

<ul style="list-style-type: none"> Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically, including graphs with discontinuities. (a, d, e) Describe a function as continuous or discontinuous. (a) Given the graph of a function, identify intervals on which the function (absolute value) is increasing or decreasing. (b) Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (g) Describe the end behavior of a function. (h) Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f, g, h, i, j, k) 	
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Quadratic Functions	
Unit 2: September 23-October 5 Unit 3: October 9-October 28	Standards of Learning
<p>The student will</p> <p>c) factor polynomials completely in one or two variables.</p> <ul style="list-style-type: none"> Factor polynomials in one or two variables with no more than four terms completely over the set of integers. Factors of the polynomial should be constant, linear, or quadratic. (c) Verify polynomial identities including the difference of squares and perfect square trinomials. (c) 	AII.1 c
<p>The student will perform operations on complex numbers and express the results in simplest form using patterns of the powers of i.</p> <ul style="list-style-type: none"> Recognize that the square root of -1 is represented as i. Simplify radical expressions containing negative rational numbers and express in $a + bi$ form. Simplify powers of i. Add, subtract, and multiply complex numbers. 	AII.2
<p>The student will solve</p> <p>b) quadratic equations over the set of complex numbers;</p> <ul style="list-style-type: none"> Solve a quadratic equation over the set of complex numbers algebraically. (b) Calculate the discriminant of a quadratic equation to determine the number and type of solutions. (b) Solve equations and verify algebraic solutions using a graphing utility. (a, b, c, d) 	AII.3 b
	AII.4

The student will solve systems of linear-quadratic and quadratic-quadratic equations, algebraically and graphically.

- Determine the number of solutions to a linear-quadratic and quadratic-quadratic system of equations in two variables.
- Solve a linear-quadratic system of two equations in two variables algebraically and graphically.
- Solve a quadratic-quadratic system of two equations in two variables algebraically and graphically.
- Solve systems of equations and verify solutions of systems of equations with a graphing utility.

For **quadratic** functions, **the student will**

- a) recognize the general shape of function families; and
- b) use knowledge of transformations to convert between equations and the corresponding graphs of functions.

- Recognize the general shape of function families. (a)
- Recognize graphs of parent functions. (a)
- Identify the graph of a function from the equation. (b)
- Write the equation of a function given the graph. (b)

The student will investigate and analyze **quadratic** function families algebraically and graphically.

- Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically, including graphs with discontinuities. (a, d, e)
- Describe a function as continuous or discontinuous. (a)
- Given the graph of a function, identify intervals on which the function (**linear, quadratic**) is increasing or decreasing. (b)
- Identify the location and value of absolute maxima and absolute minima of a function over the domain of the function graphically or by using a graphing utility. (c)
- For any x value in the domain of f , determine $f(x)$. (f)
- Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (g)
- Describe the end behavior of a function. (h)
- Investigate and analyze characteristics and multiple representations of functions with a graphing utility.
(a, b, c, d, e, f, g, h, i, j, k)

The student will investigate and describe the relationships among solutions of an equation, zeros of a function, x-intercepts of a graph, and factors of a polynomial expression.

- Define a polynomial function in factored form, given its zeros.

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AII.7 abcdefgh

AII.8

<ul style="list-style-type: none">• Determine a factored form of a polynomial expression from the x-intercepts of the graph of its corresponding function.• For a function, identify zeros of multiplicity greater than 1 and describe the effect of those zeros on the graph of the function.• Given a polynomial equation, determine the number and type of solutions. <p>The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of quadratic functions.</p> <ul style="list-style-type: none">• Determine an equation of the curve of best fit, using a graphing utility, given a set of no more than 20 data points in a table, graph, or practical situation.• Make predictions, using data, scatterplots, or the equation of the curve of best fit.• Solve practical problems involving an equation of the curve of best fit.• Evaluate the reasonableness of a mathematical model of a practical situation.	AII. 9
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Radical Functions

