Washington Township School District

***The mission of the Washington Township Public Schools** is to provide a safe, positive, and progressive educational environment that provides opportunity for all students to attain the knowledge and skills specified in the NJ Learning Standards at all grade levels, so as to ensure their full participation in an ever-changing world as responsible, self-directed and civic-minded citizens.*

Course Title:	**Pre-Algebra Resource Center**
Grade Level(s):	**8^{th} Grade**

Duration:	*Full Year:*	**X**	*Semester:*		*Marking Period:*	
Course Description:	This course is to prepare the students for their high school math career. It focuses on number sense, algebra, functions, geometry, and statistics and probability.					
Grading Procedures:	Supportives: 15% Minors: 35% Majors: 50%					
Primary Resources:	**Eureka Math²**					

Washington Township Principles for Effective Teaching and Learning

- Implementing a standards-based curriculum
- Facilitating a learner-centered environment
- Using academic target language and providing comprehensible instruction
- Adapting and using age-appropriate authentic materials
- Providing performance-based assessment experiences
- Infusing 21^{st} century skills for College and Career Readiness in a global society

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Under the Direction of:	Joanne Henry

Written: ______________________________

Revised: ______________________________

BOE Approval: ________________________________

Unit One: Ratios & Linearity

Unit Description: This unit reviews scientific notation and how it relates to real-world contexts. It also discusses the properties and definitions of exponents and how to apply them. It moves into perfect squares, perfect cubes and explores the Pythagorean theorem. The final topic reviewed is irrational numbers and how to approximate them.

Unit Duration: 6 Weeks

Desired Results

Standard(s):

8.NS.A.1

8.NS.A.2

8.EE.A.1

8.EE.A.2

8.EE.A.3

8.EE.A.4

8.G.B.7

Indicators:

- Determine whether numbers are rational or irrational.
- Use rational approximations of irrational numbers to compare the size of irrational numbers.
- Locate irrational numbers approximately on a number line.
- Approximate the values of irrational expressions.
- Apply the properties of integer exponents to generate equivalent numerical expressions.
- Solve equations of the form $x^2 = p$ as $\sqrt{p}$ and $-\sqrt{p}$ and equations of the form $x^3 = p$ as $\sqrt[3]{p}$ where p is a rational or irrational number.
- Evaluate square roots of small perfect squares and cube roots of small perfect cubes.
- Approximate and write very large and very small numbers in scientific notation.
- Express how many times as much one number is as another when both numbers are written in scientific notation.
- Add or subtract numbers written in scientific notation.
- Multiply and divide numbers written in standard form and scientific notation, and evaluate exponential expression containing numbers written in standard form and scientific notation.
- Operate with numbers written in scientific notation to solve real-world problems
- Use scientific notation and choose units of appropriate size for measurements of very large or very small quantities.
- Interpret scientific notation that has been generated by technology.
- Apply the Pythagorean Theorem to determine the unknown length of a hypotenuse in a right triangle in mathematical problems.

Understandings:

Students will understand that…

- Scientific Notation is used to write really small and really large numbers.
- Students will use the properties of exponents and definitions to simplify exponential expressions.
- Students will apply the rules of exponents to solve addition, subtraction, multiplication, and division scientific notation problems.
- Students will use the perfect squares and cubes to help solve Pythagorean theorem problems.

Essential Questions:

- How does writing a small number in a different form help us write the number as a single digit times a unit fraction with a denominator written as a power of 10 in exponential form?
- When is it useful to write a number in scientific notation?

- Students will approximate irrational numbers and understand why the numbers are irrational.

- How are adding and subtracting numbers in scientific notation and combining like terms similar? How are they different?
- What is the difference between evaluating and simplifying a numerical expression?
- Is there an advantage to writing exponential expressions with only prime bases? Explain.
- What features of a number written in scientific notation indicate it has a small positive value?
- What types of problems benefit from using numbers in scientific notation?
- How do you know if a number is a perfect square?
- How do you know if a number is a perfect cube?
- What sorts of problems did Pythagoras solve? How did he solve them?
- What relationship does the Pythagorean theorem show?
- Can we write all square roots or cube roots as rational numbers? Why?
- How would we begin to approximate the square root of a whole number that is not a perfect square?
- How are rational and irrational numbers related to real numbers?
- How do we order irrational and rational numbers?

