Randolph Township Schools
Randolph Middle School

Grade 8 Mathematics Curriculum

"Mathematics is the door and key to the sciences."
- *Roger Bacon*

Department of Science, Technology, Engineering, and Math
Anne V. Richardson, STEM Supervisor

Curriculum Committee
Ryan Hallock
Bryan Mate
Lara Hirshensen
Revision Committee
Tasha Delp, Susan Wolff
Ryan Hallock, Bryan Mate
Curriculum Developed
July 2014
Curriculum Revised
July 2016
Date of Board Approval:

Randolph Township Schools
Department of Mathematics
Grade 8 Mathematics

Table of Contents

Randolph Township Schools

Mission Statement

We commit to inspiring and empowering all students in Randolph schools to reach their full potential as unique, responsible and educated members of a global society.

Randolph Township Schools
Affirmative Action Statement

Equality and Equity in Curriculum

The Randolph Township School district ensures that the district's curriculum and instruction are aligned to the state's standards.   The curriculum provides equity in instruction, educational programs and provides all students the opportunity to interact positively with others regardless of race, creed, color, national origin, ancestry, age, marital status, affectional or sexual orientation, gender, religion, disability or socioeconomic status.

N.J.A.C. 6A:7-1.7(b): Section 504, Rehabilitation Act of 1973; N.J.S.A. 10:5; Title IX, Education Amendments of 1972

RANDOLPH TOWNSHIP BOARD OF EDUCATION
EDUCATIONAL GOALS
VALUES IN EDUCATION

The statements represent the beliefs and values regarding our educational system. Education is the key to self-actualization, which is realized through achievement and self-respect. We believe our entire system must not only represent these values, but also demonstrate them in all that we do as a school system.

We believe:
- The needs of the child come first
- Mutual respect and trust are the cornerstones of a learning community
- The learning community consists of students, educators, parents, administrators, educational support personnel, the community and Board of Education members
- A successful learning community communicates honestly and openly in a non-threatening environment
- Members of our learning community have different needs at different times. There is openness to the challenge of meeting those needs in professional and supportive ways
- Assessment of professionals (i.e., educators, administrators and educational support personnel) is a dynamic process that requires review and revision based on evolving research, practices and experiences
- Development of desired capabilities comes in stages and is achieved through hard work, reflection and ongoing growth

Randolph Township Schools
Department of Science, Technology, Engineering, & Mathematics

Introduction

Randolph Township Schools is committed to excellence. We believe that all children are entitled to an education that will equip them to become productive citizens of the 21st century. We believe that an education grounded in the fundamental principles of science, technology, engineering, and math (STEM) will provide students with the skills and content necessary to become future leaders and lifelong learners.

A sound STEM education is grounded in the principles of inquiry, rigor, and relevance. Students will be actively engaged in learning as they use real-world STEM skills to construct knowledge. They will have ample opportunities to manipulate materials and solve problems in ways that are developmentally appropriate to their age. They will work in an environment that encourages them to take risks, think critically, build models, observe patterns, and recognize anomalies in those patterns. Students will be encouraged to ask questions, not just the "how" and the "what" of observed phenomena, but also the "why". They will develop the ability, confidence, and motivation to succeed academically and personally.

STEM literacy requires understandings and habits of mind that enable students to make sense of how our world works. As described in Project 2061's *Benchmarks in Science Literacy, The Standards for Technological Literacy,* and *Professional Standards for Teaching Mathematics,* literacy in these subject areas enables people to think critically and independently. Scientifically and technologically literate citizens deal sensibly with problems that involve mathematics, evidence, patterns, logical arguments, uncertainty, and problem-solving.

Grade 8 Mathematics

Introduction

Mathematics Grade 8 is the third middle school math course, advanced and standard levels, that is given for eighth grade students.   This course introduces key concepts and tools that will be essential for students as they prepare for Algebra. Students will become familiar with pre-algebra topics such as exponents, equations, and the Pythagorean Theorem. Students will also be introduced to functional relationships which include linear, exponential, and quadratic functions. Through this course, students will be prepared for Algebra with the proper vocabulary, methods, and meanings. This course provides a strong foundation for students to continue the study of Algebra throughout high school.

The course makes use of technology to analyze and present real data. Students are encouraged to incorporate their knowledge and interest in other disciplines into project work. In addition to gaining skills necessary to produce, analyze, model and draw conclusions from data, students are encouraged to develop skills required to persevere in problem solving, produce convincing oral and written mathematical arguments, using appropriate terminology in a variety of settings.

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Curriculum Pacing Chart
Grade 8 Mathematics

SUGGESTED TIME ALLOTMENT	UNIT NUMBER	CONTENT - UNIT OF STUDY
7 weeks	I	Exponents
10 weeks	II	Equations
4 weeks	III	Relationships and Functions
4 weeks	IV	Pythagorean Theorem and Volume of Geometric Solids
7 weeks	V	Geometry
4 weeks	VI	Data Analysis

