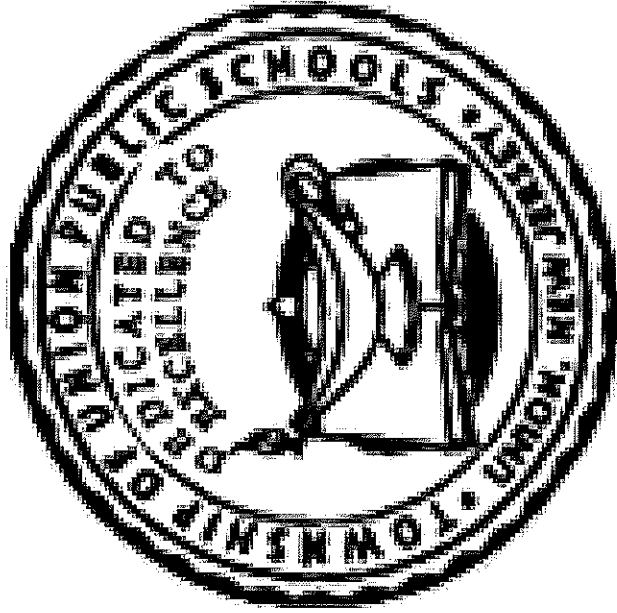


**TOWNSHIP OF UNION PUBLIC SCHOOLS**



**Math Readiness for College & Careers**  
**Adopted June 17, 2015**  
**Updated December 18, 2018**

## **Mission Statement**

The Township of Union Board of Education believes that every child is entitled to an education designed to meet his or her individual needs in an environment that is conducive to learning. State standards, federal and state mandates, and local goals and objectives, along with community input, must be reviewed and evaluated on a regular basis to ensure that an atmosphere of learning is both encouraged and implemented. Furthermore, any disruption to or interference with a healthy and safe educational environment must be addressed, corrected, or when necessary, removed in order for the district to maintain the appropriate educational setting.

## **Philosophy Statement**

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is to formulate a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

## **Course Description**

The purpose of this senior-level math course is to provide instructions in general mathematical concepts with a heavy concentration in real-world applications of mathematics. Students will improve their reasoning abilities by making generalizations and drawing logical conclusions. Concepts in Algebra 1, Geometry, Algebra 2, & Trigonometry are explored as they relate to business, science, finance, data collection, and careers.

## Curriculum Units

Unit 1: Foundations of Algebra

Unit 2: Real-World Functions and Formulas

Unit 3: Linear Relationships

Unit 4: Non-Linear Relationships

Unit 5: Polynomials, Rational Functions, and Trigonometry

## Pacing Guide

<u>Content</u>	<u>Number of Days</u>
<u>Unit 1: Foundations of Algebra</u>	35
<u>Unit 2: Real-World Functions and Formulas</u>	35
<u>Unit 3: Linear Relationships</u>	35
<u>Unit 4: Non-Linear Relationships</u>	35
<u>Unit 5: Polynomials, Rational Functions, and Trigonometry</u>	40

