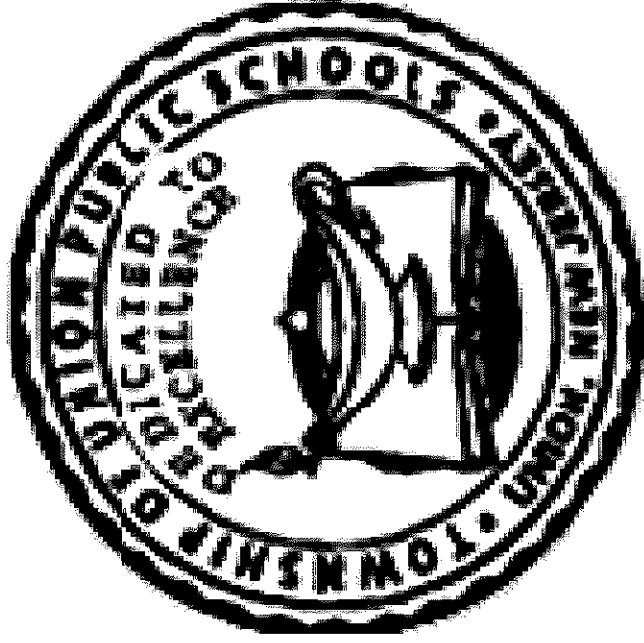
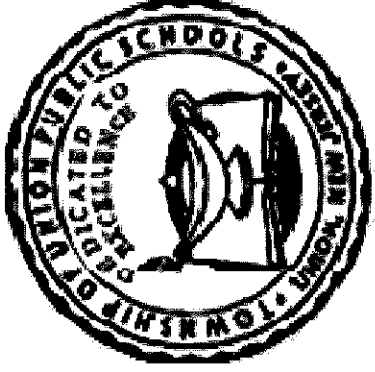


TOWNSHIP OF UNION PUBLIC SCHOOLS



Academic Area
Curriculum Guide 2015

Curriculum Guide Approved June 2015



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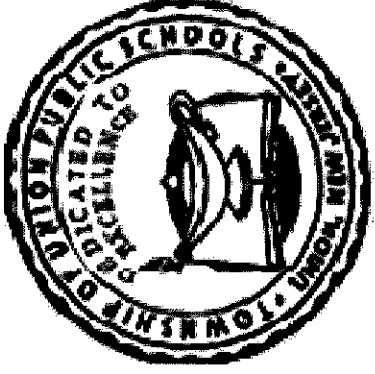
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TOWNSHIP OF UNION PUBLIC SCHOOLS
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Cheryl Fiske

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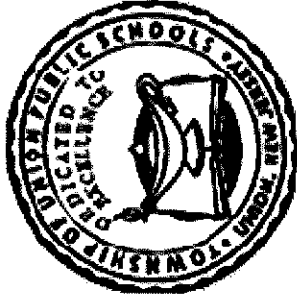
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District Mission Statement

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.

District 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 the formulation of 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.



Statement of District Goals

- ❖ Develop reading, writing, speaking, listening, and mathematical skills.
- ❖ Develop a pride in work and a feeling of self-worth, self-reliance, and self-discipline.
- ❖ Acquire and use the skills and habits involved in critical and constructive thinking.
- ❖ Develop a code of behavior based on moral and ethical principals.
- ❖ To be able to work with others cooperatively.
- ❖ Acquire a knowledge and appreciation of the historical record of human achievement and failures and current societal issues.
- ❖ Acquire a knowledge and understanding of the physical and biological sciences.
- ❖ Efficient and effective participation in economic life and the development of skills to enter a specific field of work.
- ❖ Appreciate and understand literature, art, music, and other cultural activities.
- ❖ Develop an understanding of the historical and cultural heritage.
- ❖ Develop a concern for the proper use and/or preservation of natural resources.
- ❖ Develop basic skills in sports and other forms of recreation.