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
UNIT I: Exponents

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Mathematics **8.NS.A.1** Know that numbers that are not rational are called irrational and has a decimal expansion. **8.NS.A.2** Use rational approximations to compare the size of irrational numbers and locate them on a number line. **8.EE.A.1** Know and apply the properties of integer exponents to generate equivalent numerical expressions. **8.EE.A.2** Use square root and cube root symbols to represent solutions to equations. **8.EE.A.3** Use numbers expressed in the form of a single digit times an integer power of 10.	You can use exponential notation to represent repeated multiplication of the same factor.	• Why is it beneficial to be able to express a number in multiple forms?
	The rules of exponents allow us to represent and simplify complicated expressions.	• What do we notice about the value of any exponential term with an integer or fractional base?
	Scientific notation is a way of writing numbers that makes it easier to work with very large or very small numbers.	• How can we use our knowledge of pre-fixes and exponents to determine the magnitude of a number expressed in scientific notation?
8.EE.A.4 Perform operations with numbers expressed in scientific notation. **Mathematical Practices** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and	**KNOWLEDGE**	**SKILLS**
	Students will know: Exponents with equivalent bases can be combined as one term. Negative exponents represent values that are found through the use of reciprocals. The meaning of a zero and fractional exponents.	**Students will be able to:** Evaluate expressions with exponents. Evaluate expressions with negative exponents - evaluate expressions with zero exponents. Use properties of exponents to convert powers with fractional bases to square and cube roots.

critique the reasoning of others.		Simplify expressions involving bases with a zero power.
MP4 Model with mathematics.		
MP5 Use appropriate tools strategically.	Exponent properties.	Apply the product and quotient of powers.
MP6 Attend to precision.		Apply power of a power.
MP7 Look for and make use of structure.		Apply power of a product and power of a quotient.
MP8 Look for and express regularity in repeated reasoning.	Proper format for scientific notation.	Express large and small numbers in scientific notation and compare two numbers in scientific notation.
CCSS.ELA-Science & Technical **WHST.6-8.1.B** **WHST.6-8.1.C** **RST.6-8.3** **RST.6-8.4** **RST.6-8.7** **RST.6-8.9** **RST.6-8.10**	Convert into and out of scientific notation.	Compare and interpret scientific notation quantities in the context of the situation. Use laws of exponents to perform operations with numbers written in scientific notation.
Speaking and Listening **SL.8.1.C** **SL.8.1.D** **SL.8.3** **SL.8.4**	Perfect squares from 1 to 25 and perfect cubes from 1 to 8.	Solve equations with mathematical operations using numbers in scientific notation. Evaluate the square root and cube root of perfect squares and perfect cubes.
Technology Literacy **8.1.8.A.5**	Perfect squares can be used to help estimate values of non-perfect squares.	Estimate square roots of non-perfect squares to the nearest integer.
Science **5.2.12.A.6** .	Scientific notation as generated on various calculators or other technology.	Use technology to assist in solving real-world problems involving scientific notation.
	In scientific notation, an increase of 1 in the exponent, results in the value increasing 10 times.	Apply the pattern of increasing exponents. Science Interdisciplinary: Use powers of 10 to calculate and compare the pH levels of various solutions.

	VOCABULARY: base, exponent, exponential notation, power, prime factorization, coefficient, scientific notation, standard form **KEY TERMS:** power to a power, power of a product, power of a quotient, prefix system	

ASSESSMENT EVIDENCE: Students will show their learning by:
- Pre-Assessments, Quizzes
- Math in Focus Chapter & Benchmark Assessments

KEY LEARNING EVENTS AND INSTRUCTION:
-

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
UNIT I: Exponents

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
7 Weeks	**Unit I: Exponents** • Real Numbers • Rational Approximations • Exponential Notation • The Product and the Quotient of Powers • The Power of a Power • The Power of a Product and the Power of a Quotient • Zero and Negative Exponents • Square & Cube Roots • Scientific Notation • Adding and Subtracting in	Number Line Creator http://themathworksheetsite.com/numline.html Worksheets http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Holt Mathematics Course 3 Textbook Positive and Negative Integers in Golf video www.nbclearn.com/science-of-golf Math in Focus – Singapore Math Textbook Interactive math practice www.ixl.com Absolute Value http://www.sheppardsoftware.com/mathgames/Numberballs_absolute_value/numberballsAS2_abs.htm Math Goodies Interactive Practice www.mathgoodies.com

	Scientific Notation • Multiplying and Dividing in Scientific Notation	

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
UNIT II: Equations

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Mathematics **8.EE.B.5** Compare two different proportional relationships represented in different ways. **8.EE.B.6** 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. **8.EE.C.7.A** Give examples of linear equations in one variable with one solution, infinitely many solutions, or no solutions. **8.EE.C.7.B** Solve linear equations with rational number coefficients, including equations whose solutions require expanding expressions using the distributive property and collecting like terms. **8.EE.C.8.A** Understand that solutions to a system of two linear equations in two variables correspond to points of intersection of their graphs. **8.EE.C.8.B** Solve systems of two linear equations in two variables algebraically, and estimate solutions by graphing the equations.	A linear equation with one variable can have one solution, no solution, or infinitely many solutions.	• How do you verify that your solution to a linear equation is correct?
	The graph of a linear equation in two variables is a line, and you can write the equation of the line in slope intercept form.	• What information can we infer from the relationship between two variables based on the slope and y-intercept of the graph or equation?
	Several representations of linear equations and systems are used to model and solve real-world problems.	• What characteristics determine which method should be used to solve a system of equations?
	KNOWLEDGE	**SKILLS**
	Students will know: Number properties and properties of equality can be used to justify equation solving.	**Students will be able to:** Solve equations with a variable on one side and variables on both sides. Apply the appropriate properties to combine like terms in order to isolate the variable while solving equations.