## Unit 1: Foundations of Algebra

Essential Questions	Instructional Outcomes	Activities	Assessments	NJSLS
<ul style="list-style-type: none"> <li>When is it advantageous to use fractions instead of decimals/percents, decimals instead of fractions/percents, or percents instead of fractions/decimals?</li> </ul>	<ul style="list-style-type: none"> <li>Convert between fractions, decimals, and percents</li> <li>Use <math>&lt;</math>, <math>=</math>, or <math>&gt;</math> to compare rational numbers</li> <li>Plot and order rational numbers on a number line</li> </ul>	<ul style="list-style-type: none"> <li>Choose the rational number (fraction, decimal, or percent) that is most sensible</li> <li>Given a pair of rational numbers, fill in <math>&lt;</math>, <math>=</math>, or <math>&gt;</math></li> <li>Given a list of rational numbers, plot and order them on a number line</li> </ul>	<ul style="list-style-type: none"> <li>Given a real life scenario and a list of 3 equivalent rational numbers, choose the most appropriate rational number (fraction, decimal, or percent)</li> <li>Fill in <math>&lt;</math>, <math>=</math>, or <math>&gt;</math> <math>\frac{2}{3}</math> <math>\underline{\quad}</math> <math>0.6</math></li> <li>Plot and order the following: <math>\frac{4}{9}</math>, <math>\frac{2}{5}</math>, <math>42\%</math>, <math>0.41</math>, <math>\frac{9}{20}</math></li> </ul>	<p>6.RP.2-3 7.RP.1-3 7.SP.1-2, 5 S-ID.1-4 S-CP.2, 6-9</p>
<ul style="list-style-type: none"> <li>How are rational numbers used to solve real-life problems?</li> <li>What is the best way to simplify expressions involving several operations?</li> </ul>	<ul style="list-style-type: none"> <li>Perform all operations on rational numbers</li> <li>Use exponents &amp; radicals to simplify expressions</li> <li>Use order of operations to simplify</li> </ul>	<ul style="list-style-type: none"> <li>Simplify numerical expressions by adding, subtracting, multiplying, and dividing</li> <li>Simplify numerical expressions using exponents and radicals</li> <li>Simplify numerical expressions using</li> </ul>	<ul style="list-style-type: none"> <li>The Lincoln Tunnel EZPass weekday off-peak toll is \$9.75 and peak toll is \$11.75. If you travel into NYC through the Lincoln Tunnel Monday – Friday for four weeks, how much money would you save when traveling</li> </ul>	<p>6.RP.2-3 7.RP.1-3 7.SP.1-2, 5 S-ID.1-4 S-CP.2, 6-9</p>

	expressions	the order of operations	off-peak hours compared to peak hours?	
<ul style="list-style-type: none"> <li>When are rational numbers used to solve real-life problems?</li> <li>How are rational numbers used to analyze information and guide decision-making?</li> </ul>	<ul style="list-style-type: none"> <li>Use fractions, decimals, and percents to calculate sales tax, tip, commissions, percent change</li> <li>Use mean, median, mode, and range to organize and summarize data</li> <li>Calculate theoretical and experimental probability</li> </ul>	<ul style="list-style-type: none"> <li>Given real life scenarios involving fractions, decimals, and percents, write and solve equations to solve problems <b>(Interdisciplinary Connection)</b></li> <li>Given a list of values from a real-life scenario, calculate the mean, median, mode, and range and determine what's the most revealing measure of central tendency</li> <li>Given a real-life scenario, calculate the experimental probability</li> <li>Given an event or series of events,</li> </ul>	<ul style="list-style-type: none"> <li>Simplify <math>4 + 8 \times \sqrt[3]{27} \div (2 + 4)</math></li> <li>Calculate the final price of a refrigerator costing \$850, with a 15% off coupon, and 7% sales tax.</li> <li>Find the real estate's commission for a house sold at \$375,000 at a 6% rate.</li> <li>Given a list of values from a real-life scenario, calculate the mean, median, mode, and range and determine what's the most revealing measure of central tendency</li> <li>The skateboard manufacturer inspects 2500 skateboards and</li> </ul>	<p>6.RP.2-3 7.RP.1-3 7.SP.1-2, 5 S-ID.1-4 S-CP.2, 6-9</p>

		<p>calculate the theoretical probability that the scenario occurs.</p>	<p>found that 2450 of them had no defects. Find the probability that a skateboard selected at random has no defects.</p> <ul style="list-style-type: none"> <li>You take a five-question multiple choice quiz and guess on all questions selecting one of four answers randomly each time. What is the probability you will get a perfect score?</li> </ul>	
<p>How are graphs used to analyze data and guide decision-making?</p>	<ul style="list-style-type: none"> <li>Use bar graphs, histograms, flow charts, circle graphs, line graphs, and scatter plots to interpret and analyze data</li> </ul>	<ul style="list-style-type: none"> <li>Given a graph, interpret and analyze the data presented</li> <li>Given a table of data or word problem, create a graph that best depicts this data</li> </ul>	<ul style="list-style-type: none"> <li>Given three tables, create a graph for each that best depicts the data (bar graph, line graph, circle graph).</li> <li>Analyze graph to make decisions</li> </ul>	<p>6.RP.2-3 7.RP.1-3 7.SP.1-2, 5 S-ID.1-4 S-CP.2, 6-9</p>