Course Description

This course follows a structured scope and sequence, introducing, reinforcing and extending topics identified by the Common Core State Standards. This course will prepare students for college level courses in mathematics. The course is divided into multiple units covering the traditional skills and concepts required for advancement into pre-calculus in a rigorous college preparatory program. It includes the use of group explorations, scientific and graphing calculators, and computer software to study real world problems solving techniques and presentation strategies. Students will model and solve algebraic problems that involve the study of linear, polynomial, quadratic, and radical functions, nonlinear functions and relations, probability, matrices, the algebraic and geometric descriptions of inequalities, real and complex number systems, and trigonometry. A portion of weekly lessons will be dedicated to reinforcing those mathematical skills that have been identified on the PARCC. A summer review packet of algebra 1 will be required for all students applying to the course.

Recommended Textbooks

Algebra and Trigonometry for College Readiness

Pearson 2011

Margaret Lial and John Hornsby

Course Proficiencies

Students will be able to

1. Solve and graph absolute value equations and inequalities
2. Model real-life problems using equations and inequalities
3. Write and graph linear equations given specific conditions
4. Graph piecewise and absolute value functions
5. Solve systems of equations algebraically and graphically
6. Graph and solve systems of linear inequalities – Linear Programming
7. Solve systems of linear equations in 3 and 4 variables
8. Demonstrate knowledge of matrices, including operations with matrices, determinants, identity, inverse, and solve systems by using matrices.
9. Solve quadratic equations by graphing, factoring, finding the square roots, completing the square, and using the quadratic formula
10. Graph and solve quadratic inequalities
11. Add, subtract, and multiply complex numbers.
12. Add, subtract, multiply, and divide polynomials. Solve polynomial equations
13. Evaluate and simplify expressions written in either exponential or radical form
14. Solve radical and exponential equations
15. Use the properties of logarithms to simplify expressions and solve equations
16. Model real-life problems using direct, inverse, and joint variation
17. Simplify rational expressions and solve rational equations
18. Apply formulas of geometric and arithmetic sequences and series
19. Find the probability of a given event and use combinations and permutations to solve counting problems
20. Apply standard deviation and variance

21. Recognize and be able to graph the equation of circles and ellipses
22. Convert between degrees and radian measure
23. To learn the Unit circle and circular functions
24. To learn trigonometric ratios
25. To evaluate trigonometric and inverse trigonometric functions
26. Use the Laws of Sines and Cosines to find missing parts of triangles
27. Use trigonometric identities to simplify trigonometric expressions

Curriculum Units

Unit 1: Linear Equations, Inequalities, Functions, and Systems

Unit 2: Quadratic and Polynomial Functions

Unit 3: Radical, Exponential, Logarithmic, and Rational Functions

Unit 4: Sequences and Series

Unit 5: Statistics, Probability, and Matrices

Unit 6: Conic Sections and Trigonometry

Unit 1 Linear Equations, Inequalities, Functions, and Systems

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	Solve linear equations including equations with fractions and decimals	HSA.REI.B.3
2	Solve applied problems by using equations and formulas	HSN.CED.A.1
3	Solve and graph simple and compound inequalities	HSN.REI.B.3
4	Solve and graph absolute value equations and inequalities	HSN.REI.B.3
5	Write and graph linear equations and inequalities in two variables	HSA.REI.D.12
6	Identify functions	HSF.IF.A.1
7	Solve systems of linear equations and inequalities algebraically and graphically	HSA.REI.C.6

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).

Bold type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

Selected Opportunities for Connection to 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.

All of the content presented at this grade level has connections to the standards for mathematical practices.

Bold type identifies possible starting points for connections to the SLOs in this unit.

Code #	Common Core State Standards
1	<p>CCSS.MATH.CONTENT.HSA.REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>
2	<p>CCSS.MATH.CONTENT.HSA.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i></p>
3	<p>CCSS.MATH.CONTENT.HSA.REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>
4	<p>CCSS.MATH.CONTENT.HSA.REI.B.3 Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.</p>
5	<p>CCSS.MATH.CONTENT.HSA.REI.D.12 Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.</p>
6	<p>CCSS.MATH.CONTENT.HSF.IF.A.1 Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range.</p>

	If f is a function and x is an element of its domain, then $f(x)$ denotes the output of f corresponding to the input x . The graph of f is the graph of the equation $y = f(x)$.
7	CCSS.MATH.CONTENT.HSA.REI.C.6 Solve systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).