8.EE.C.8.C Solve real world and mathematical problems leading to two linear equations in two variables. **Mathematical Practices** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **CCSS.ELA-Science & Technical** **WHST.6-8.1.B** **WHST.6-8.1.C** **RST.6-8.3** **RST.6-8.4** **RST.6-8.7** **RST.6-8.9** **RST.6-8.10** **Speaking and Listening** **SL.8.1.C** **SL.8.1.D** **SL.8.4** **SL.8.6** **Technology Literacy** **8.1.8.A.5** **8.1.8.E.1**	Linear equations may have one solution, no solution, or infinitely many solutions. A proportional relationship can be shown as a graph on a coordinate plane. There are three forms of linear equations. Graphs, tables, and equations can be used to determine the unit rate of a proportional relationship. The significance of slope and intercepts of linear equations in relation to real-world situations. Systems of linear equations can be solved by the elimination method, the substitution method, or by graphing.	Solve two step and multi-step equations. Solve equations that have one solution, no solution, or infinitely many solutions, and explain why. Identify special cases, such as no solution or infinitely many solutions and understand their meaning. Graph linear equations on a coordinate plane from given data (i.e. tables, different forms of equations, word problems) to demonstrate a proportional relationship. Convert any two variable real-world problems or mathematical problems into the most appropriate form of a linear equation (i.e. standard form, slope-intercept, point-slope, etc.). Represent functions and relations numerically, graphically, and algebraically. Analyze a graphical representation of a situation and create the corresponding linear equation shown. Develop a real world application from a given graph or equation. Determine the most efficient method for solving a linear system based on the information given. When solving graphically, students will recall upon prior knowledge of graphing linear equations. Create equivalent linear equations in order to facilitate the use of the elimination method. Recognize and use the technique of isolating a

| | | variable in order to use the substitution method.

Determine whether a system of linear equations has no, one, are infinitely many solutions |

Systems of linear equations may have one solution, no solution, or infinitely many solutions.

VOCABULARY: inconsistent equations, consistent equations, identity, slope, rise, run, y-intercept, x-intercept, slope-intercept form, linear relationship, system of linear equations, unique solution, common term, elimination method, substitution method, standard form, graphical method, point of intersection, inconsistent system of equations, dependent system of equations

KEY TERMS: substitute, solve, identify, y=mx+b, parallel lines

ASSESSMENT EVIDENCE: Students will show their learning by:
- Pre-assessments, Quizzes
- Math in Focus Chapter & Benchmark Assessments

KEY LEARNING EVENTS AND INSTRUCTION:
- Systems of Equations project—reference Appendix B

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
10 Weeks	**Unit II: Equations** • Solving Linear Equations in One Variable • Identifying the Number of Solutions • Understanding Linear Equations with Two Variables • Solving for a Two Variable Linear Equation • Find and Interpret Slopes of Lines • Understanding Slope-Intercept Form • Writing Linear Equations • Sketching Graphs of Linear Equations. • Introduction to Systems of Linear Equations • Solving Systems of Linear Equations using Algebraic Methods • Solving Systems of Linear Equations by Graphing • Inconsistent and Dependent Systems of Linear Equations	Worksheets http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Holt Mathematics Course 3 Textbook STEM Worksheets www.superteacherworksheets.com Interactive math practice www.ixl.com Electronic Flashcards on solving inequalities http://www.quia.com/jfc/906428.htm Students must solve equations and find pairs of equations that "match" http://www.bbc.co.uk/education/mathsfile/shockwave/games/equationmatch.html Solving Equations: How Sweet It Is! – hand-on approach to solving equations http://www.lpb.org/education/classroom/itv/algebra/sweet.pdf System of Equations Activities http://www.ilovemath.org/index.php?option=com_docman&task=cat_view&gid=53 More Systems Activities http://player.discoveryeducation.com/index.cfm?guidAssetId=41BD9CF7-7138-46E9-A81B-BB0E01B7526A&blnFromSearch=1&productcode=US Systems Jeopardy

		http://www.quia.com/cb/79607.html Solving systems of equations basketball game http://www.crctlessons.com/systems-of-equations-game.html

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Mathematics **8.F.A.1** Understand that a function is a rule that assigns to each input exactly one output. **8.F.A.2** Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions). **8.F.A.3** Interpret the equation y=mx+b as defining a linear function, whose graph is a straight line and give examples of functions that are not linear. **8.F.B.4** Construct a function to model a linear relationship between two quantities. Determine and interpret rate of change and initial value of the function. **8.F.B.5** Describe qualitatively the functional relationship between two quantities by analyzing a graph and sketch a graph of a function that has been described verbally. **Mathematical Practices** **MP1** Make sense of problems and persevere in solving them.	Functional relationships between two quantities can be expressed using ordered pairs of numbers.	• In what ways can the relationship between two variables be displayed?
	The value of one variable may be uniquely determined by the value of another variable.	• Why can some situations be represented as functions, while others cannot?
	A function is a relation between a set of inputs and a set of outputs, in which every input has exactly one output.	• What are various ways you can model a relation? What is the best way to display the relationship?
	KNOWLEDGE	**SKILLS**
	Students will know: A function is a relationship between variables in which each value of the input variable is associated with a unique value of the output variable. The graph of a function is the set of ordered pairs consisting of an input and the corresponding output. Functions can be represented as rules, tables, and graphs.	**Students will be able to:** Use functions to model real-world phenomena and solve problems. Identify when a set of ordered pairs, graph, or table represents a function. Graph a relation from a table of values.