### Unit 1 Proficiencies

Students will be able to:

- Convert between fractions, decimals, and percents
- Use  $<$ ,  $=$ , or  $>$  to compare rational numbers
- Plot and order rational numbers on a number line
- Perform all operations on rational numbers
- Use exponents & radicals to simplify expressions
- Use order of operations to simplify expressions
- Use fractions, decimals, and percents to calculate sales tax, tip, commissions, percent change
- Use mean, median, mode, and range to organize and summarize data
- Calculate theoretical and experimental probability
- Use bar graphs, histograms, flow charts, circle graphs, line graphs, and scatter plots to interpret and analyze data

### Suggested Differentiation for Unit 1

- **Tier 1 Learners:**
  - Have guided notes filled out at different levels according to ability.
  - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
  - Group students by similar interest when working on application problems.
  - Use mini lessons to reteach to those having difficulty.
  - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
  - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
  - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**

- Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
- **Tier 3 Learners:**
  - Have problems posted around the room. Have students loop to specific questions based on difficulty.

### Curriculum Resources

- Insider's Guide to Teaching Mathematics (Course Textbook)
- Preparing for HSPA Mathematics Coach
- Kuta Software
- Rudolph Academy
- Khan Academy
- College Readiness for SAT
- [https://www.monroecollege.edu/uploadedFiles/Site\\_Assets/PDF/placementexamreview.pdf](https://www.monroecollege.edu/uploadedFiles/Site_Assets/PDF/placementexamreview.pdf)
- <https://www-math.umd.edu/cgi-bin/placement/index.cgi>
- [www.math.com](http://www.math.com)

### Formative Assessments

Homework  
 Classroom whiteboard problem solving  
 Exit tickets  
 Mini whiteboards  
 Use of technology (Google Suite)  
 Do nows  
 Oral questioning  
 Short constructed responses

### Summative Assessments

Quiz  
 Chapter Test  
 Projects

## Unit 2: Real World Functions and Formulas

Essential Questions	Instructional Outcomes	Activities	Assessments	NJSLs
<ul style="list-style-type: none"> <li>• What are functions and how are they used to help us understand the relationship between two quantities?</li> <li>• How are graphs used to represent and analyze functions?</li> <li>• What are examples of real-world linear functions and how can we model them with equations?</li> <li>• How are geometry formulas used in the real</li> </ul>	<ul style="list-style-type: none"> <li>• A function is a rule that assigns to each input exactly one output.</li> <li>• The graph of a function is the set of ordered pairs consisting of an input and the corresponding output.</li> <li>• Geometry formulas allow us to calculate the distance of line segments, the perimeter and area of 2D shapes, the circumference and area of circles, and the surface area and volume of 3D shapes.</li> </ul>	<ul style="list-style-type: none"> <li>• Given a function rule, fill out an input-output table.</li> <li>• Given two sets of quantities, write the function rule and graph the function.</li> <li>• Given the graph of a function, identify the ordered pairs and write the function rule.</li> <li>• Use an appropriate domain for a given real world scenario, find the corresponding range, write and graph the function.</li> </ul>	<ul style="list-style-type: none"> <li>• Given <math>y = 5x - 2</math>, complete an input-output table.</li> <li>• Given <math>(0,1)</math>, <math>(2, 4)</math>, <math>(4, 7)</math>, <math>(6, 10)</math>, write the function rule and graph the function.</li> <li>• Al's Auto Rental charges \$32 per day plus \$0.28 per mile for an automobile rental. Elaine rented a car for 2 days and drove 83 miles. How much did she pay? Ramon paid \$60 to rent a car for</li> </ul>	<p>F-IF.4, 6-9 F-LE.1-3 A-SSE.3</p>

world?

- Solve real world problems involving coordinate geometry using formulas for distance, midpoint, perimeter, circumference, and area. **(Interdisciplinary Connection)**

one day. How far did he drive?

- A bakery sells a 9" by 13" cake for the same price as an 8" diameter round cake. If the round cake is twice the height of the rectangular cake, which option gives the most cake for the money?