Unit 4: October 30-November 22	Standards of Learning
<p>The student will</p> <p>b) add, subtract, multiply, divide, and simplify radical expressions containing rational numbers and variables, and expressions containing rational exponents.</p> <ul style="list-style-type: none"> • Simplify radical expressions containing positive rational numbers and variables. (b) • Convert between radical expressions and expressions containing rational exponents. (b) • Add and subtract radical expressions. (b) • Multiply and divide radical expressions. Simplification may include rationalizing denominators. (b) 	AII.1b
<p>The student will solve</p> <p>d) equations containing radical expressions.</p> <ul style="list-style-type: none"> • Solve an equation containing no more than one radical expression algebraically and graphically. (d) • Solve equations and verify algebraic solutions using a graphing utility. (a, b, c, d) 	AII.3 d
<p>For radical functions, the student will</p> <p>a) recognize the general shape of function families; and</p> <p>b) use knowledge of transformations to convert between equations and the corresponding graphs of functions.</p> <ul style="list-style-type: none"> • Recognize the general shape of function families. (a) • Recognize graphs of parent functions. (a) • Identify the graph of a function from the equation. (b) • Write the equation of a function given the graph. (b) 	AII.6 ab
<p>The student will investigate and analyze square root and cube root function families algebraically and graphically.</p> <ul style="list-style-type: none"> • Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically, including graphs with discontinuities. (a, d, e) • Describe a function as continuous or discontinuous. (a) • Given the graph of a function, identify intervals on which the function (square root, cube root) is increasing or decreasing. (b) • Identify the location and value of absolute maxima and absolute minima of a function over the domain of the function graphically or by using a graphing utility. (c) • Identify the location and value of relative maxima or relative minima of a function over some interval of the domain graphically or by using a graphing utility. (c) • For any x value in the domain of f, determine $f(x)$. (f) • Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (g) 	A11.7 abcdefgh

The student will investigate and analyze **polynomial** function families algebraically and graphically.

- Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically, including graphs with discontinuities. (a, d, e)
- Describe a function as continuous or discontinuous. (a)
- Given the graph of a function, identify intervals on which the function (**polynomial**) is increasing or decreasing. (b)
- Identify the location and value of absolute maxima and absolute minima of a function over the domain of the function graphically or by using a graphing utility. (c)
- Identify the location and value of relative maxima or relative minima of a function over some interval of the domain graphically or by using a graphing utility. (c)
- For any x value in the domain of f , determine $f(x)$. (f)
- Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (g)
- Describe the end behavior of a function. (h)
- Investigate and analyze characteristics and multiple representations of functions with a graphing utility.
(a, b, c, d, e, f, g, h, i, j, k)

AII.7 abcdefgh

The student will investigate and describe the relationships among solutions of an equation, zeros of a function, x -intercepts of a graph, and factors of a polynomial expression.

- Define a polynomial function in factored form, given its zeros.
- Determine a factored form of a polynomial expression from the x -intercepts of the graph of its corresponding function.
- For a function, identify zeros of multiplicity greater than 1 and describe the effect of those zeros on the graph of the function.
- Given a polynomial equation, determine the number and type of solutions.

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The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of quadratic functions.

- Determine an equation of the curve of best fit, using a graphing utility, given a set of no more than 20 data points in a table, graph, or practical situation.
- Make predictions, using data, scatterplots, or the equation of the curve of best fit.
- Solve practical problems involving an equation of the curve of best fit.
- Evaluate the reasonableness of a mathematical model of a practical situation.

AII.9

Exponential and Logarithmic Functions

Unit 5: December 3-December 17

Standards of Learning

For **exponential and logarithmic** functions, **the student will**

- a) recognize the general shape of function families; and
- b) use knowledge of transformations to convert between equations and the corresponding graphs of functions.

- Recognize the general shape of function families. (a)
- Recognize graphs of parent functions. (a)
- Identify the graph of a function from the equation. (b)
- Write the equation of a function given the graph. (b)
- Graph a transformation of a parent function, given the equation. (b)
- Identify the transformation(s) of a function. Transformations of exponential and logarithmic functions, given a graph, should be limited to a single transformation. (b)
- Investigate and verify transformations of functions using a graphing utility. (a, b)

The student will investigate and analyze **exponential and logarithmic** function families algebraically and graphically.