MP2 Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **CCSS.ELA-Science & Technical** **WHST.6-8.1.B** **WHST.6-8.1.C** **RST.6-8.3** **RST.6-8.4** **RST.6-8.7** **RST.6-8.9** **RST.6-8.10** **Speaking and Listening** **SL.8.1.C** **SL.8.1.D** **SL.8.4** **SL.8.6** **Technology Literacy** **8.1.8.A.5** **8.1.8.E.1** **Science** **5.2.12.E.1** **5.2.8.E.2**	Function maps. The unit rate is the change in the y value per 1 unit change in the x value. Undefined slope is defined as a vertical line. Parent linear, exponential, and quadratic functions. The vertical motion model. A linear function is defined by an equation in slope-intercept, standard, or point-slope form whose graph is a straight line. The rate of change is the ratio that compares the change in the y values to the change in the x values between two points. **VOCABULARY:** relation, input, output, function, vertical line test, linear function, rate of change, nonlinear function **KEY TERMS:** mapping, types of relations, increasing function, decreasing function	Write a function representing a given graph or table of values. Using the unit rate (slope), compare properties of two functions each represented algebraically, graphically, numerically, or by verbal descriptions. Use the vertical line test to identify if a relation is a function. Identify and compare linear, exponential and quadratic models. Solve for an unknown quantity using the vertical motion model. Science Interdisciplinary: Students will assess the changes in variables based on experiments conducted in Science lab utilizing vertical motion model in various scenarios. Graph functions to show the relationship represented by a set of ordered pairs. Determine the rate of change and initial value of a function from a description of a relationship or from two ordered pairs, algebraically, numerically, or graphically.

ASSESSMENT EVIDENCE: Students will show their learning by:
- Pre-assessments, Quizzes
- Math in Focus Chapter & Benchmark Assessments

KEY LEARNING EVENTS AND INSTRUCTION:
- Systems of Equations project—reference Appendix B (Project could be used during Unit III to illustrate relationships between functions)

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
Unit III: Relationships and Functions

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
4 Weeks	**Unit III: Relationships and Functions** • Understanding Relations and Functions • Representing Functions • Understanding Linear and Non-Linear Functions • Comparing Two Functions	Worksheets www.mathmix.com http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Holt Mathematics Course 3 Textbook Math in Focus – Singapore Math Textbook Function Jeopardy game http://www.mathwarehouse.com/games/jeopardy/math-function-relation-jeopardygame.php Clarifying activities: Linear Functions http://www.utdanacenter.org/mathtoolkit/downloads/activities/alg1/alg1_linear.pdf Function Rule Practice: http://www.studyzone.org/mtestprep/math8/g/7functionrulep.cfm Video: Determining whether a relation is a function http://www.brightstorm.com/math/algebra/graphs-and-functions/relations-anddetermining-whether-a-realation-is-a-function

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
UNIT IV: Pythagorean Theorem and Volume of Geometric Solids

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Mathematics **8.G.B.6** Explain a proof of the Pythagorean Theorem and its converse. **8.G.B.7** Apply the Pythagorean Theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. **8.G.B.8** Apply the Pythagorean Theorem to find the distance between two points in a coordinate system. **8.G.C.9** Know the formulas for the volumes of cones, cylinders, and spheres and use them to solve real-world and mathematical problems. **8.EE.A.2** Use square root and cube root symbols to represent solutions to equations of the form $x^2=p$ and $x^3=p$, where p is a positive rational number. **Mathematical Practices** **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively. **MP3** Construct viable arguments and critique the reasoning of others.	The Pythagorean Theorem describes the relationship among the three sides of a right triangle.	• What are real world applications of the Pythagorean theorem?
	The distance formula is used to find the distance between any two points on a plane.	• How are formulas developed from mathematical theorems?
	The Pythagorean Theorem can be used to find volume of composite solids.	• Why do we need to apply the Pythagorean Theorem when solving for volume of composite solids?
	KNOWLEDGE	**SKILLS**
	Students will know: The Pythagorean Theorem applies to right triangles. The converse of the Pythagorean Theorem. There are many proofs of the Pythagorean Theorem. The distance formula can be used to find the distance	**Students will be able to:** Use the Pythagorean Theorem to find unknown side lengths in real world problems. Use the converse of the Pythagorean Theorem to determine if a triangle is a right triangle. Explain a proof of the Pythagorean Theorem and its converse. Find the distance between two points on a graph

MP4 Model with mathematics.	between two points on a coordinate plane.	using the distance formula.
MP5 Use appropriate tools strategically.	Formulas for the volumes of cones, cylinders, and spheres	Use the volume formulas to solve real-world and mathematical problems.
MP6 Attend to precision.		
MP7 Look for and make use of structure.	The relationship between formulas for volume of geometric solids.	Describe the similarities between the volumes of mathematical solids.
MP8 Look for and express regularity in repeated reasoning.	Triangles can be used to find unknown lengths in geometric solids.	Apply the Pythagorean Theorem to find the slant height of pyramids and cones or the length of diagonals in prisms.

CCSS.ELA-Science & Technical
WHST.6-8.1.B
WHST.6-8.1.C
RST.6-8.3
RST.6-8.4
RST.6-8.7
RST.6-8.9
RST.6-8.10

Speaking and Listening
SL.8.1.C
SL.8.1.D
SL.8.4
SL.8.6

Technology Literacy
8.1.8.A.5
8.2.8.B.1

VOCABULARY: Pythagorean Theorem, hypotenuse, leg, cylinder, cone, sphere, volume

KEY TERMS: right triangle, three-dimensional figures, base, side, slant height, height, central diagonal, dimensions, lateral area, surface area

ASSESSMENT EVIDENCE: Students will show their learning by:
- Pre-assessments, Quizzes
- Math in Focus Chapter & Benchmark Assessments