Assessment Evidence

Performance Tasks:
Lesson 6- Learn Section->Video and Digital Activities
Lesson 9- Learn Section-> Power Rounds Activity
Lesson 13- Learn Section-> Balloon Activity
Lesson 14- Learn Section-> Differentiation: Challenge Project
Lesson 23- Learn Section-> Differentiation Challenge- Battle Cards

Other Evidence:

Quizzes for each topic

- Topic A- Lessons 1-4
- Topic B- Lessons 5-10
- Topic C- Lessons 11-15
- Topic D- Lessons 16-20
- Topic E- Lessons 21-24

Benchmarks:

Module 1 Assessment

Learning Plan

Learning Activities:
Each lesson consists of the following

Fluency Activities
Launch
Learn
Exit Tickets

Resources:
- Eureka Math^2- Module Overview (Explains in detail the different Fluency activities)

Unit Two: Rigid Motions and Congruent Figures
Unit Description: Students experience rigid motions by using a transparency to represent the movement of the plane under a translation, reflection, or ration. They apply rigid motions to draw images of figures and they learn to use precise language to describe rigid motions of the plane and on the coordinate plane. Thye define one figure as congruent to another if there is a sequence of rigid motions. Students apply rigid motions and the definition of congruent figures to establish facts about the angles created by parallel lines cut by a transversal. They will determine the sum of interior angle measures of a triangle and find the relationship between an exterior anlge measure and the pair of remote interior anlge measures of a triangle.
Unit Duration: 6 weeks
Desired Results
Standard(s): **8.G.A.1** **8.G.A.1a** **8.G.A.1b** **8.G.A.1c** **8.G.A.2** **8.G.A.3** **8.G.A.5** **8.G.A.6** **8.G.A.7** **8.G.A.8**
Indicators: • Verify experimentally the properties of translations, reflections, and rotations. • Recognize that a two-dimensional figure is congruent to another if the second can be obtained from the first by a sequence of rigid motions. • Describe a sequence of translations, reflections, and rotations that exhibits the congruence between two given figures. • Use coordinates to describe the effect of translations, reflections, and rotations on two-dimensional figures in the plane. • Apply, establish, and explain facts about the angle sum and exterior angles of triangles. • Solve for unknown angle measures by using facts about the angles created when parallel lines are cut by a transversal. • Explain a proof of the Pythagorean theorem and its converse geometrically. • Apply the Pythagorean theorem to determine unknown side lengths in right triangles in real-world and mathematical problems in two and three dimensions. • Apply the Pythagorean theorem to find the distance between two points in a coordinate system.

Understandings: *Students will understand that…* U • Rigid motions are movements such as translation, reflection, and rotation • Rigid motions are congruent to each other. • Parallel lines cut by a transversal form angle relationships and how to find the angle relationships • The Pythagorean Theorem	**Essential Questions:** • How are translations and reflections on the coordinate plane the same as translations and reflections without the coordinate plane? • How is the coordinate plane helpful for precisely describing a translation or reflection? • How are rotations on the coordinate plane the same as rotations without the coordinate plane? • How is the coordinate plane helpful for precisely describing a rotation? • How can we describe a rigid motion that maps an image back onto its original figure? • Does the order matter when applying a sequence of rigid motions? Why? • What does it mean for two figures to be congruent? • How do we show that two figures are congruent? • When two lines are cut by a transversal, how can we show that a pair of angles are congruent? • What is the relationship between the measures of an exterior angle and the remote interior angles of a triangle? • How can we prove the Pythagorean theorem? • Can we prove the converse of the Pythagorean theorem? How? • How can we find the distance between two points in the coordinate plane? • In what real-world and mathematical situations does the Pythagorean theorem apply? • How can we use the Pythagorean theorem and the distance on a grid to model situations and solve problems?

