Critical Areas of Focus

IT IS IN SECONDARY MATHEMATICS III that students pull together and apply the accumulation of learning that they have from their previous courses, with content grouped into four critical areas, organized into units. They apply methods from probability and statistics to draw inferences and conclusions from data. Students expand their repertoire of functions to include polynomial, rational, and radical functions.[3] They expand their study of right triangle trigonometry to include general triangles. And, finally, students bring together all of their experience with functions and geometry to create models and solve contextual problems. The Mathematical Practice Standards apply throughout each course and, together with the content standards, prescribe that students experience mathematics as a coherent, useful, and logical subject that makes use of their ability to make sense of problem situations.

CRITICAL AREA 1: In this unit, students see how the visual displays and summary statistics they learned in earlier grades relate to different types of data and to probability distributions. They identify different ways of collecting data— including sample surveys, experiments, and simulations—and the role that randomness and careful design play in the conclusions that can be drawn.

CRITICAL AREA 2: This unit develops the structural similarities between the system of polynomials and the system of integers. Students draw on analogies between polynomial arithmetic and base-ten computation, focusing on properties of operations, particularly the distributive property. Students connect multiplication of polynomials with multiplication of multi-digit integers, and division of polynomials with long division of integers. Students identify zeros of polynomials and make connections between zeros of polynomials and solutions of polynomial equations. The unit culminates with the fundamental theorem of algebra. Rational numbers extend the arithmetic of integers by allowing division by all numbers except 0. Similarly, rational expressions extend the arithmetic of polynomials by allowing division by all polynomials except the zero polynomial. A central theme of this unit is that the arithmetic of rational expressions is governed by the same rules as the arithmetic of rational numbers.

CRITICAL AREA 3: Students develop the Laws of Sines and Cosines in order to find missing measures of general (not necessarily right) triangles. They are able to distinguish whether three given measures (angles or sides) define 0, 1, 2, or infinitely many triangles. This discussion of general triangles open up the idea of trigonometry applied beyond the right triangle—that is, at least to obtuse angles. Students build on this idea to develop the notion of radian measure for angles and extend the domain of the trigonometric functions to all real numbers. They apply this knowledge to model simple periodic phenomena.

CRITICAL AREA 4: In this unit students synthesize and generalize what they have learned about a variety of function families. They extend their work with exponential functions to include solving exponential equations with logarithms. They explore the effects of transformations on graphs of diverse functions, including functions arising in an application, in order to abstract the general principle that transformations on a graph always have the same effect regardless of the type of the underlying functions. They identify appropriate types of functions to model a situation, they adjust parameters to improve the model, and they compare models by analyzing appropriateness of fit and making judgments about the domain over which a model is a good fit. The description of modeling as "the process of choosing and using mathematics and statistics to analyze empirical situations, to understand them better, and to make decisions" is at the heart of this unit. The narrative discussion and diagram of the modeling cycle should be considered when knowledge of functions, statistics, and geometry is applied in a modeling context.

Quarter 1: District Benchmark test during dates of October 15 – 23. Tests returned to district office October 23.

Day-to-day pacing is left to the discretion of the individual collaborative teams. Mappings are to be followed to facilitate district-wide collaboration and correlation.

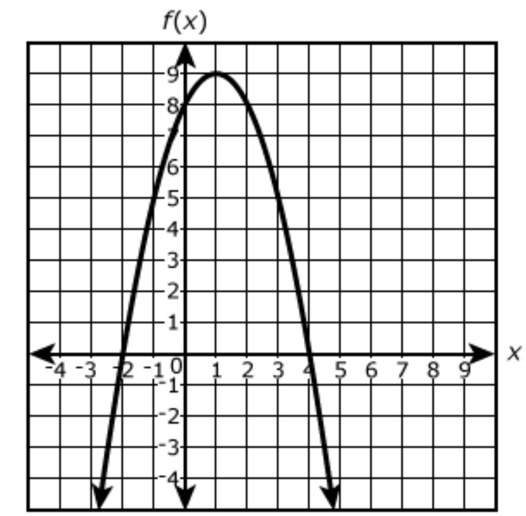
Standards that require revisiting each quarter according to their applicable portions:*A.CED.1, 2, 3, 4; A.REI.11; F.BF.1, 3, 4; F.IF.4, 5, 7, 8, 9)