Bold type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

CCSS #	Assessments
HSA.REI.B.3	Solve the equation $1.5(4x - 2) = 2(0.5x - 3.5)$
HSN.CED.A.1	In 1794, the French army sent soldiers up in hot balloons to observe enemy troop movements. One such balloon, L'Entreprenant, had a volume of $\frac{256\pi}{3}$ cubic meters. a) Solve the formula for the volume of a sphere $V = \frac{4}{3}\pi r^3$. Then use this formula to calculate the radius of the L'Entreprenant balloon. b) What was the diameter of the balloon? c) Use the formula of the surface area of a sphere ($S = 4\pi r^2$) to approximate the surface area of the L'Entreprenant balloon?
HSN.REI.B.3	Solve and graph the inequality $-4 \leq 2 - x < 6$ Give your answer in interval notation.
HSN.REI.B.3	Solve and graph the solution of $ 8x - 12 \leq 4$ Write the answer in interval notation.
HSA.REI.D.12	Write the equation of the line that passes through $(-5,9), (-4,7)$ and graph the line Graph and shade the solution of the inequality $9x - 9y \geq -36$. Describe the steps.

HSF.IF.A.1	Graph the relation, tell whether the relation is a function, identify the domain and the range $\{(-5, -6), (-4, -4), (-3, -2), (0, -1), (3, -2), (4, -4)\}$
HSA.REI.C.6	Graph the linear system and tell how many solutions it has. Then solve the system algebraically to check the solutions $7x + y = 10$ $3x - 2y = -3$

Unit 2 Quadratic and Polynomial Functions

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	To use rules of exponents to simplify and evaluate expressions	HSA.SSE.B.3.C
2	To add, subtract, multiply, and divide polynomials	HSA.APR.A.1
3	To recognize and evaluate polynomial functions and to find composition of functions	HSF.IF.A.2
4	To factor polynomials and use factoring to solve equations	HSA.APR.B.3
5	To solve quadratic equations by graphing, finding square roots, completing the square, factoring, and using the quadratic formula	HSA.REI.B.4
6	To solve quadratic inequalities algebraically and graphically	HAS.CED.A.1
7	To perform operations with complex numbers	HSN.CN.A.2 HSN.CN.A.3

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).

Italic type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

Selected Opportunities for Connection to 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.
- All of the content presented at this grade level has connections to the standards for mathematical practices.*

Bold type identifies possible starting points for connections to the SLOs in this unit.

Code #	Common Core State Standards
1	CCSS.MATH.CONTENT.HSA.SSE.B.3.C Use the properties of exponents to transform expressions for exponential functions. <i>For example the expression $1.15t$ can be rewritten as $(1.15^{1/12})^{12t} \approx 1.01212t$ to reveal the approximate equivalent monthly interest rate if the annual rate is 15%.</i>
2	CCSS.MATH.CONTENT.HSA.APR.A.1 Understand that polynomials form a system analogous to the integers, namely, they are closed under the operations of addition, subtraction, and multiplication; add, subtract, and multiply polynomials.
3	CCSS.MATH.CONTENT.HSF.IF.A.2 Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.