Assessment Evidence

Performance Tasks:	Other Evidence:
Lesson 4- Learn Section-> Digital Activities Lesson 7- Learn Section-> CTRL->Z Lesson 11- Learn Section-> Design Thinking Lesson 13- Learn Section-> Rip It Up Lesson 19- Learn Section-> Card Sort Lesson 22- On the Right Path: Amusement Park Project	Quizzes for each topic • Topic A- Lessons 1-6 • Topic B- Lessons 7-11 • Topic C- Lessons 12-16 • Topic D- Lessons 17-22

Benchmarks:

Module 2 Assessment

Learning Plan

Learning Activities:
Each lesson consists of the following

Fluency Activities
Launch
Learn
Exit Tickets

Resources:

- Eureka Math²- Module Overview (Explains in detail the different Fluency activities)

Unit Three: Dilations and Similar Figures

Unit Description:

Students analyze how dialations are different from rigid motions and scale drawings. Students draw images of figures under dilations by using a variety of tools that include transparencies, rulers, lined paper, grids, and the coordinate plane. They learn that similar figures are figures that can be mapped onto one another by using a sequence of rigid motions or dilations, or both. Students discover the angle-angle criterion for similarity and use ut ti determine whether two triangles are similar. They solve for unknown side lengths in similar triangles for a variety of mathematical and real world problems.

Unit Duration: 5 weeks

Desired Results

Standard(s):

8.EE.B.6 **8.G.A.3** **8.G.A.4** **8.G.A.5** **8.G.B.7**
Indicators: • Determine the values of the ratios of corresponding side lengths on similar right triangles that have horizontal and vertical legs and have hypotenuses that lie on the same line. • Describe the effect of dilations on two-dimensional figures in the plane. • Use coordinates to describe the effect of dilations on two-dimensional figures in the plane. • Recognize that a two-dimensional figure is similar to another if the second can be obtained from the first by a sequence of rigid motions or dilations, or both. • Describe a sequence of rigid motions or dilations, or both, that exhibits the similarity between two given figures. • Informally argue to establish facts about the angle–angle criterion for similar triangles and apply the angle–angle criterion for similarity. • Apply the Pythagorean theorem to determine unknown side lengths in similar right triangles in real-world and mathematical problems in two and three dimensions.

Understandings: *Students will understand that…* • Dialations are different than rigid motions and scale drawings • Patterns between the coordinates of points and their images to write a rule that determines the coordinates of a point's image under a dilation centered at the origin. • Similar figures are figures that can be mapped onto one another by using a sequence of rigid motions or dilations, or both. • triangles meeting these criteria are similar triangles- horizontal and vertical legs and have hypotenuses that lie on the same line	**Essential Questions:** • What information do we need to apply dilations? • What is the relationship between the center of dilation, a point, and its image under a dilation with a scale factor greater than 1? • What is the relationship between the center of dilation, a point, and its image under a dilation? • Can we draw the image of a segment under a dilation by finding the images of only its endpoints under the dilation? Why? • How can we draw the image of a figure with curves under a dilation? • What is the relationship between the coordinates of a point and the coordinates of its image under a dilation centered at the origin? • Can we locate the center of dilation? How? • What information do we need to describe a dilation? • How can we use angle relationships to help us show that two triangles are similar?

	• How can we use properties of similar figures to find an unknown side length of a figure? • How is linear perspective related to dilations?