KEY LEARNING EVENTS AND INSTRUCTION:
-

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
4 Weeks	**Unit IV: Pythagorean Theorem & Volume of Geometric Solids** • Understanding the Pythagorean Theorem and Plane Figures • Understanding the distance Formula • Understand the Pythagorean Theorem and Solids • Identifying Volumes of Composite Solids	Worksheets www.mathmix.com http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Holt Mathematics Course 3 Textbook Math in Focus – Singapore Math Textbook Interactive math practice www.ixl.com STEM Worksheets www.superteacherworksheets.com 3-D Geometry shapes and nets "Moving day" activity http://www.learningresources.com/text/pdf/8521book.pdf Finding surface area and volume activity http://illuminations.nctm.org/LessonDetail.aspx?ID=U166 Pythagorean Theorem Calculator http://www.algebra.com/calculators/geometry/pythagorean.mpl

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
UNIT V: Geometry

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Mathematics **8.G.A.1.A** Lines are taken to lines, and line segments to line segments of the same length. **8.G.A.1.B** Angles are taken to taken to angles of the same measure. **8.G.A.1.C** Parallel lines are taken to parallel lines. **8.G.A.2** Understand that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rotations, reflections and translations. **8.G.A.3** Describe the effect of dilations, translations, rotations, and reflections on two-dimensional figures using coordinates. **8.G.A.4** Understand that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rotations, reflections, translations and dilations. **8.G.A.5** Use informal arguments to establish facts about the angle sum and exterior angle of triangles, about the angles created when parallel lines are cut by a transversal, and the angle-angle criterion	Geometry is the study of shapes and their relationships.	• How do shapes define our world?
	Transformations can be performed on any geometric figure.	• How can you verify that certain transformations maintain the size and shape of the original figure?
	Both congruent figures and similar figures can be related by geometric transformations.	• What are the similarities and differences between congruent and similar figures?
	KNOWLEDGE	**SKILLS**
	Students will know: Congruent figures have the same size and shape. Similar figures have the same shape and may have different sizes. Similar figures are proportionally related using a scale factor.	**Students will be able to:** Use a series of one or more transformations to map one congruent figure to another. Use a series of one or more dilations to map one figure to another. Describe a sequence of transformations to prove or disprove that two given figures are similar. Apply a given scale factor in order to create similar figures.

for similarity of triangles.

Mathematical Practices

MP1 Make sense of problems and persevere in solving them.

MP2 Reason abstractly and quantitatively.

MP3 Construct viable arguments and critique the reasoning of others.

MP4 Model with mathematics.

MP5 Use appropriate tools strategically.

MP6 Attend to precision.

MP7 Look for and make use of structure.

MP8 Look for and express regularity in repeated reasoning.

CCSS.ELA-Science & Technical
WHST.6-8.1.B
WHST.6-8.1.C
RST.6-8.3
RST.6-8.4
RST.6-8.7
RST.6-8.9
RST.6-8.10

Speaking and Listening
SL.8.1.C
SL.8.1.D
SL.8.4
SL.8.6

Technology Literacy
8.1.8.A.5
8.2.8.B.1

There is a relationship between scale factors and the areas of similar figures.

When writing a statement of congruence or similarity for two figures, the corresponding vertices must be matched in the same order.

Transformations and dilations on a coordinate plane can be done without the use of a visual aid.

Properties of exterior angles in polygons.

Geometric transformations can be applied to angles, lines, and two-dimensional figures.

VOCABULARY: translation, map, image, transformation, invariant point, reflection, line of reflection, rotation, center of rotation, clockwise, counterclockwise, angle of rotation, half turn, dilation, scale factor, center of dilation, isometry, congruence, corresponding angles, corresponding sides, statement of congruence, similarity

KEY TERMS: vertical, horizontal, enlarged, reduced

Find a scale factor given similar figures.

Explain the effect of the scale factor on the area of similar figures.

Write congruency statements that display the proper order of corresponding vertices.

Describe the changes occurring to the x- and y-coordinates of a figure after a transformation or dilation.

Find unknown exterior angles of polygons from given information.

Find the images of lines, angles, and parallel lines under rotations, reflections, translations, and dilations.

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

ASSESSMENT EVIDENCE: Students will show their learning by:
- Pre-assessments, Quizzes
- Math in Focus Chapter & Benchmark Assessments

KEY LEARNING EVENTS AND INSTRUCTION:
- Geometric Transformations Project—reference Appendix C
- MATH Financial Literacy Project—reference folder on Shared Drive

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
Unit V: Geometry

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
7 weeks	**Unit IV: Geometry** • Translations • Reflections • Rotations • Dilations • Comparing Transformations • Understanding and Applying Congruent Figures • Understanding and Applying Similar Figures • Congruent and Similar Figures to Geometric Transformations • Angles & Lines	Worksheets www.mathmix.com http://www.kutasoftware.com/ www.mathblaster.com Illuminations Activities http://illuminations.nctm.org Brain Pop Videos http://www.brainpop.com/math/ Holt Mathematics Course 3 Textbook Math in Focus – Singapore Math Textbook Interactive math practice www.ixl.com STEM Worksheets www.superteacherworksheets.com Blow'em up Cartoon http://connect.discoveryeducation.com/index.cfm\

