl will be selected.*
   b. Develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process. *For example, find the approximate probability that a spinning penny will land heads up or that a tossed paper cup will land open-end down. Do the outcomes for the spinning penny appear to be equally likely based on the observed frequencies?*

7.SP.8. Find probabilities of compound events using organized lists, tables, tree diagrams, and simulation.
   a. Understand that, just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs.
   b. Represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams. For an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
   c. Design and use a simulation to generate frequencies for compound events. *For example, use random digits as a simulation tool to approximate the answer to the question: If 40% of donors have type A blood, what is the probability that it will take at least 4 donors to find one with type A blood?*

Primary Interdisciplinary Connections

LAL: Connect math and literacy through reading books

21st Century Interdisciplinary Themes:

      _X_ Global Awareness   **_X_ Financial, economic, business, and entrepreneurial literacy**

      ___ Civic Literacy   **___ Health Literacy**

Transfer

Students will be able to independently use their learning to investigate chance processes and develop, use, and evaluate probability models.

Meaning

Understandings Students will understand that…	**Essential Questions** Students will keep considering…
U1 - the probability of a chance event is a number between 0 and 1 that expresses the likelihood of the event occurring. **U2 -** just as with simple events, the probability of a compound event is the fraction of outcomes in the sample space for which the compound event occurs. **U3 -** probability models can be used to find the probability of events.	**Q1 -** What real-life applications would involve finding the probability of an event? **Q2 -** What is the purpose of a simulation? **Q3 -** Why would one need to use a probability model?

Knowledge Students will know…	**Skills** Students will be able to…
K1 - probability is equal to the ratio of favorable number of outcomes to total possible number of outcomes. **K2 -** as a number for probability increases, so does the likelihood of the event occurring. **K3 -** a probability near 0 indicates an unlikely event. **K4 -** a probability around 1/2 indicates an event that is neither unlikely nor likely. **K5 -** a probability near 1 indicates a likely event. **K6 -** long-run relative frequencies allow one to approximate the probability of a chance event and vice versa. *For example, when rolling a number cube 600*	**S1 -** approximate the probability of a chance event. **S2 -** collect data on the chance process that produces an event. **S3 -** observe an event's long-run relative frequency. **S4 -** predict the approximate relative frequency of an event given the probability. **S5 -** develop a probability model. **S6 -** use a developed probability model to find probabilities of events. **S7 -** compare probabilities from a model to observed frequencies. **S8 -** if the agreement between the probability model and observed frequencies is not good, explain possible sources of the discrepancy.

times, predict that a 3 or 6 would be rolled roughly 200 times, but probably not exactly 200 times.

K7 - a probability model is a visual display of the sample space and each corresponding probability. *For example, toss a die—the sample space is {1, 2, 3, 4, 5, 6} and the probability of each is 1/6. Therefore, the probability model is*

<u>outcome   1   2   3   4   5   6</u>
       probability 1/6 1/6 1/6 1/6 1/6 1/6

K8 - a uniform probability model has equally likely probabilities.
K9 - discrepancies between a model and observed frequencies could occur for various reasons, including experimental error, recording error or simulations that were improperly designed.
K10 - a compound event consists of two or more simple events.
K11 - a sample space is a list of all possible outcomes of an experiment.
K12 - how to make an organized list.
K13 - how to create a tree diagram.

S9 - develop a probability model (which may not be uniform) by observing frequencies in data generated from a chance process.
S10 - find probabilities of compound events using organized lists.
S11 - find probabilities of compound events using tables.
S12 - find probabilities of compound events using tree diagrams.
S13 - find probabilities of compound events using simulation.
S14 - represent sample spaces for compound events using methods such as organized lists, tables and tree diagrams.
S15 - for an event described in everyday language (e.g., "rolling double sixes"), identify the outcomes in the sample space which compose the event.
S16 - design a simulation to generate frequencies for compound events.
S17 - use a designed simulation to generate frequencies for compound events.

Evidence (Stage 2)

Checks for Alignment	*Evaluation Criteria* **Performance is judged in terms of…**	*Assessment Evidence*
U1 – U3 **Q1 – Q3** **K1 – K13**	Formative ● question-answer in class ● homework ● do now ● exit pass Summative ● projects ● periodic assessment tasks	## Transfer Task(s) Investigate chance processes and develop, use, and evaluate probability models. **S1 – S17**

Learning Plan (Stage 3)

Checks for alignment and best practice	**Summary of Key Learning Events and Instruction** *The teaching and learning needed to achieve the unit goals.*	
	Required Activities	Required Resources
	Student groups are formed to examine the Looking Back problems in the text.	What Do You Expect?
	Suggested Activities	Suggested Resources
	Unit Project ● Students will collaborate to complete The Carnival Game Teaching the Common Core Math Standards (with Hands-On Activities) ● On A Scale of Zero to One ● Probability Simulations ● Spinner Experiment ● Working with Sample Spaces Virtual Classroom ● Students learn at their own pace using online tutorials	What Do You Expect? Teaching the Common Core Math Standards (with Hands-On Activities) http://shodor.org http://nces.ed.gov http://www.beaconlearningcenter.com http://media.emgames.com/emgames http://illuminations.nctm.org/