Assessment Evidence

Performance Tasks: Lesson 6- Learn Section-> Where to Stand Lesson 9- Learn Section-> Digital Activity Lesson 16- Learn Section-> Right Triangle Cards	**Other Evidence:** Quizzes for each topic • Topic A- Lessons 1-3 • Topic B- Lessons 4-8 • Topic C- Lessons 9-13 • Topic D- Lessons 14-17

Benchmarks:

Module 3 Assessment

Learning Plan

Learning Activities:
Each lesson consists of the following

Fluency Activities
Launch
Learn
Exit Tickets

Resources:

- Eureka Math^2- Module Overview (Explains in detail the different Fluency activities)

Unit Four: Linear Equations in One or Two Variables

Unit Description:

Students solve linear equatins in one variable and discover that these equations can have only one solution, infinitely many solutions, or no solution. They then transition to solving linear equations in two variables. Students recognize that each solution to a linear equation in two variables is composed of two values which can be written as an ordered pair. STudnets find that there are an infinite number of solutions to a linear equation in two variables and if they graph these solutions in a coordinate plane, the points form a line. Students use proportional relationships and similar triangles to develop an understanding of the slope of a line and then develop the slope-intercetp form and the point-slope form of a linear equation.

Unit Duration: 7 weeks

Desired Results

Standard(s):

8.EE.B
8.EE.B.5
8.EE.B.6
8.NS.A.1
8.EE.C.7
8.EE.C.7a
8.EE.C.7b

Indicators:

- Represent decimal expansions that repeat eventually as rational numbers of the form p/q, where p and q are integers and q≠0.
- Write and solve linear equations in one variable with only one solution, infinitely many solutions, or no solution.
- Solve linear equations with rational number coefficients.
- Make connections between linear equations in two variables and their graphs.
- Analyze linear equations in two variables and their solutions to predict the shape of their graphs.
- Interpret the meaning of linear equations in two variables that represent real-world contexts.
- Graph proportional relationships and interpret the unit rate as the slope of the graph.
- Compare two different proportional relationships represented in different ways.
- Explain why the slope is the same between any two points on a nonvertical line in the coordinate plane by using similar triangles.
- Derive the equations y = mx and y = mx + b by using properties of similar triangles.
- Write and solve linear equations in one variable for real-world and mathematical problems.

Understandings:
Students will understand that… *U*

- Linear equations can be written and solved to answer questions about consecutive integers and geometric relationships.
- Linear equations in one variable can have only one solution, infinitely many solutions, or no solutions.
- Two values are needed to represent a solution to a linear equation in two variables.
- Proportional relationships lines have a slope.
- The slope intercept form is not proportional, but is linear.
- There are different forms to write linear equations: slope-intercept, point slope, and standard form.

Essential Questions:

- Why is it important to define the variable for a situation?
- How does knowing the structure of the equation help us write an equation with only one solution, infinitely many solutions, or no solution?
- How can we use equations to represent real-world situations?
- How do we know if an ordered pair is a solution to an equation?
- What do equations of all horizontal lines have in common? Why?
- What do equations of all vertical lines have in common? Why?
- For a proportional relationship, how are its unit rate and the slope of its associated line related?
- What does the slope of a line tell us?
- Can we find the slope of a rising line that does not pass through the origin? If so, how?
- What information determines a line?

	• What does the slope of a line tell us? • Do we need the graph of a line to find its slope? Why? • What are the benefits of using slope-intercept form instead of standard form? • How can slope help us identify lines that are parallel? • When is the point-slope form of the equation of a line useful? • Without graphing, how can we determine whether tables represent the same line? • How do we use given information to write linear equations to model real-world situations?

Assessment Evidence

Performance Tasks: Lesson 8- Learn Section->Equation Card Sort Lesson 11- Learn Section-> Planning a Trip Lesson 12- Learn Section-> Digital Activity	**Other Evidence:** Quizzes for each topic • Topic A- Lessons 1-6 • Topic B- Lessons 7-11 • Topic C- Lessons 12-14 • Topic D- Lessons 15-19 • Topic E- Lessons 20-27

Benchmarks:

Module 4 Assessment

Learning Plan

Learning Activities:
Each lesson consists of the following

Fluency Activities
Launch
Learn
Exit Tickets

Resources:
- Eureka Math^2- Module Overview (Explains in detail the different Fluency activities)

Unit Five: Systems of Linear Equations

Unit Description:

Students graph systems of linear equations in two variables, estimate the coordinates of the intersection point on the graph, and verify that the ordered pair is a solution to the system. They also analyze systems of linear equations to determine the number of solutions. Students find that estimating solutions from a graph is difficult for solutions composed of one or more fractional values. So, they use the substitution method to write a system of linear equations in two variables as one linear equation in one variable. Now equipped with various solution methods, students are challenged to write and solve systems-resulting from numerical, geometrical, historical, and real-world contexts.