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
UNIT VI: Data Analysis

STANDARDS / GOALS:	ENDURING UNDERSTANDINGS	ESSENTIAL QUESTIONS
Mathematics **8.SP.A.1** Construct and interpret scatter plots for bivariate measurement data to investigate patters on association between two quantities. **8.SP.A.2** Know that straight lines are widely used to model relationships between two quantitative variables. Informally fit a straight line on a scatter plot and assess the model fit by judging the closeness of the data. **8.SP.A.3** Use the equation of linear model to solve problems in the context of bivariate measurement data, interpreting the slope and intercept.	Data analysis often reveals patterns and enables prediction.	• How can predictions be made from data?
	Choices in data collection and representation affect their interpretation and use.	• How is data analysis used to make informed decisions about uncertain events?
	A line of best fit can be used to model the linear association of bivariate quantitative data.	• How can a line of best fit model the relationship between variables?
8.SP.A.4 Construct and interpret a two-way table summarizing data on two categorical variables collected from the same subjects. Use relative frequencies to describe possible association between the two variables.	**KNOWLEDGE**	**SKILLS**
Mathematical Practices **MP1** Make sense of problems and persevere in solving them. **MP2** Reason abstractly and quantitatively.	**Students will know:** Scatter plots can be used to show and investigate the patterns of association between bivariate data.	**Students will be able to:** Construct a scatter plot given two sets of quantitative data. Identify patterns of association between two sets of quantitative data. Science Interdisciplinary: Using data gathered during science lab such as International Boiling Point Project, students will construct and analyze a scatter plot for a real-world situation.

MP3 Construct viable arguments and critique the reasoning of others. **MP4** Model with mathematics. **MP5** Use appropriate tools strategically. **MP6** Attend to precision. **MP7** Look for and make use of structure. **MP8** Look for and express regularity in repeated reasoning. **CCSS.ELA-Science & Technical** **WHST.6-8.1.B** **WHST.6-8.1.C** **RST.6-8.3** **RST.6-8.4** **RST.6-8.7** **RST.6-8.9** **RST.6-8.10** **Speaking and Listening** **SL.8.1.C** **SL.8.1.D** **SL.8.4** **SL.8.6** **Technology Literacy** **8.1.8.A.5** **8.2.8.D.1** **Science** **5.2.6.A.3** **5.2.8.A.3**	An outlier is a data point that is numerically distant from the rest of the data points in the data set. The line of best fit can be used to interpret the association between bivariate data represented in a scatter plot. An equation for the line of best fit can help to estimate unknown values in a situation or make predictions. There are two different methods for making predictions called interpolation and extrapolation. A two-way table can be used to represent data and study the association between two categorical data sets of a population. **VOCABULARY:** scatter plot, quantitative data, association, bivariate data, clustering, line of best fit, interpolate, extrapolate, two-way table, categorical data, qualitative data **KEY TERMS:** horizontal axis, vertical axis, data points, strong association, weak association, no association, bivariate data	Identify outliers in a scatter plot. Draw a line of best fit that best represents the data set, if applicable. Write a linear equation for the line of best fit. Use the line of best fit to make estimates or predictions. Make predictions within a data set as well as outside a data set. Create a two-way table to record the frequencies of bivariate categorical values.

ASSESSMENT EVIDENCE: Students will show their learning by:
- Pre-assessments, Quizzes
- Math in Focus Chapter & Benchmark Assessments

KEY LEARNING EVENTS AND INSTRUCTION:

-

RANDOLPH TOWNSHIP SCHOOL DISTRICT
Grade 8 Mathematics
Unit VI: Data Analysis

SUGGESTED TIME ALLOTMENT	CONTENT-UNIT OF STUDY	SUPPLEMENTAL UNIT RESOURCES
3 Weeks	**Unit VI: Data Analysis** • Scatter Plots • Modeling Linear Associations • Best-Fit Linear Models • Two-Way Models	Worksheets www.mathmix.com http://www.kutasoftware.com/ www.mathblaster.com Brain Pop Videos http://www.brainpop.com/math/ Holt Mathematics Course 3 Textbook Math in Focus – Singapore Math Textbook Evaluate Linear Functions http://www.ixl.com/math/grade-8/evaluate-a-linear-function Satisfying a linear equation http://www.ixl.com/math/grade-8/does-x-y-satisfy-the-linear-equation Students will plot points on a coordinate grid to represent ships before playing a graphing equations game with a partner. http://illuminations.nctm.org/LessonDetail.aspx?id=L782 Videos, worksheets, stories and songs to help Grade 8 students learn about scatter Plots, Line of Best Fit and Correlation. http://www.onlinemathlearning.com/scatter-plot.html Interactive activity on line of best fit http://illuminations.nctm.org/ActivityDetail.aspx?ID=146

APPENDIX A

Math in Focus: Singapore Math by Marshall Cavendish ISBN: 978-0-547-56098-4
Math in Focus Activity Book ISBN: 978-0-547-57898-9
Math in Focus Singapore Online Resources
Math in Focus Singapore Exam View
Math in Focus Singapore Activity Book
Math in Focus Singapore Brain @ Work
Math in Focus Singapore Enrichment
Math in Focus Singapore Activity Book
Math in Focus Singapore Vocabulary Review
Math in Focus Singapore Reteach
Math in Focus Singapore Spanish Edition
Big Ideas Math Textbook ISBN: 978-1-60840-231-1
Explorations in Core Math for Common Core Grade 8 ISBN: 978-0-547-87643-6
Holt Mathematics Course 3 Textbook ISBN: 0-03-092946-6
Holt Mathematics Grade 8 Textbook for Common Core ISBN: 978-0-547-64727-2
Mastering the Common Core in Mathematics Grade 8 Textbook ISBN: 978-1-59807-339-3
Glencoe Math Course 8 Textbook ISBN: 978-0-07661-929-0
Clarifying Expectations for Teachers & Students by McGraw Hill for Grade 8 Common Core ISBN: 978-007-662900-8
Partnership for Assessment of Readiness for College and Careers - http://www.parcconline.org/
Common Core State Standards Initiative - http://www.corestandards.org/
Khan Academy Videos www.khanacademy.org

Resource: Systems of Equations (Unit II Project)

Name: _____ Date: _____ Per: _____

Systems of Equations
21 Points

Directions: *The following real world problem relates to your classwork on linear equations and solving systems of linear equations. In your group, you will have 20 minutes to read through, discuss each question, and determine which strategies to use. After discussing with your group, you will have the rest of the hour today and tomorrow to complete the performance task. The rubric for grading is provided on the back.*

You are working as a representative for a cell phone company. Part of your job requires you to visually display the available cell phone plans. This way you can easily point out the advantages of each plan to the customers.