## Unit 2 Proficiencies

Students will be able to:

- Define a function
- Graph a function using the set of ordered pairs consisting of an input and the corresponding output
- Find the domain and range of a function
- Read, interpret, and analyze functions graphically
- Calculate the distance of line segments, the perimeter and area of 2D shapes, the circumference and area of circles, and the surface area and volume of 3D shapes.

## Suggested Differentiation for Unit 2

### • Tier 1 Learners:

- Have guided notes filled out at different levels according to ability.
- Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
- Group students by similar interest when working on application problems.
- Use mini lessons to reteach to those having difficulty.
- Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
- Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
- Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.

### • Tier 2 Learners:

- Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.

### • Tier 3 Learners:

- Have problems posted around the room. Have students loop to specific questions based on difficulty.

### Curriculum Development Resources

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- <https://www.math.umd.edu/cgi-bin/placement/index.cgi>
- [www.math.com](http://www.math.com)

### Formative Assessments

Homework  
Classroom whiteboard problem solving  
Exit tickets  
Mini whiteboards  
Use of technology (Google Suite)  
Do nows  
Oral questioning  
Short constructed responses

### Summative Assessments

Quiz  
Chapter Test  
Projects

### Unit 3: Linear Relationships

Essential Questions	Instructional Outcomes	Activities	Assessments	NJSLS
<ul style="list-style-type: none"> <li>Is there an advantage to solve equations algebraically vs. guess and check method?</li> </ul>	<ul style="list-style-type: none"> <li>Solving Equations In one variable (One-Step, Two-Step, Multi-step, Variables on both sides)</li> </ul>	<ul style="list-style-type: none"> <li>Show slight differences in problems and common mistakes.</li> <li>Creating equations to help solve real-life problems.</li> </ul>	<ul style="list-style-type: none"> <li>3 consecutive integers add up to 39. What are the 3 integers?</li> </ul>	<ul style="list-style-type: none"> <li>HSA.REI.A.1,</li> <li>HSA.REI.A.2</li> </ul>

<ul style="list-style-type: none"> <li>What is the best way to represent change mathematically?</li> </ul>	<ul style="list-style-type: none"> <li>Finding slope of a line when given two points on the line.</li> <li>Identifying slope of a linear equation (Slope-intercept form, standard form, and point-slope form).</li> <li>Finding intercepts of linear equations.</li> <li>Solving literal equations.</li> </ul>	<ul style="list-style-type: none"> <li>Slope-Speed Dating: Each student will be given a unique ordered pair, students will be given a time to pair with another student and find the slope of the line that passes between their points, after the time passes students will go on the next student. (This activity could be</li> </ul>	<ul style="list-style-type: none"> <li>Find the slope of the line that passes through the following points: (2,3) and (12,6).</li> <li>Rental Car Company "A" charges \$30 to rent a car and \$0.50 for each mile driven. Rental car company "B" charges a flat rate of \$75. If you have to use a rental car to</li> </ul>	<ul style="list-style-type: none"> <li>HSA.REI.B.3</li> </ul>
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<ul style="list-style-type: none"> <li>• How can linear inequalities be used to solve real-life problems?</li> </ul>	<ul style="list-style-type: none"> <li>• Solve and graph inequalities written in one variable.</li> <li>• Graph linear inequalities.</li> </ul>	<p>done with midpoint formula, distance formula, or equation of a line.)</p> <ul style="list-style-type: none"> <li>• Convert the following equation to slope-intercept form.</li> <li>• Students will be separated and asked to graph an equation using 3 different methods. (Slope-intercept form, intercepts, and using t-chart)</li> </ul>	<p>drive 80 miles, which company is economically better?</p> <ul style="list-style-type: none"> <li>• List the pros and cons of each of the methods of graphing.</li> <li>• <math>A^2 + B^2 = C^2</math>; solve for B, then solve for C.</li> <li>• Compare your results to a formula that you already know.</li> </ul>	
		<ul style="list-style-type: none"> <li>• Use the smart board to show how changing an inequality affects the graph of that inequality.</li> </ul>	<ul style="list-style-type: none"> <li>• Give an example of a real life limit and express that limit as an inequality.</li> <li>• Solve and graph the following inequality: <math>2x - 5x &gt; 2(x-4)</math></li> </ul>	<ul style="list-style-type: none"> <li>• HSA.REI.B.3</li> </ul>