Unit Duration: 5 weeks

Desired Results

Standard(s):

8.EE.C.8

8.EE.C.8a

8.EE.C.8b

8.EE.C.8c

Indicators:

- Verify that an ordered pair is a solution to a given system of two linear equations in two variables and explain what the solution means in terms of the system's graph.
- Solve systems of two linear equations in two variables algebraically.
- Estimate solutions to systems of two linear equations in two variables by graphing the equations.
- Determine the number of solutions to the system of two linear equations by inspection.
- Solve mathematical and real-world problems leading to two linear equations in two variables.

Understandings:

Students will understand that… *U*

- Systems of equations are used to find a solution between two variables.
- There are a few ways to solve systems and can analyze the equations to determine the best method to use.
- System of equations are used in real-world situations and how to solve them.

Essential Questions:

- How can a graph help us find a solution to a system of equations?
- How can we determine whether an ordered pair is a solution to a system of linear equations?
- How do we know whether a system of equations has no solution?
- How does the graph of a system of linear equations look when it has only one solution? No solution? Infinitely many solutions?
- Is it helpful to analyze a system of equations before graphing? Why?
- Are there any limitations to solving systems of equations by graphing? If so, what are they?
- Can we solve a system of equations without graphing? How?
- When given a system of equations, how do we determine which method to use to find the solution?

	• What kinds of problems can we solve by using a system of equations? What information do we need to write a system of equations to find the intersection point of two lines?

Assessment Evidence

Performance Tasks: **Performance Tasks:** Lesson 5- Learn Section->Graphing Systems Relay Lesson 10- Learn Section-> Gallery Walk Lesson 12- Learn Section-> Digital Activity	**Other Evidence:** Quizzes for each topic • Topic A- Lessons 1-5 • Topic B- Lessons 6-10 • Topic C- Lessons 11-14

Benchmarks:

Module 5 Assessment

Learning Plan

Learning Activities:
Each lesson consists of the following

Fluency Activities
Launch
Learn
Exit Tickets

Resources:

- Eureka Math^2- Module Overview (Explains in detail the different Fluency activities)

Unit Six: Functions and Bivariate Statistics

Unit Description:

Students learn that a function relates inputs and outputs in such a way that each input is assigned one and only one output. They write equations to represent linear functions, and they relate the rate of change and initial value of each function back to the context. Students use scatter plots to display bivariate numerical data. For data that appear to have a linear pattern, they draw a line that fits the data and write an equation of that line. Students examine bivariate categorical data by using two-way tables and find row or column relative frequencies to informally assess evidence of an association between two categorical variables. Students develop volume formulas for pyramids, cylinders, cones, and spheres and use linear functions to solve real-world problems involving volume

Unit Duration:

Desired Results

Standard(s):
8.F.A.1
8.F.A.2
8.F.A.3
8.F.B.4
8.F.B.9
8.SP.A.1
8.SP.A.2
8.SP.A.3
8.SP.A.4

Indicators:

- Justify whether relationships are functions based on the understanding that functions are rules that assign each input to exactly one output.
- Solve problems by using the equations of linear models in the context of bivariate numerical data.
- Construct and interpret two-way tables summarizing data on two categorical variables collected from the same subjects.
- Describe po Interpret rates of change and initial values of linear functions in terms of the situations that they model. ssible associations between two variables by using relative frequencies.
- Calculate the volume of right and oblique cones, cylinders, and spheres in real-world and mathematical problems.
- Compare properties of functions represented in different ways.
- Identify linear and nonlinear functions.
- Construct functions to model linear relationships by determining rate of change and initial value given a description or two values in a table or graph.
- Interpret rates of change and initial values of linear functions in terms of the situations that they model.
- Describe functions by analyzing their graphs.
- Sketch graphs of functions that exhibit qualitative features that have been described verbally.
- Interpret and describe patterns of association between two quantities shown in scatter plots.
- Informally fit lines that model linear relationships and assess the fit of the lines for two numerical variables displayed in scatter plots.