Part A:
There are three cell phone plans. All plans include unlimited calling, free nights and weekends, and free long distance. Write an equation for each cell phone plan.

Plan A costs $40 a month and $0.10 per text message.   _____

Plan B costs $100 a month and has unlimited text messaging. _____

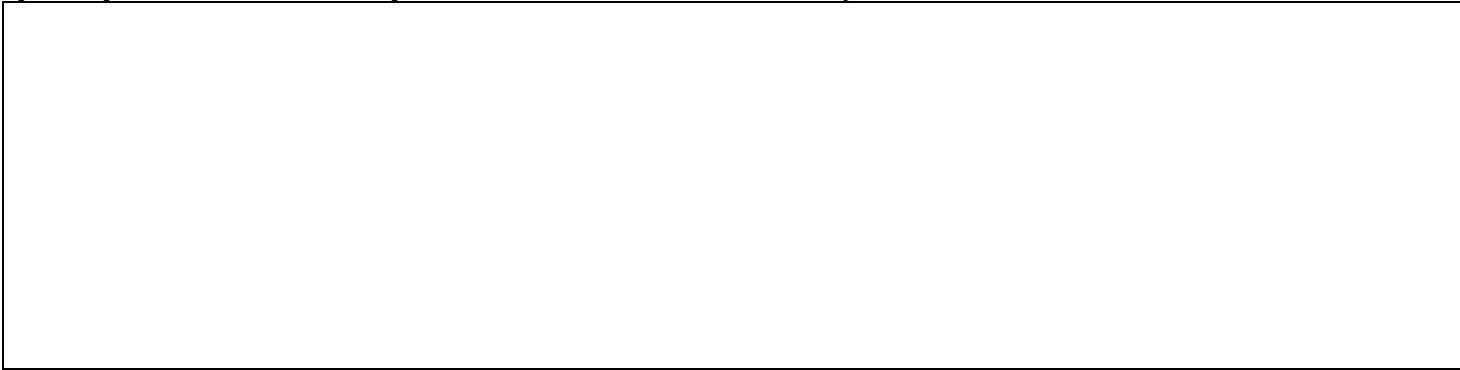Plan C costs $50 a month and $0.05 per text message.   _____

Part B:
On the paper provided, graph the three cell phone plans. Each cell phone plan should be clearly labeled with an equation. The graph should be labeled and neat.

Part C:

A customer would like to know which cell phone plan will be the cheapest choice. Show your math work below. Then, in 4 – 5 Sentences, explain which phone plan would be the cheapest choice for the customer and why.
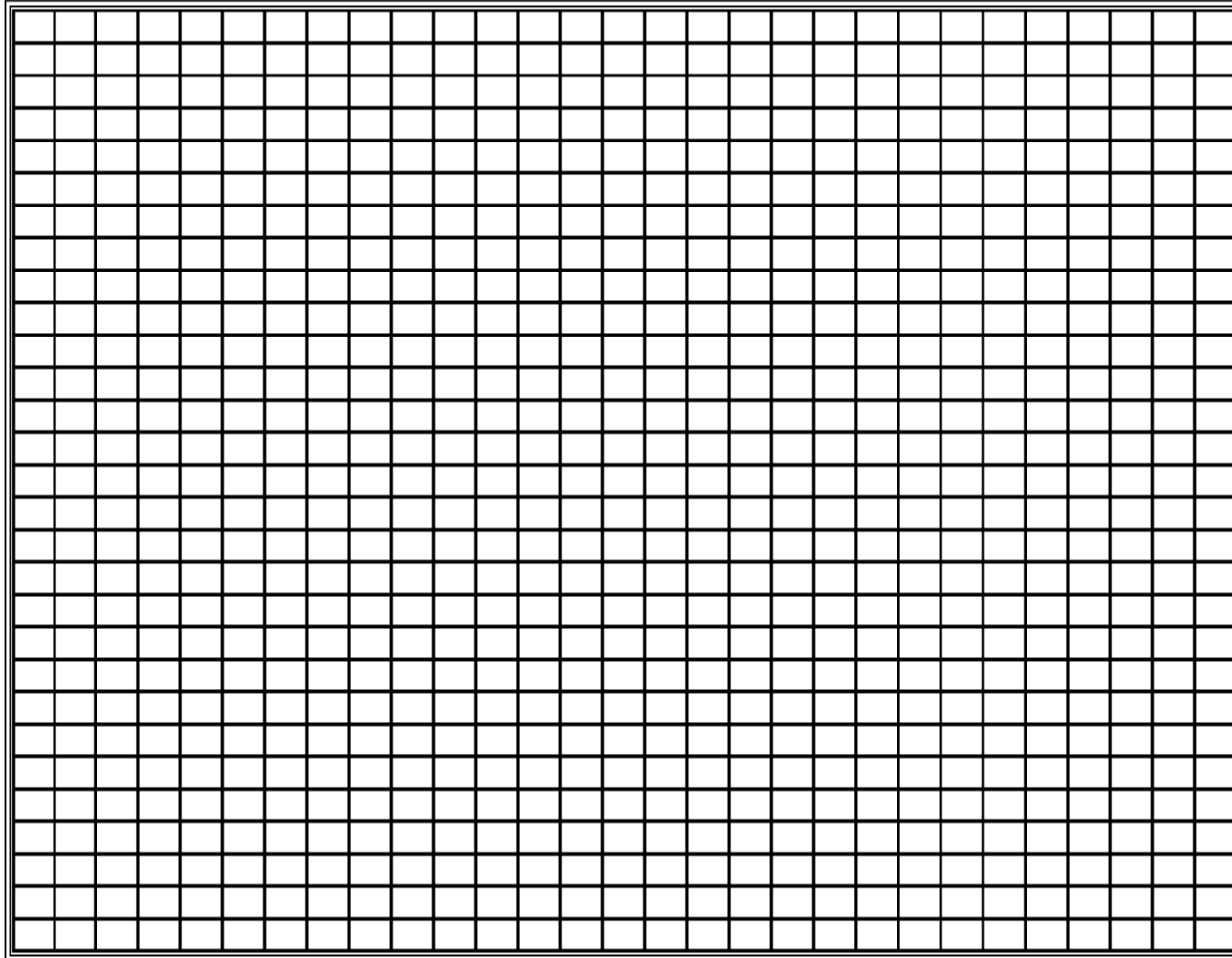
Part D:

A customer explains that she typically sends an average of 400 text messages per month. Which cell phone plan would be the best choice for the customer? Show your math work below. Then, in 4 – 5 sentences, explain which cell phone plan would be the best choice for the customer.

Part B: Title: _____

Rubric:

Equations (Part A):
    3 – 3/3 equations are correctly written in y=mx+b form.
    2 – 2/3 equations are correctly written in y=mx+b form.
    1 – 1/3 equations are correctly written in y=mx+b form.
    0 – 0/3 equations are correctly written in y=mx+b form.

Graphing (Part B) Equations:
    3 – Equations are correctly graphed and labeled.
    2 – Equations are correctly graphed and labeled with minor errors.
    1 – Equations are correctly graphed but not labeled, or equations are incorrectly graphed but labeled.
    0 – Equations are incorrectly graphed and not labeled.

Graph (Part B):
    3 – The graph is neat and all parts are labeled.
    2 – The graph is neat and most parts are labeled.
    1 – The graph is neat and not labeled, or the graph is not legible and labeled.
    0 – The graph is not legible and not labeled.

Solving Systems (Part C):
    3 – Shows understanding of the problems mathematical understandings and principles.
    2 – Shows understanding of the problems mathematical understanding and principles with minor errors.
    1 – Show little understanding of the problems mathematical understanding and principles.
    0 – Shows no understanding of the problems mathematical understanding and principles.

Written Explanation for Customer (Part C):
    3 – Shows understanding of the problems mathematical understandings and principles.
    2 – Shows understanding of the problems mathematical understanding and principles with minor errors.
    1 – Show little understanding of the problems mathematical understanding and principles.
    0 – Shows no understanding of the problems mathematical understanding and principles.

Solve Equations (Part D):
    3 – Shows understanding of the problems mathematical understandings and principles.
    2 – Shows understanding of the problems mathematical understanding and principles with minor errors.
    1 – Show little understanding of the problems mathematical understanding and principles.
    0 – Shows no understanding of the problems mathematical understanding and principles.

Written Explanation for Customer (Part D):
    3 – Shows understanding of the problems mathematical understandings and principles.
    2 – Shows understanding of the problems mathematical understanding and principles with minor errors.
    1 – Show little understanding of the problems mathematical understanding and principles.
    0 – Shows no understanding of the problems mathematical understanding and principles.

Resource: Geometric Transformations (Unit V Project)

Name: _____ Date: _____ Per: _____

Describing Geometric Transformations
24 Points

Directions: The figure drawn on the coordinate plane on Page 91 is made up of a circle, four parallelograms, one rectangle and a square. In this project, you will form the figure in the same position by applying transformations to the shapes given on Page 92.
- On the Student Recording Sheet, describe in detail the geometric transformation(s) need to transform Shapes A to F into the figure drawn on Page 91.
- Each shape can undergo more than one geometric transformation.
- The geometric transformations you can use are translations, reflections, rotations, and dilations.

http://my.hrw.com/mif_6/mif_2012/assets/grade8_volB/data/chap08/activity_project.pdf
This link contains the Student Recording Sheet and Materials sheets Page 91 & 92.
This project is available in the Math In Focus Activity Book—Chapter 8.

Rubric:

Shape A:
4 – Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).
3 – Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).
2 – Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).
1 – Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.

Shape B:
4 – Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).
3 – Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).
2 – Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).
1 – Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.

Shape C:
4 – Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).
3 – Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).
2 – Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).
1 – Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.

Shape D:
4 – Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).
3 – Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).
2 – Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).
1 – Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.

Shape E:
4 – Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).
3 – Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).
2 – Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).
1 – Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.

Shape F:

4 – Explanation shows complete understanding of the mathematical concepts used to solve the problem(s).

3 – Explanation shows substantial understanding of the mathematical concepts used to solve the problem(s).

2 – Explanation shows some understanding of the mathematical concepts needed to solve the problem(s).

1 – Explanation shows very limited understanding of the underlying concepts needed to solve the problem(s) OR is not written.