HOWELL TOWNSHIP
PUBLIC SCHOOLS

MATHEMATICS CURRICULUM FRAMEWORK

GRADE 8 PRE-ALGEBRA

BOARD APPROVED: August 23, 2017

8th Grade Curricular Framework for Pre-Algebra

Overview	NJSLS Standards	Unit Focus	**Standards for Mathematical Practices** 1. Make sense of problems and persevere in solving them. 2. Reason abstractly and quantitatively. 3. Construct viable arguments and critique the reasoning of others. 4. Model with mathematics. 5. Use appropriate tools strategically. 6. Attend to precision. 7. Look for and make use of structure. 8. Look for and express regularity in repeated reasoning.
Unit 1			
● Expressions and Equations	8.EE.7a,8.EE.7b	● To solve linear equations in one variable.	
● Geometry	8.G.1a,8.G.1b,8.G.1c,8.G.2,8.G.3 ,8.G.4,8.G.5	● To identify, describe, and model all transformations and to identify similarity and congruency in geometric figures. ● To identify and apply properties of parallel lines, to find the unknown angle measurements of polygons and to determine if triangles are similar.	
Unit 2			
● Equations and Expressions	8.EE.5,8.EE.6,8.EE.8a,8b,8c,8.EE. 7	● To write and graph linear equations. ● To write and solve systems of linear equations.	
● Functions	8.F.4,8.F.2,8.F.3,8.F.5	● To write and interpret functions represented by	

8th Grade Curricular Framework for Pre-Algebra

		words, tables ,and graphs.	
Unit 3			
● Equations and Expressions	8.EE.1,8.EE.2,8.EE.3,8.EE.4	● To apply the properties of exponents, to write numbers in scientific notation and to perform operations with numbers expressed in scientific notation and to perform operations with numbers expressed in scientific notation	
● The Number System	8.NS.1,8.NS.2	● To classify real numbers	
● Geometry	8.G.6,8.G.7,8.G.8,8.G.9	● To explain through application the pythagorean Theorem ● To find the volumes of cones, spheres and cylinders and use properties of similar solids	
● Statistics	8.SP.1,8.SP.2,8.SP.3,8.SP.4	● To analyze and construct appropriate displays.	

8th Grade Curricular Framework for Pre-Algebra

<table>
<tr><td colspan="4">Unit 1: Expressions and Equations</td></tr>
<tr><td colspan="4">Learning Goal: Solve linear equations in one variable</td></tr>
<tr><td colspan="4">Learning Target: Solve one-step and multi-step equations with variables on both sides, solve literal equations,</td></tr>
<tr><td colspan="4">Prerequisite Skills:
Add, subtract, factor, and expand linear expressions with rational coefficients
Solve multi-step problems posed with positive and negative rational numbers
Solve word problems leading to equations of the form px + q = r and p(x+ q) = r, where p,q, and r are rational numbers</td></tr>
<tr><td>Content Standards</td><td>Mathematical Practices</td><td>Enduring Understandings</td><td>Essential Questions</td></tr>
<tr><td>Math: 8.EE.7a,8.EE.7b
Technology Standards:
8.1.8.A.1
Career Readiness Practices:
CRP2, CRP4, CRP8, CRP11</td><td>MP.1
MP.2
MP.3
MP.4
MP.6
MP.7
MP.8</td><td>Students will learn to solve linear equations with rational number coefficients. The equations will include the distributive property and collecting like terms. The students will also learn to show that equations have one solution, infinitely many solutions, or no solution.</td><td>How can you use inductive reasoning to discover rules in mathematics?How can you test a rule?
How can you solve a multi-step equation? How can you check the reasonableness of your solution?
How can you solve an equation that has variables on both sides
How can you use a formula for one measurement to write a formula for a different measurement</td></tr>
<tr><td colspan="4">Assessments:
STAR Math – Fall
Chapter Assessments
Trimester Assessments</td></tr>
</table>