Creating Equations		**A.CED**
Create equations that describe numbers or relationships.		
1. Create equations and inequalities in one variable and use them to solve problems. Include equations arising from linear and quadratic functions, and simple rational and exponential functions.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3
In 1997 the population of a small town was 700. If the annual rate of increase is about 0.8%, which value below expresses the population five years later? a. $(700)(1.008)^5$ b. $5(700)(1.008)$ c. $(700)(0.008)^5$ d. $(700)(0.008)^5$	The sum of two numbers is 80. The larger number is 12 more than 3 times the smaller number. What is the smaller number? What is the equation that will best represent the situation?	A real estate agent agrees to sell an apartment complex according to the following commission schedule: $45,000 plus 25% of the selling price in excess of $900,000. Assuming that the complex will sell at some price between $900,000 and $1,100,000 inclusive, over what range does the agent's commission vary?

Creating Equations		**A.CED**
Create equations that describe numbers or relationships.		
2. Create equations in two or more variables to represent relationships between quantities; graph equations on coordinate axes with labels and scales.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3
Graph the solution set for $x^2 < 4$.	A population of insects doubles every month. There are 10 insects in the	$f(x) = x^2 + 2x + 1$. $g(x)$ is a linear function where $f(0) = g(0)$ and

<table>
<tr>
<td></td>
<td>original population.
a. Write the function that describes the number of insects (y) that can be found in x months.
b. How many insects can be expected in the last month of year one?
c. Graph the function.</td>
<td>$f(-3)=g(-3)$.
a. What is the equation for $g(x)$?
b. Graph both $f(x)$ and $g(x)$.</td>
</tr>
</table>

<table>
<tr>
<td colspan="2">Creating Equations</td>
<td>A.CED</td>
</tr>
<tr>
<td colspan="3">Create equations that describe numbers or relationships.</td>
</tr>
<tr>
<td colspan="3">3. Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or non-viable options in a modeling context. For example, represent inequalities describing nutritional and cost constraints on combinations of different foods.</td>
</tr>
<tr>
<td>Depth of Knowledge Level 1</td>
<td>Depth of Knowledge Level 2</td>
<td>Depth of Knowledge Level 3</td>
</tr>
<tr>
<td>The figure shows a graph of the function $f(x)$ in the xy-coordinate plane.</td>
<td>The following coordinates either lie on an exponential function or a quadratic function. Place them in the appropriate category. Some coordinates may be placed in both categories.
(-1, 1), (2, 4), (1, 2), (0, 1), (3, 8), (4, 16), (5, 25), (-2, 4)
<table><tr><th>Exponential Function</th><th>Quadratic Function</th></tr><tr><td></td><td></td></tr></table></td>
<td>A ball is thrown vertically upward with an initial velocity of 96 feet per second. The distance s (in feet) of the ball from the ground after t seconds is $s(t)+96t-16t^2$.
a. At what time t will the ball strike the ground?
b. For what time t is the ball more than 128 feet above the ground?</td>
</tr>
</table>

<table>
<tr>
<td>

A second function *g* is defined by $g(x) = -3x + 2$.

Which inequality symbol (<, ≤, ≥, or >) will correctly complete the sentence *f*(2) is ___ *g*(2)?</td>
<td></td>
<td></td>
</tr>
</table>

<table>
<tr><td colspan="3">Creating Equations A.CED</td></tr>
<tr><td colspan="3">Create equations that describe numbers or relationships.</td></tr>
<tr><td colspan="3">4. Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations. For example, rearrange Ohm’s law V = IR to highlight resistance R.</td></tr>
<tr><td>Depth of Knowledge Level 1</td><td>Depth of Knowledge Level 2</td><td>Depth of Knowledge Level 3</td></tr>
</table>