- Identify the domain, range, zeros, and intercepts of a function presented algebraically or graphically, including graphs with discontinuities. (a, d, e)
- Describe a function as continuous or discontinuous. (a)
- Given the graph of a function, identify intervals on which the function (**exponential and logarithmic**) is increasing or decreasing. (b)
- For any x value in the domain of f , determine $f(x)$. (f)
- Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (g)
- Describe the end behavior of a function. (h)
- Determine the equations of vertical and horizontal asymptotes of functions (rational, exponential, and logarithmic). (i)
- Graph the inverse of a function as a reflection over the line $y = x$. (j)
- Investigate and analyze characteristics and multiple representations of functions with a graphing utility.
(a, b, c, d, e, f, g, h, i, j, k)

The student will collect and analyze data, determine the equation of the curve of best fit in order to make predictions, and solve practical problems, using mathematical models of quadratic functions.

- Determine an equation of the curve of best fit, using a graphing utility, given a set of no more than 20 data points in a table, graph, or practical situation.

AII.6 ab

AII.7 abdefghij

AII.9

<ul style="list-style-type: none"> • For any x value in the domain of f, determine $f(x)$. (f) • Represent relations and functions using verbal descriptions, tables, equations, and graphs. Given one representation, represent the relation in another form. (g) • Describe the end behavior of a function. (h) • Determine the equations of vertical and horizontal asymptotes of functions (rational). (i) • Investigate and analyze characteristics and multiple representations of functions with a graphing utility. (a, b, c, d, e, f, g, h, i, j, k) <p>The student will represent and solve problems, including practical problems, involving inverse variation, joint variation, and a combination of direct and inverse variations.</p> <ul style="list-style-type: none"> • Given a data set or practical situation, write the equation for an inverse variation. • Given a data set or practical situation, write the equation for a joint variation. • Solve problems, including practical problems, involving inverse variation, joint variation, and a combination of direct and inverse variations. 	<p>AII.10</p>
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Sequences and Series	
Unit 8: February 28- March 17 (we finished the material before the shutdown)	Standards of Learning
<p>The student will investigate and apply the properties of arithmetic and geometric sequences and series to solve practical problems, including writing the first n terms, determining the nth term, and evaluating summation formulas. Notation will include Σ and a_n.</p> <ul style="list-style-type: none"> • Distinguish between a sequence and a series. • Generalize patterns in a sequence using explicit and recursive formulas. • Use and interpret the notations Σ, n, n^{th} term, and a_n. • Given the formula, determine a_n (the n^{th} term) for an arithmetic or a geometric sequence. • Given formulas, write the first n terms and determine the sum, S_n, of the first n terms of an arithmetic or geometric series. • Given the formula, determine the sum of a convergent infinite series. • Model practical situations using sequences and series. 	<p>AII.5</p>

Statistics and Probability	
Unit 9: Upcoming	Standards of Learning
<p>The student will</p> <ol style="list-style-type: none"> identify and describe properties of a normal distribution; interpret and compare z-scores for normally distributed data; and 	<p>AII.11</p>

<p>c) apply properties of normal distributions to determine probabilities associated with areas under the standard normal curve.</p> <ul style="list-style-type: none"> • Identify the properties of a normal distribution. (a) • Describe how the standard deviation and the mean affect the graph of the normal distribution. (a) • Solve problems involving the relationship of the mean, standard deviation, and z-score of a normally distributed data set. (b) • Compare two sets of normally distributed data using a standard normal distribution and z-scores, given the mean and standard deviation. (b) • Represent probability as area under the curve of a standard normal distribution. (c) • Use the graphing utility or a table of Standard Normal Probabilities to determine probabilities associated with areas under the standard normal curve. (c) • Use a graphing utility to investigate, represent, and determine relationships between a normally distributed data set and its descriptive statistics. (a, b, c) 	
<p>The student will compute and distinguish between permutations and combinations.</p> <ul style="list-style-type: none"> • Compare and contrast permutations and combinations. • Calculate the number of permutations of n objects taken r at a time. • Calculate the number of combinations of n objects taken r at a time. • Use permutations and combinations as counting techniques to solve practical problems. • Calculate and verify permutations and combinations using a graphing utility. 	<p>AII.12</p>