Understandings:
Students will understand that… *U*

- When a function can be represented by an equation, the graph of the function lies on the graph of the corresponding equation.
- If the rate of change is the same at every interval of a function, then the function is a linear function
- Data has a linear pattern; students draw a line that fits the data.
- Using segmented bar graphs to make a visual connection to row or column relative frequencies and determine

Essential Questions:

- How are linear functions and proportional relationships the same? How are they different?
- What do all functions have in common?
- When can we represent a function with an equation?
- How can we determine what inputs make sense for a function?
- How can we determine whether a function is a linear function?
- What does it mean for a linear function to be increasing? Decreasing?

whether there is an association between two categorical variables. • The relationship between the volume of a prism and the volume of a pyramid and the relationship between the volume of a cylinder and the volume of a cone.	• How can we find the rate of change and the initial value from different representations of functions? • How do we determine where a function is increasing? Decreasing? • What features of a graph help us classify it? • How do we know whether a function is linear or nonlinear? • Why is a scatter plot useful when working with bivariate numerical data? • What can an association tell us about two variables? What can it not tell us? • What is an effective strategy for fitting a line to data in a scatter plot? • How can we organize and display bivariate categorical data? • What are some tools and methods we can use to analyze bivariate categorical data?

Assessment Evidence

Performance Tasks: Lesson 1-> Learn Section-> Digital Activity Lesson 11->Learn Section-> Digital Activity Lesson 16->Learn Section->Measure the Height Lesson 21-> Learn Section->Find Its Match Lesson 22->Learn Section->Digital Activity Lesson 23->Learn Section-> Sort It Out	**Other Evidence:** Quizzes for each topic • Topic A- Lessons 1-5 • Topic B- Lessons 6-10 • Topic C- Lessons 11-17 • Topic D- Lessons 18-20 • Topic E- Lessons 21-25

Benchmarks:

Module 6 Assessment

Learning Plan

Learning Activities:
Each lesson consists of the following

Fluency Activities
Launch
Learn
Exit Tickets

Resources:
- Eureka Math^2- Module Overview (Explains in detail the different Fluency activities)

Unit Modifications for Special Population Students

English Language Learners	Pair students who have different levels of math proficiency Pair students who have different levels of language proficiency Join pairs to join small groups of four

Learners with an IEP	Each special education student has in Individualized Educational Plan (IEP) that details the specific accommodations, modifications, services, and support needed to level the playing field. This will enable that student to access the curriculum to the greatest extent possible in the least restrictive environment. These include: • Variation of time: adapting the time allotted for learning, task completion, or testing • Variation of input: adapting the way instruction is delivered • Variation of output: adapting how a student can respond to instruction • Variation of size: adapting the number of items the student is expected to complete • Modifying the content, process or product Additional resources are outlined to facilitate appropriate behavior and increase student engagement. The most frequently used modifications and accommodations can be viewed here. Teachers are encouraged to use the Understanding by Design Learning Guidelines (UDL). These guidelines offer a set of concrete suggestions that can be applied to any discipline to ensure that all learners can access and participate in learning opportunities. The framework can be viewed here www.udlguidelines.cast.org
Learners with a 504	Refer to page four in the Parent and Educator Guide to Section 504 to assist in the development of appropriate plans.

Interdisciplinary Connections

Indicators:

Integration of 21st Century Skills

Indicators:
Creativity- Advertisement project in Lesson 14
Collaboration- working in pairs and small groups
Communication- discusses held during the lesson
Social Skills- discussing different problems in pairs or small groups.