4	<p>CCSS.MATH.CONTENT.HSA.APR.B.3 Identify zeros of polynomials when suitable factorizations are available, and use the zeros to construct a rough graph of the function defined by the polynomial.</p> <p>CCSS.MATH.CONTENT.HSA.REI.B.4 Solve quadratic equations in one variable.</p>
6	<p>CCSS.MATH.CONTENT.HSA.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i></p> <p>CCSS.MATH.CONTENT.HSN.CN.A.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.</p> <p>CCSS.MATH.CONTENT.HSN.CN.A.3 (+) Find the conjugate of a complex number; use conjugates to find moduli and quotients of complex numbers.</p>

Math Coach Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).
Bold type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

CCSS #	Assessments
HSA.SSE.B.3.C	Choose the correct answer to the simplified form of the expression $\frac{(2k)^2 m^{-5}}{(km)^{-3}}$ so that no negative

	<p>exponents appear in the final result. Assume that all variables represent nonzero real numbers.</p> <p>a) $\frac{2k^5}{m^2}$</p> <p>b) $\frac{4k^5}{m^2}$</p> <p>c) $\frac{4m^2}{k^5}$</p> <p>d) $\frac{4k^6}{m^2}$</p>
HSA.APR.B.2	Use synthetic division and the Remainder Theorem to find $f(k)$ if $k = 3$; $f(x) = 2x^5 - 10x^3 - 19x^2 - 45$
HSF.IF.A.2	Given $f(x) = 4x - 1$ and $g(x) = x^2 + 5$ find the following $(f \circ g)(2)$ $(g \circ f)(x)$
HSA.APR.B.3	The polynomial $f(x) = 6x^3 + 19x^2 + 2x - 3$ has $(x + 3)$ as a factor. Factor the polynomial into three linear terms. Describe the steps you would use to sketch the graph of the function defined by this polynomial, identify all intercepts, and end behavior of the graph.
HSA.REI.B.4	Write the equation in standard form, use the discriminant to predict the nature of the roots and use the quadratic formula to solve the equation $(x - 3)(x + 5) = 2$
HSF.IF.C.7.A	Graph the parabola. Plot at least two points as well as the vertex. Give the vertex, axis of symmetry, domain and range. $f(x) = (x + 2)^2 - 1$

Perform the operations, give the answers in the form $a + bi$, match the left column with the correct answer on the right column

HSN.CN.A.2,3	1) $-\sqrt{-18}$	a) $i\sqrt{2}$
	2) $\frac{\sqrt{-54}}{27}$	b) $12 - i$
	3) $(3 + 21) + (9 - 3i)$	c) $-3i\sqrt{2}$
	4) $(3 - 2i)^2$	d) $-2 + i$
	5) $\frac{-3 + 4i}{2 - i}$	e) $5 - 12i$

Unit 3 Radical, Exponential, Logarithmic, and Rational Functions

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	To find the nth root and convert between radicals and rational exponents	HSN.RN.A.2
2	To use the rules of exponents with rational exponents	HSN.RN.A.1
3	To simplify, add, subtract, multiply, and divide radical expressions	HSN.RN.B.3
4	To solve equations with radicals	HSA.REI.A.2
5	To find and graph the equation of the inverse of a function	HSF.BF.B.4
6	To graph exponential functions	HSF.IF.C.7.E
7	To use exponential growth and decay functions in real life situations	HSF.LE.A.1.C

8	To solve exponential and logarithmic equations	HSF.LE.A.4
9	To use the properties of logarithms and evaluate common and natural logarithms	HSF.LE.A.4
10	To recognize and use direct, inverse, and joint variation	HSA.CED.A.1
11	To simplify, add, subtract, multiply, and divide rational expressions	HSA.APR.D.7
12	To solve rational equations and applications of rational equations	HSA.REI.A.2
13	To graph rational functions	HSF.IF.C.7.D

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).
Bold type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.
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6. Attend to precision.
7. Look for and make use of structure.
8. Look for and express regularity in repeated reasoning.

All of the content presented at this grade level has connections to the standards for mathematical practices.

Bold type identifies possible starting points for connections to the SLOs in this unit.