<ul style="list-style-type: none"> <li>• How can systems be used to help solve real-life problems?</li> <li>• When can a system of equations be used?</li> <li>• When can a system of inequalities be used?</li> </ul>	<ul style="list-style-type: none"> <li>• Solve systems of equations using both the elimination and substitution methods.</li> <li>• Graph systems of inequalities. (Tell whether a point falls within the solution.)</li> </ul>	<ul style="list-style-type: none"> <li>• Have students solve systems using graphing, elimination, and substitution and show them that each method will provide the same answer if done correctly.</li> <li>• Give students a linear equation and tell them to find a partner and choose a method to tell where there equations meet.</li> </ul>	<ul style="list-style-type: none"> <li>• Kimberly went to the movie theatre and purchased 2 adult tickets and 5 student tickets for \$45. Malcolm went to the same theatre and purchased 5 adult tickets and 2 student tickets for \$65. What is the price of each ticket?</li> </ul>	<ul style="list-style-type: none"> <li>• HSA.REI.C.5-9</li> </ul>
<ul style="list-style-type: none"> <li>• What is the meaning of absolute value and when does it apply?</li> </ul>	<ul style="list-style-type: none"> <li>• Solve absolute value equations.</li> </ul>	<ul style="list-style-type: none"> <li>• Students will review common mistakes</li> </ul>	<ul style="list-style-type: none"> <li>• What are the differences between the two absolute value equations:  <math>3 x+1 =30</math> and <math> 3x+3 =30</math></li> </ul>	<ul style="list-style-type: none"> <li>• HSA.REI.D.11</li> </ul>

<b>Unit 3 Proficiencies</b>
Students will be able to:
<ul style="list-style-type: none"> <li>• Solve equations in one variable (one-step, two-step, multi-step, double-side variable).</li> </ul>

- Find slope when given two points and when given a linear equation written in any form.
- Write equation in slope-intercept form or standard form when given two points.
- Convert equations in between forms (slope-intercept form, standard form, point-slope form).
- Solve literal equation.
- Find intercepts of a line when given two points or when given a linear equation in any form.
- Graph linear equations written in standard form or slope-intercept form.
- Solve and graph inequalities, both in one variable and linear.
- Solve absolute value equations.
- Solve systems (Systems of Equations, 2 Equations w/ 2 variables; Systems of Inequalities)

### Suggested Differentiation for Unit 3

- **Tier 1 Learners:**
  - Have guided notes filled out at different levels according to ability.
  - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
  - Group students by similar interest when working on application problems.
  - Use mini lessons to reteach to those having difficulty.
  - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
  - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
  - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
  - Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
- **Tier 3 Learners:**
  - Have problems posted around the room. Have students loop to specific questions based on difficulty.

### Curriculum Resources

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### Formative Assessments

Homework  
Classroom whiteboard problem solving  
Exit tickets  
Mini whiteboards  
Use of technology (Google Suite)  
Do nows  
Oral questioning  
Short constructed responses