8th Grade Curricular Framework for Pre-Algebra

Unit 1: Geometry			
Learning Goal: Identify, describe and model all transformations, identify similarity and congruency in geometric figures,apply properties of parallel lines, find unknown angle measurements of polygons			
Learning Target: Define congruent figures,identify transformations, find ratios of perimeters and areas of similar figures,find measures of angles formed by parallel lines and a transversal, find interior and exterior angle measure of triangles, find interior and exterior angle measures of a polygons			
Prerequisite Skills: ● Draw geometric shapes with given conditions ● Represent proportional relationships with equations ● Find unit rates associated with ratios of perimeters and area ● Use proportionality to solve ratio problems ● Reproduce a scale drawing at a different scale			
Content Standards	Mathematical Practices	Enduring Understandings	Essential Questions
Math: 8.G.1a, G.1b, 8.G.1c, 8.G.2, 8.G.3, 8.G.4, 8.G.5 Technology Standards: 8.1.8.A.1 Career Readiness Practices: CRP2, CRP4, CRP6, CRP8, CRP11,	MP.1 MP.3 MP.4 MP.5 MP.6 MP.8	Students will learn to verify the properties of translations, reflections , rotations and dilations. The students will be able to describe a sequence that exhibits congruence between figures. The students will also be able to classify angles and find the measure of angles of polygons.	● How can you identify congruent triangles? ● How can you use reflections to classify a frieze pattern? ● What are the three basic ways to move an object in a plane? ● How do changes in dimensions of similar geometric figures affect perimeters and areas of figures? ● How can you enlarge or reduce a figure in the coordinate plane?

			• How can you describe angles formed by parallel lines and transversals? • How can you describe the relationships among the angles of a triangle? • How can you find the sum of the interior angle measures and the sum of the exterior angle measures of a polygon?
Unit 1 Resources: Big Ideas Learning www.bigideasmath.com TI83 Graphing Calculator:https://www.ti.com/ DESMOS:https://www.desmos.com 8.EE.A.1 Extending the Definitions of Exponents 8.EE.A.3 Ant and Elephant 8.EE.A.4 Giantburgers 8.EE.B.5 Who Has the Best Job?			
Assessments: STAR Math – Fall Chapter Assessments Trimester Assessments			

Unit 2: Equations and Expressions
Learning Goal: Write and Graph linear equations; Write and solve systems of linear equations.
Learning Target: Graph linear equations, system of linear equations and proportional relationships.

8th Grade Curricular Framework for Pre-Algebra

<table>
<tr><td colspan="4">Find the slope of a line. Solve a system of linear equations by substitution and elimination. Solve a system with no solution or infinitely many solutions.</td></tr>
<tr><td colspan="4">Prerequisite Skills:
Identify the constant of proportionality (unit rate) in tables, graphs,equations, diagrams, and verbal descriptions
Represent proportional relationships with equations
Write graph and solve one-step equations
Solve two step equations
Construct simple equations</td></tr>
<tr><td>Content Standards</td><td>Mathematical Practices</td><td>Enduring Understandings</td><td>Essential Questions</td></tr>
<tr><td>Math: 8.EE.5, 8.EE.6, 8.EE.5a, 8.EE.8b, 8.EE.8c, 8.EE.7
Technology Standards:
8.1.8.A.1, 8.1.8.A.4
Career Readiness Practices:
CRP2, CRP4, CRP8, CRP11</td><td>MP.1
MP.2
MP.3
MP.4
MP.5
MP.6
MP.7
MP.8</td><td>Students will learn to use similar triangles to explain slope of a line. They will be able to graph and interpret proportional relationships. They will be able to derive the slope intercept form of an equation. The students will be able to solve systems of two linear equations in two variables graphically and algebraically. They will also be able to solve real-world problems leading to systems of equations.</td><td>How can you recognize a linear equation?How can you draw its graph ?
How can you use the slope of a line to describe the line?
How can you describe the graph of the equation y = mx?
How can you describe the graph of the equation y = mx + b?
How can you describe the graph of the equation ax + by = c?
How can you write an equation of a line when you are given the slope and the y-intercept of the line?
How can you write an equation of a line when you are given the slope and a point on the line ?</td></tr>
</table>

			● How can you solve a system of linear equations? ● How can you use substitution to solve a system of linear equations? ● How can you use elimination to solve a system of linear equations? ● Can a system of linear equations have no solution? Can a system of linear equations have many solutions?
Assessments: STAR Math – Fall Chapter Assessments Trimester Assessments			