Code #	Common Core State Standards
1	CCSS.MATH.CONTENT.HSN.RN.A.2

	Rewrite expressions involving radicals and rational exponents using the properties of exponents.
2	<p>CCSS.MATH.CONTENT.HSN.RN.A.1</p> <p>Explain how the definition of the meaning of rational exponents follows from extending the properties of integer exponents to those values, allowing for a notation for radicals in terms of rational exponents. <i>For example, we define $5^{1/3}$ to be the cube root of 5 because we want $(5^{1/3})^3 = 5$.</i></p> <p>CCSS.MATH.CONTENT.HSN.RN.B.3</p> <p>Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and that the product of a nonzero rational number and an irrational number is irrational.</p>
4	<p>CCSS.MATH.CONTENT.HSA.REI.A.2</p> <p>Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.</p> <p>CCSS.MATH.CONTENT.HSF.BF.B.4</p> <p>Find inverse functions.</p>
6	<p>CCSS.MATH.CONTENT.HSF.IF.C.7.E</p> <p>Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.</p> <p>CCSS.MATH.CONTENT.HSF.LE.A.1.C</p> <p>Recognize situations in which a quantity grows or decays by a constant percent rate per unit interval relative to another.</p>
8	<p>CCSS.MATH.CONTENT.HSF.LE.A.4</p> <p>For exponential models, express as a logarithm the solution to $abct = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.</p>

9	CCSS.MATH.CONTENT.HSF.LE.A.4 For exponential models, express as a logarithm the solution to $abct = d$ where a , c , and d are numbers and the base b is 2, 10, or e ; evaluate the logarithm using technology.
10	CCSS.MATH.CONTENT.HSA.CED.A.1 Create equations and inequalities in one variable and use them to solve problems. <i>Include equations arising from linear and quadratic functions, and simple rational and exponential functions.</i>
11	CCSS.MATH.CONTENT.HSA.APR.D.7 (+) Understand that rational expressions form a system analogous to the rational numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.
12	CCSS.MATH.CONTENT.HSA.REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.
13	CCSS.MATH.CONTENT.HSF.IF.C.7.D (+) Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).
Bold type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

CCSS #	Assessments
HSN.RN.A.2	Write with radicals. Assume all variables represent positive real numbers. $(5x^2 + 3z^3)^{-\frac{5}{6}}$
HSN.RN.A.1	Write with rational exponents and then apply the properties of exponents. Assume that all radicals represent positive

	real numbers. Answer in exponential form. $\sqrt[3]{\sqrt[5]{\sqrt{y}}}$
HSN.RN.B.3	Multiply and simplify each product. Assume all variables represent positive real numbers. $(\sqrt[3]{2y - 5})(4\sqrt[3]{2y + 1})$
HSA.REI.A.2	In solving the equation $\sqrt{5x + 6} - \sqrt{x + 3} = 3$, a student wrote $(5x + 6) + (x + 3) = 9$ as their first step. Explain the error and solve the given equation correctly.
HSF.BF.B.4	Graph the function and its inverse on the same set of axes. $f(x) = 2x - 1$
HSF.IF.C.7.E	Which statement is true? A) the y - intercept of the graph of $f(x) = 10^x$ is $(0, 10)$. B) for any $a > 1$, the graph of $f(x) = a^x$ falls from left to right C) the point $(\frac{1}{2}, \sqrt{5})$ lies on the graph of $f(x) = 5^x$ D) the graph of $f(x) = 4^x$ rises at a faster rate than the graph of $f(x) = 10^x$
HSF.LE.A.1.C	The amount of radioactive material in an ore sample is given by the function defined by $A(t) = 100(3.2)^{-0.56t}$, where $A(t)$ is the amount present, in grams, of a sample t months after the initial measurement. A) How much was present at the initial present? B) How much was present 2 months later? C) How much was present 10 months later?
HSF.LE.A.4	Solve $\log x + \log(x - 21) = 2$
HSF.LE.A.4	Use the properties of logs to write each expression as a single log. $3 \log_p x + \frac{1}{2} \log_p y - \frac{3}{2} \log_p z - 3 \log_p a$

HSA.CED.A.1	Over a specified distance, speed varies inversely with time. If a Dodge Viper on a test track goes a certain distance in one-half minute at 160mpg, what speed is needed to go the same distance in one-fourths minute?
HSA.APR.D.7	Simplify, $\frac{x^{-2}-y^{-2}}{x^{-1}-y^{-1}}$
HSA.REI.A.2	Wayne can do a job in 9 hours, while Susan can do the same job in 5 hours. How long would it take them to do the job if they worked together?
HSF.IF.C.7.D	Graph the function defined by $f(x) = \frac{-2}{x+1}$. Give the equation of its vertical asymptote.