### Summative Assessments

Quiz  
Chapter Test  
Projects

## Unit 4: Non Linear Relationships

Essential Questions	Instructional Outcomes	Activities	Assessments	NJSLs
<ul style="list-style-type: none"> <li>• How can we use mathematical language to describe non-linear change?</li> <li>• How can we model situations using quadratics?</li> <li>• How can we model situations using exponents?</li> </ul>	<ul style="list-style-type: none"> <li>• Use the properties of exponents to simplify the following exponential expressions.</li> <li>• Recognize and solve problems that can be modeled using a quadratic function. Interpret the solution in terms of the context of the original problem.</li> <li>• Solve equations involving several variables for one variable in terms of the others.</li> <li>• Solve single-variable quadratic equations.</li> <li>• Provide and describe multiple representations of</li> </ul>	<ul style="list-style-type: none"> <li>• Show video clip of Tarzan swinging from vine and baseball hit to represent parabolic curves and discuss shape, location, and meaning of vertex, domain, range, max/min and opening direction.</li> <li>• Have students choose between an allowance of \$5 a day or start with a penny and double daily for one month.</li> <li>• Use the Smart Board to illustrate changes to the vertical motion model in real-life problems <b>(Interdisciplinary – Physics).</b></li> </ul>	<ul style="list-style-type: none"> <li>• Determine the vertex of the function <math>F(x) = 4x^2 - 4x + 8</math></li> <li>• Given the following increasing numerical pattern, determine the type of relationship that exists (linear quadratic or exponential) and justify your conclusion: -3, -1, 5, 23, 77, ...</li> <li>• An owl is circling a field at a height of 70 feet and sees a mouse. The owl folds its wings and begins to dive with an initial speed of 6 feet per second. Estimate the time the mouse has to escape. The model for the height of the</li> </ul>	<p>NJSLs HAS.REI.B.4</p>

	<p>solutions to simple exponential equations using concrete models, tables, graphs, symbolic expressions and technology.</p>	<ul style="list-style-type: none"> <li>Given the volume of various solids, students will rewrite the formulas in terms of height.</li> <li>Use the graphing calculator to identify the zeroes of the quadratic equation.</li> <li>Students will track a credit card purchase over a given period of time. Students will graph the final result.</li> </ul>	<p>owl at time  <math>t</math> is <math>h = -16t^2 - 6t + 70</math></p> <ul style="list-style-type: none"> <li>Solve for <math>r</math>: <math>V = 1 \pi r^2 h</math></li> <li>Solve for <math>x</math>: <math>(3x - 7)^3 = 0</math></li> <li>Solve for <math>x</math>: <math>5x^2 - 2x - 10 = -13</math></li> <li>What is the solution set for <math>6x^2 + 7x - 5 = 0</math>?</li> <li>Using a table, graph, and/or symbolic expressions, solve the following equation. Provide more than one representation of the solutions and explain your work.</li> </ul> <p><math>16 = 2^x</math></p>	
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**Unit 4 Proficiencies**

Students will be able to:

- Simplify expressions using the properties of exponents.
- Add, subtract, and Multiply Polynomials (Recognize Special Polynomial Products).
- Factor monomials and quadratics.
- Solve quadratic equations (Factoring, Completing the Square, and Quadratic Formula).
- Solve Rational Expressions

#### Suggested Differentiation for Unit 4

- **Tier 1 Learners:**
  - Have guided notes filled out at different levels according to ability.
  - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
  - Group students by similar interest when working on application problems.
  - Use mini lessons to reteach to those having difficulty.
  - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
  - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
  - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
  - Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
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#### Curriculum Resources

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Homework  
 Classroom whiteboard problem solving  
 Exit tickets  
 Mini whiteboards  
 Use of technology (Google Suite)  
 Do nows  
 Oral questioning  
 Short constructed responses

### Summative Assessments

Quiz  
 Chapter Test  
 Projects

## Unit 5: Polynomials, Rational Functions, and Trigonometry

Essential Questions	Instructional Outcomes	Activities	Assessments	NJSLs
<ul style="list-style-type: none"> <li>Is there a way to easily factor polynomials when the leading coefficient is not one?</li> <li>Why can I not solve for two variables with one equation?</li> <li>How can I find the area of a polygon on a coordinate plane?</li> <li>How can I figure out how to maximize profits and minimize costs?</li> <li>How can I determine if a business is profitable?</li> </ul>	<ul style="list-style-type: none"> <li>Factor polynomials, expand polynomials, simplify rational expressions.</li> <li>Solve a two variable system using graphing, elimination, and substitution.</li> <li>Solve a system of inequalities by graphing.</li> <li>Solve a quadratic equation by factoring, completing the square, and using the quadratic formula.</li> <li>Calculate the area of a polygon on a coordinate plane.</li> <li>Calculate the area of</li> </ul>	<ul style="list-style-type: none"> <li>Expand polynomials by distributing, multiplying polynomials using distribution.</li> <li>Simplifying rational expressions by factoring and identifying any restrictions on variables.</li> <li>Graphing various costs for a cell phone plan to see which plan is better for the consumer.</li> <li>Splitting the class in two to substitute and eliminate (one side solves for x first while the</li> </ul>	<ul style="list-style-type: none"> <li>Algebra Operations- Evaluate . State all restrictions on the variables.</li> <li>Solutions of Equations and Inequalities- A restaurant's supper club offers 6 meals for \$300 and 12 meals for \$480. Each package requires you to buy into the supper club at the restaurant and includes a one-time membership fee in the package price. What is the cost of each meal?</li> <li>Coordinate Geometry- A boat has a speed of 48 mi/h in still water. A river is flowing at 14 mi/h due south. If the boat is heading due east, what are the boats</li> </ul>	<ul style="list-style-type: none"> <li>HSA.APR.A.1,</li> <li>HSA.APR.B.2</li> <li>HSA.REI.C.(5-9)</li> <li>HSG.GPE.B.7</li> <li>HSA.CED.A.3</li> <li>HSG.SRT.C.8</li> </ul>