Unit 2: Functions			
Learning Goal: Students will be able to write and interpret functions represented by words, tables and graphs.			
Learning Target: Determine whether a relation is a function. Represent a functions as an equation, input-output table and graph. Write linear functions from graphs and tables. Compare linear and nonlinear functions. Use numberless graphs			
Prerequisite Skills: ● Identify the constant of proportionality (unit rate) in tables, graphs, equations , diagrams, and verbal descriptions ● Represent proportional relationships with equations			
Content Standards	Mathematical Practices	Enduring Understandings	Essential Questions
Math: 8.F.1, 8.F.2, 8.F.3, 8.F.4, 8.F.5	MP.1 MP.2	Students will learn and understand the definition of a	● How can you use a mapping diagram to

Technology Standards: 8.1.8.A.1, 8.1.8.A.4 Career Readiness Practices: CRP2, CRP4, CRP6, CRP8, CRP11	MP.3 MP.4 MP.5 MP.6 MP.7 MP.8	function. They will be able to compare and write functions either as a table, a graph, or in words. They will be able to interpret the rate of change of a function as well as identify whether it is linear or nonlinear.	show the relationship between two data sets? ● How can you represent a function in different ways? ● How can you use a function to describe a linear pattern? ● How can you recognize when a pattern in real life is linear or nonlinear? ● How can you use a graph to represent relationships between quantities without using numbers?
Unit 2 Resources: Big Ideas Learning www.bigideasmath.com TI83 Graphing Calculator:https://www.ti.com/ DESMOS:https://www.desmos.com 8.F.A.1 Function Rules 8.F.A.2 Battery Charging 8.F.A.3 Introduction to Linear Functions 8.F.B.4 Chicken and Steak, Variation 1 8.F.B.4 Baseball Cards 8.EE.C.7 The Sign of Solutions 8.EE.C.7 Coupon versus discount 8.EE.C.8a Intersection of Two Lines 8.EE.C.8 How Many Solution			
Assessments:			

8th Grade Curricular Framework for Pre-Algebra

STAR Math – Fall Chapter Assessments Trimester Assessments

Unit 3: Equations and expressions			
Learning Goal: Students will be able to apply the properties of exponents, to write numbers in scientific notation and to perform operations with numbers expressed scientific notation.			
Learning Target: Write and evaluate powers. Use the Exponential Rules. Evaluate and simplify expressions with negative and zero exponents. To read numbers in scientific notation and write them in standard form. Write numbers in scientific notation. Add , subtract, and multiply and divide numbers in scientific notation			
Prerequisite Skills: ● Solve Problems involving operations with rational numbers. ● Understands that rewriting expressions in different forms can show how quantities are related			
Content Standards	Mathematical Practices	Enduring Understandings	Essential Questions
Math: 8.EE.1, 8.EE.3, 8.EE.4 Technology Standards: 8.1.8.A.1 Career Readiness Practices: CRP2, CRP4, CRP8, CRP11,	MP.1 MP.2 MP.3 MP.5 MP.6 MP.7 MP.8	Students will use the properties of integer exponents to generate equivalent expressions. They will be able to use scientific notation to estimate large and small quantities.	● How can you use exponents to write numbers? ● How can you use inductive reasoning to observe patterns and write general rules involving properties of exponents? ● How can you divide two powers that have the same base? ● How can you evaluate a nonzero number with an exponent of zero?

			● How can you evaluate a nonzero number with a negative integer exponent? ● How can you read numbers that are written in scientific notation? ● How can you write a number in scientific notation?
Assessments: STAR Math – Fall Chapter Assessments Trimester Assessments			

Unit 3: Number Sense & Equations & Expressions			
Learning Goal: Students will be able to classify real numbers and to explain, through application, the Pythagorean Theorem			
Learning Target: Find and approximate square roots. Find cube root. Use the Pythagorean Theorem to solve right triangles and use the distance formula.			
Prerequisite Skills: ● Convert rational numbers to decimals using long division ● Add, subtract , multiply, and divide rational numbers ● Understand that every quotient of integers (non-zero divisor) is a rational numbers			
Content Standards	Mathematical Practices	Enduring Understandings	Essential Questions
Math: 8.NS.1, 8.NS.2, 8.EE.2, 8.G.6, 8.G.7, 8.G.8	MP.1 MP.2	The students will be able to understand that every rational	● How can you find the dimensions of a square