Unit 4 Sequences and Series

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	To find the nth term of an arithmetic sequence and to find the rule for the nth term of the sequence.	HSF.BF.A.2
2	To find the sum of an arithmetic series and to use summation notation	HSA.SSE.B.4
3	To find the nth term of a geometric sequence and to find the rule for the nth term of the sequence	HSF.BF.A.2
4	To find the sum of a geometric series and to use summation notation	HSA.SSE.B.4

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).
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Selected Opportunities for Connection to Mathematical Practices

1. Make sense of problems and persevere in solving them.
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 8. Look for and express regularity in repeated reasoning.
- All of the content presented at this grade level has connections to the standards for mathematical practices.*

Bold type identifies possible starting points for connections to the SLOs in this unit.

Code #	Common Core State Standards
1	CCSS.MATH.CONTENT.HSF.BF.A.2 Write arithmetic and geometric sequences both recursively and with an explicit formula, use them to model situations, and translate between the two forms.
2	CCSS.MATH.CONTENT.HSA.SSE.B.4 Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. <i>For example, calculate mortgage payments.*</i>
3	CCSS.MATH.CONTENT.HSF.BF.A.2 Write arithmetic and geometric sequences both recursively and with an explicit

	formula, use them to model situations, and translate between the two forms.
4	CCSS.MATH.CONTENT.HSA.SSE.B.4 Derive the formula for the sum of a finite geometric series (when the common ratio is not 1), and use the formula to solve problems. <i>For example, calculate mortgage payments.*</i>

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CCSS #	Assessments
HSF.BF.A.2	Each year a volunteer organization expects to add 5 more people to the number of shut-ins for whom the group provides home maintenance services. This year, the organization provides the service for 32 people. a) Write a recursive formula for the number of people the organization expects to serve each year. b) Write the first five terms of the sequence. c) Write an explicit formula for the number of people the organization expects to serve each year. d) How many people would the organization expect to serve in the 20th year?
HSA.SSE.B.4	An embroidery pattern calls for five stitches in the first row and for three more stitches in each successive row. The 25th row, which is the last row, has 77 stitches. Find the total number of stitches in the pattern.
HSF.BF.A.2	The deer population in an area is increasing. This year, the population was 1,025 times last year's population of 2537. a) Assuming that the population increases at the same rate for the next few years, write an explicit formula for the sequence. b) Find the expected deer population for the fourth year of the sequence.
HSA.SSE.B.4	This month, your friend deposits \$600 to save for a vacation. She plans to deposit 10% more each successive month for the next 11 months. How much will she have saved after the 12 deposits?

Unit 5 Statistics, Probability, and Matrices

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	Find the probability of a given event and use combinations and permutations to solve counting problems	HSS.CP.A.1 HSS.CP.A.2 HSS.CP.B.9
2	To apply standard deviation and variance	HSS.ID.A.2 HSS.ID.A.4
3	To perform operations with matrices and find the determinant of a matrix	HSN.VM.C.8
4	To solve systems of equations using the inverse of a matrix and Cramer's Rule	HSN.VM.C.10

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).

Bold type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

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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.

All of the content presented at this grade level has connections to the standards for mathematical practices.

Bold type identifies possible starting points for connections to the SLOs in this unit.