<ul style="list-style-type: none"> <li>• Is there any way to tell if parts of a building will violate the building code?</li> </ul>	<ul style="list-style-type: none"> <li>• a triangle on a coordinate plane using Heron's Formula.</li> <li>• Perform vector operations.</li> <li>• Calculate distance and magnitudes of resultant vectors</li> <li>• Perform function operations</li> <li>• Determine maximum profits using linear programming.</li> <li>• Perform function operations</li> <li>• Determine the break-even point for a production of a product or event.</li> <li>• Use Pythagorean Theorem to find missing sides of right triangles</li> <li>• Use trigonometry to find missing parts of</li> </ul>	<ul style="list-style-type: none"> <li>• other side solves for y first to show that order is not important)</li> <li>• Modeling a quadratic equation by throwing a ball in an arc and determining when it's at a certain height.</li> <li>• Plot a figure on a plane and calculate the area. This is done using normally oriented figures and abnormally oriented figures. Use Heron's formula for area of a triangle including calculating semiperimeter.</li> <li>• Add and subtract vectors to show</li> </ul>	<ul style="list-style-type: none"> <li>• resultant speed and direction?</li> <li>• Applications and other Algebra Topics- A t-shirt takes 10 min to make, costs \$4 to make, and yields a profit of \$6. A sweatshirt takes 30 min to make, costs \$20 to make, and yields a profit of \$20. Fred is selling the shirts at a summer concert series. He will spend no more than 20 hours making shirts, no more than \$600 making shirts, and will make at least 50 total shirts. How many of each shirt should Fred make to maximize profit? How much is the profit?</li> <li>• Functions- The CookieMan Cookie shop sells all cookies for \$2. The daily cost of</li> </ul>
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	<p>right triangles.</p>	<p>resultant magnitude.</p> <ul style="list-style-type: none"> <li>• Show how water affects vectors by putting a boat in a bucket of water and having the students blow the boat in different directions.</li> <li>• Have the students each open a business and put different parameters on the business to try to prevent profitability. See which student of group of students can remain profitable despite different constraints.</li> <li>• Examine the cost of doing business in the United</li> </ul>	<p>the shop (gas, electricity) is \$120. Each cookie costs \$1.40 to make. How many cookies must the CookieMan sell to break even daily?</p> <ul style="list-style-type: none"> <li>• Trigonometry- A town's building code requires a ramp to be 6 in. high for every 3 ft long. The ramp must attach to a landing that is 5 ft high. If there are 45 ft. available in which to build the ramp, will it be up to code? What angle will the ramp and the ground form?</li> </ul>	
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States versus the cost of moving production overseas. Identify why business' move production overseas and identify factors that could keep production in the US. Have students start businesses in the US and overseas and identify which are more profitable. **(Interdisciplinary - SS)**

- Build a model handicapped ramp. Identify the angle that the ramp rises at and the different lengths of the sides. Examine different national building codes to

		determine if the ramp is within the building codes.	
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### Unit 5 Proficiencies

Students will be able to:

- Factor polynomials, expand polynomials, simplify rational expressions.
- Solve a two variable system using graphing, elimination, and substitution.
- Solve a system of inequalities by graphing.
- Solve a quadratic equation by factoring, completing the square, and using the quadratic formula.
- Calculate the area of a polygon on a coordinate plane.
- Calculate the area of a triangle on a coordinate plane using Heron's Formula.
- Perform vector operations.
- Calculate distance and magnitudes of resultant vectors
- Perform function operations
- Determine maximum profits using linear programming.
- Perform function operations
- Determine the break-even point for a production of a product or event.
- Use Pythagorean Theorem to find missing sides of right triangles
- Use trigonometry to find missing parts of right triangles.