Technology Standards: 8.1.8.A.1, 8.1.8.D.4 Career Readiness Practices: CRP2, CRP4, CRP6, CRP8, CRP11	MP.3 MP.4 MP.5 MP.6 MP.7	number has a decimal expression that terminates or repeats. They will also understand that numbers that are not rational are irrational. They will be able to evaluate square roots and cube roots. The students will be able to explain and use the Pythagorean Theorem.	or a circle when you are given its area? ● How is the cube root of a number different from the square root of a number ? ● How are the lengths of the sides of a right triangle related? ● How can you find decimal approximations of square roots that are not rational? ● In what other ways can you use the pythagorean Theorem?
Assessments: STAR Math – Fall Chapter Assessments Trimester Assessments			

Unit 3: Geometry
Learning Goal: Students will be able to find the volumes of cones, spheres and cylinders and use properties of similar solids
Learning Target: Find the volume of cylinder, cones, and spheres. Find the surface areas and volumes of similar solids.
Prerequisite Skills: ● Find areas and circumferences of Circles

8th Grade Curricular Framework for Pre-Algebra

- Solve problems involving area, volume , and surface area of objects composed of triangles, quadrilaterals, cubes, and right prisms
- Represent proportional relationships with equations
- Decide whether two quantities are proportional
- Use scale drawings to compute actual lengths and areas

Content Standards	Mathematical Practices	Enduring Understandings	Essential Questions
Math: 8.G.9 Technology Standards: 8.1.8.A.1 Career Readiness Practices: CRP2, CRP4, CRP6, CRP8, CRP11	MP.1 MP.2 MP.3 MP.4 MP.6 MP.7 MP.8	Students will be able to apply the formulas for the volume of cones, cylinders, and spheres. They will also be able to describe a sequence that exhibits similarity between two figures.	● How can you find the volume of a cylinder? ● How can you find the volume of a cone? ● How can you find the volume of a sphere? ● When the dimensions of a solid increase by a factor of k, how does the surface area change? How does the volume change?
Assessments: STAR Math – Fall Chapter Assessments Trimester Assessments			

Unit 3: Statistics and Probability
Learning Goal: Students will be able to analyze and construct appropriate displays
Learning Target: Make and describe scatter plots. Identify a line of fit for a scatter plot. Construct and analyse two -way tables.

8th Grade Curricular Framework for Pre-Algebra

Prerequisite Skills:

- Use samples to draw inferences about populations
- Use measures of center and variability from random samples to compare two populations.

Content Standards	Mathematical Practices	Enduring Understandings	Essential Questions
Math: 8.SP.1, 8.SP.2, 8.SP.3, 8.SP.4 Technology Standards: 8.1.8.A.1, 8.1.8.A.4, 8.1.8.D.4 Career Readiness Practices: CRP2, CRP4, CRP6, CRP8, CRP11	MP.1 MP.2 MP.3 MP.4 MP.5 MP.6	Students will learn to construct and interpret scatter plots. They will be able to use equations of lines to solve problems and interpret the slope and the y-intercept. They will also be able to choose appropriate data displays.	• How can you construct and interpret a scatter plot? • How can you use data to predict an event? • How can you read and make a two -way table? • How can you display data in a way that helps you make decisions?

Unit 3 Resources:
Big Ideas Learning www.bigideasmath.com
TI83 Graphing Calculator:https://www.ti.com/
DESMOS:https://www.desmos.com
8.EE.A.1 Extending the Definitions of Exponents
8.G.C.9 A Canister of Tennis Balls
8.EE.A.3 Ant and Elephant
8.EE.A.4 Giantburgers
8.EE.B.5 Who Has the Best Job?
8.EE.B.6 Slopes Between Points on a Line

Assessments:
STAR Math – Fall
Chapter Assessments

8th Grade Curricular Framework for Pre-Algebra

Trimester Assessments