Code #	Common Core State Standards
1	<p>CCSS.MATH.CONTENT.HSS.CP.A.1 Describe events as subsets of a sample space (the set of outcomes) using characteristics (or categories) of the outcomes, or as unions, intersections, or complements of other events ("or," "and," "not").</p> <p>CCSS.MATH.CONTENT.HSS.CP.A.2 Understand that two events A and B are independent if the probability of A and B occurring together is the product of their probabilities, and use this characterization to determine if they are independent.</p> <p>CCSS.MATH.CONTENT.HSS.CP.B.9 (+) Use permutations and combinations to compute probabilities of compound events and solve problems.</p>
2	<p>CCSS.MATH.CONTENT.HSS.ID.A.2 Use statistics appropriate to the shape of the data distribution to compare center (median, mean) and spread (interquartile range, standard deviation) of two or more different data sets.</p> <p>CCSS.MATH.CONTENT.HSS.ID.A.4 Use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages. Recognize that there are data sets for which such a procedure is not appropriate. Use calculators, spreadsheets, and</p>

	tables to estimate areas under the normal curve.
	CCSS.MATH.CONTENT.HSN.VM.C.8 (+) Add, subtract, and multiply matrices of appropriate dimensions. CCSS.MATH.CONTENT.HSN.VM.C.10 (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.
3	CCSS.MATH.CONTENT.HSN.VM.C.10 (+) Understand that the zero and identity matrices play a role in matrix addition and multiplication similar to the role of 0 and 1 in the real numbers. The determinant of a square matrix is nonzero if and only if the matrix has a multiplicative inverse.

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).

Bold type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

CCSS #	Assessments
HSS.CP.A.1	Indicate whether each situation involves a combination or permutation. Then evaluate.
HSS.CP.A.2	1) A team of 6 is chosen from a class of 36
HSS.CP.B.9	2) An 8-digit code is chosen for a lock
HSS.ID.A.2	For the pair of data sets, which is likely to have the greater standard deviation? Ages of thirty college students or
HSS.ID.A.4	ages of thirty high school students
HSN.VM.C.8	Perform the operation using the given matrices.

HSN.VM.C.10

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix} B = \begin{bmatrix} -1 \\ 7 \end{bmatrix} C = \begin{bmatrix} -1 & 5 \\ 7 & 0 \end{bmatrix} \quad 1) A+C \quad 2) A+B \quad 3) C-A \quad 4) AB \quad 5) AC$$

Solve the system of equations by using the inverse of the coefficient matrix and by Cramer's rule if applicable.

$$7x + y - z = 4$$

HSN.CM.C.10

$$\begin{aligned} 2x - 3y + z &= 2 \\ -6x + 9y - 3z &= -6 \end{aligned}$$

Unit 6 Conic Sections and Trigonometry

#	STUDENT LEARNING OBJECTIVES	CORRESPONDING CCSS
1	To recognize and graph the equations of circles and ellipses	HSG.GPE.A.1 HSG.GPE.A.3
2	To find the values of the six trigonometric functions and use them to solve right triangles	HSF.TF.A.3
3	To find measure of angles in standard position using degree and radian measure	HSF.TF.A.1
4	To calculate arc lengths and areas of sectors	HSG.C.B.5
5	To evaluate trigonometric functions of any angle	HSF.TF.A.2
6	To evaluate inverse trigonometric functions	HSF.TF.B.6
7	To graph sine and cosine functions	HAS.CED.A.2
8	To use the Law of Sines and the Law of Cosines to find the sides and angles of a triangle	HSG.SRT.D.10 HSG.SRT.D.11
9	To use trigonometric identities to simplify expressions and to verify other identities	HSF.TF.C.8

Major Content Supporting Content **Additional Content** (Identified by PARCC Model Content Frameworks).

Bold type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

Selected Opportunities for Connection to 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.
- All of the content presented at this grade level has connections to the standards for mathematical practices.*

Bold type identifies possible starting points for connections to the SLOs in this unit.