### **Suggested Differentiation for Unit 5**

- **Tier 1 Learners:**
  - Have guided notes filled out at different levels according to ability.
  - Give assignments that contain tasks of varying difficulty. Each task should focus on essential learning that all students should master, but the tasks will vary in difficulty.
  - Group students by similar interest when working on application problems.
  - Use mini lessons to reteach to those having difficulty.
  - Group students so that each group contains all level learners. The tier 3 learners can serve as peer helpers.
  - Assign a basic homework assignment. Require students to spend a set amount of time to work (showing effort) on the assignment rather than completing the entire assignment.
  - Allow students to choose a method for completing a project: video, PowerPoint, paper, or presentation.
- **Tier 2 Learners:**
  - Utilize foldables creating tangible products to help students digest information while incorporating several of the multiple intelligences.
- **Tier 3 Learners:**
  - Have problems posted around the room. Have students loop to specific questions based on difficulty.

### **Curriculum Development Resources**

- Insider's Guide to Teaching Mathematics (Course Textbook)
- Preparing for HSPA Mathematics Coach
- Kuta Software
- Rudolph Academy
- Khan Academy
- College Readiness for SAT
- [https://www.monroecollege.edu/uploadedFiles/Site\\_Assets/PDF/placementexamreview.pdf](https://www.monroecollege.edu/uploadedFiles/Site_Assets/PDF/placementexamreview.pdf)
- <https://www-math.umd.edu/cgi-bin/placement/index.cgi>

- [www.math.com](http://www.math.com)

### **Formative Assessments**

Homework  
Classroom whiteboard problem solving  
Exit tickets  
Mini whiteboards  
Use of technology (Google Suite)  
Do nows  
Oral questioning  
Short constructed responses

### **Summative Assessments**

Quiz  
Chapter Test  
Projects

**Additional Suggested Modifications for Units**

Below is an additional list of modifications and accommodations opportunities. This includes, but is not limited to,;

1. English Language Learners.
    - a. Read written instructions.
    - b. Model and provide examples
    - c. Extended time on assessments when needed.
    - d. Establish a non-verbal cue to redirect student when not on task.
    - e. Students may use a bilingual dictionary.
- English Language Development Standard 3: Language of Mathematics:** English language learners communicate information, ideas and concepts necessary for academic success in the content area of mathematics.

2. Special Education/504 Students.
  - a. Extended time on assessments when needed.
  - b. Preferred seating to be determined by student and teacher.
  - c. Provide modified assessments when necessary.
  - d. Student may complete assessments in alternate setting when requested.
  - e. Establish a non-verbal cue to redirect student when not on task.
  - f. Maintain strong teacher / parent communication.
  - g. Conversion chart

**New Jersey Student Learning Standards - Technology**

- 8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.
- A. Technology Operations and Concepts: Students demonstrate a sound understanding of technology concepts, systems and operations
  - B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products

and process using technology.

C. Communication and Collaboration: Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning.

E: Research and Information Fluency: Students apply digital tools to gather, evaluate, and use information.

F: Critical thinking, problem solving, and decision making: Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.

**\*See Activities for Technology Integration.**

**Career Readiness Practices**

- CRP1. Act as a responsible and contributing citizen and employee.
- CRP2. Apply appropriate academic and technical skills.
- CRP4. Communicate clearly and effectively and with reason.
- CRP6. Demonstrate creativity and innovation.
- CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.
- CRP11. Use technology to enhance productivity.

**NJSLS 9.2 - Career Awareness, Exploration, and Preparation**

9.2.8.B.3 Evaluate communication, collaboration, and leadership skills that can be developed through school, home, work, and extracurricular activities for use in a career.