Code #	Common Core State Standards
1	<p>CCSS.MATH.CONTENT.HSG.GPE.A.1 Derive the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.</p> <p>CCSS.MATH.CONTENT.HSG.GPE.A.3 (+) Derive the equations of ellipses and hyperbolas given the foci, using the fact that the sum or difference of distances from the foci is constant.</p>
2	<p>CCSS.MATH.CONTENT.HSF.TF.A.3 (+) Use special triangles to determine geometrically the values of sine, cosine, tangent for $\pi/3$, $\pi/4$ and $\pi/6$, and use the unit circle to express the values of sine,</p>

	cosine, and tangent for x , $\pi + x$, and $2\pi - x$ in terms of their values for x , where x is any real number.
3	<p>CCSS.MATH.CONTENT.HSF.TF.A.1</p> <p>Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.</p>
4	<p>CCSS.MATH.CONTENT.HSG.C.B.5</p> <p>Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.</p>
5	<p>CCSS.MATH.CONTENT.HSF.TF.A.2</p> <p>Explain how the unit circle in the coordinate plane enables the extension of trigonometric functions to all real numbers, interpreted as radian measures of angles traversed counterclockwise around the unit circle.</p>
6	<p>CCSS.MATH.CONTENT.HSF.TF.B.6</p> <p>(+) Understand that restricting a trigonometric function to a domain on which it is always increasing or always decreasing allows its inverse to be constructed.</p>
7	<p>CCSS.MATH.CONTENT.HSA.CED.A.2</p> <p>Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.</p>
8	<p>CCSS.MATH.CONTENT.HSG.SRT.D.10</p> <p>(+) Prove the Laws of Sines and Cosines and use them to solve problems.</p> <p>CCSS.MATH.CONTENT.HSG.SRT.D.11</p> <p>(+) Understand and apply the Law of Sines and the Law of Cosines to find</p>

	unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).
9	CCSS.MATH.CONTENT.HSF.TF.C.8 Prove the Pythagorean identity $\sin^2(\theta) + \cos^2(\theta) = 1$ and use it to find $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ given $\sin(\theta)$, $\cos(\theta)$, or $\tan(\theta)$ and the quadrant of the angle.

Major Content Supporting Content Additional Content (Identified by PARCC Model Content Frameworks).

Italic type indicates grade level fluency requirements. (Identified by PARCC Model Content Frameworks).

CCSS #	Assessments
HSG.GPE.A.1 HSG.GPE.A.3	Find the center and radius of the circle. Then graph. $3x^2 + 3y^2 - 12x - 24y + 12 = 0$
HSF.TF.A.3	Solve the right triangle ABC. $A = 62.5^\circ$ $a = 12.7m$
HSF.TF.A.1	Convert the following to degrees or radians. 1) $\frac{7\pi}{3}$ 2) -250° 3) 75° 4) $\frac{15\pi}{6}$
HSG.C.B.5	Two gears are adjusted so that the smaller gear with a radius of 3.7cm drives the larger gear with a radius of 7.1cm. If the smaller gear rotates through an angle of 300° , through how many degrees with the larger gear rotate? Sketch the figure and explain the solution.
HSF.TF.A.2	Find the exact circular function value of $\sec \frac{5\pi}{4}$. Draw the angle and explain the steps used to find the solution.
HSF.TF.B.6	Find the exact value of each expression without using a calculator. $\csc x = \sqrt{2}$.

HAS.CED.A.2	Graph the function $y = -2\sin 2x$. Find the amplitude and the period.
HSG.SRT.D.10 HSG.SRT.D.11	To find the distance AB across a river, a surveyor laid off a distance $BC = 354\text{m}$ on one side of the river. It is found that $B = 112^\circ 10'$ and $C = 15^\circ 20'$. Find AB. Draw the figure.
HSF.TF.C.8	Write the expression in terms of sine and cosine function. Then simplify so that no quotients are in the final answer. $\cot x \sec x$

Pacing Guide – Course

Unit 1: Linear Equations, Inequalities, Functions, and Systems	15 days
Unit 2: Quadratic and Polynomial Functions	30 days
Unit 3: Radical, Exponential, Logarithmic, and Rational Functions	45 days
Unit 4: Sequences and Series	10 days
Unit 5: Statistics, Probability, and Matrices	25 days
Unit 6: Conic Sections and Trigonometry	30 days

**25 days are left open for state and course wide testing and school programs