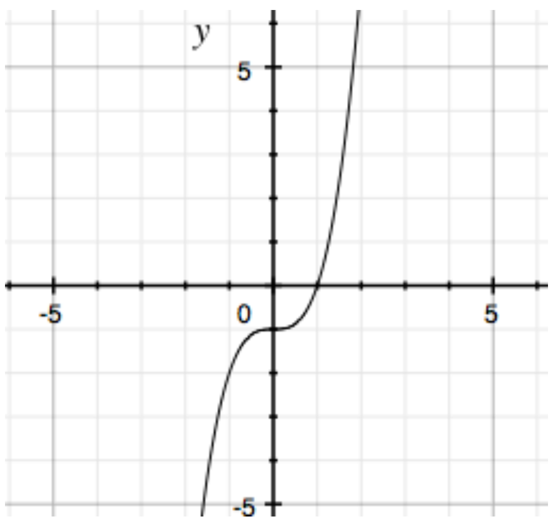
Volume of a cone: $V = \frac{1}{3}\pi r^2 h$. Caroline knows the height and the required volume of a con-shaped vase she is designing. What formula can she use to determine the radius of the vase?	We know that electrical power 'P=IV', and that 'V=IR' (where I=current, V=voltage and R=resistance). From the given equations **form** a new equation for P which does not include V.	The formula $S = 2\pi\sqrt{\frac{L}{32}}$ represents the swing of a pendulum. *S* is the time in seconds to swing back and forth and *L* is the length of the pendulum in feet. Find the length of a pendulum that makes one swing in 2.5 seconds. (Round to three decimal places).

Reasoning with Equations and Inequalities		**A.REI**
Represent and solve equations and inequalities graphically.		
11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3
$f(x) = x^2 + 2x + 1$ and *g*(*x*) = 2x + 4. For $D = \{x \mid x < 0\}$ use a graph to approximate the intersection.	$f(x) = x^2 + 2x + 1$ and *g*(*x*) = 2x + 4. Use algebra to find the point(s) of intersection.	$f(x) = x^2 + 2x + 1$. $g(x)$ is a linear function where $f(0) = g(0)$ and $f(-3) = g(-3)$. a. What is the equation for $g(x)$? b. Graph both *f*(*x*) and *g*(*x*).

Building Functions	**F.BF**
Build a function that models a relationship between two quantities.	
1. Write a function that describes a relationship between two quantities.★	

b. Combine standard function types using arithmetic operations. For example, build a function that models the temperature of a cooling body by adding a constant function to a decaying exponential, and relate these functions to the model.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3
$f(x)=x^2+2x+1$ and $g(x)=2x-1$. Find each of the following and their domains: *f(x)+g(x)* *f(x)-g(x)* *f(x)[g(x)]*	Two functions F and G are defined such that F(x) = x^2 and G(x) = (x+2). Find the range of the function F(G(x)).	What is the domain of $\frac{f(x)}{g(x)}$ when $f(x)=3x$ and $g(x)=4x+3$? *Hint: The denominator cannot equal 0.*

Building Functions		**F.BF**
Build new functions from existing functions.		
3. Identify the effect on the graph of replacing f(x) by f(x) + k, k f(x), f(kx), and f(x + k) for specific values of k (both positive and negative); find the value of k given the graphs. Experiment with cases and illustrate an explanation of the effects on the graph using technology. Include recognizing even and odd functions from their graphs and algebraic expressions for them.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3
What kind of transformation converts the graph of *f(x)* = $9(x-5)^2 + 8$ into the graph of *f(x)* = $9(x-5)^2 + 4$?	Describe what the following transformations do to the graphs? a. *f(x) →f(x) + 3* b. *f(x) →3f(x)* c. *f(x) →f(x + 3)*	Find *g(x)*, where *g(x)* is a reflection across the *y*-axis of *f(x) = -7x + 2.*

Building Functions		**F.BF**
Build new functions from existing functions.		
4. Find inverse functions. a. Solve an equation of the form f(x) = c for a simple function f that has an inverse and write an expression for the inverse. For example, $f(x) = 2x^3$ or f(x) = (x+1)/(x-1) for x≠1.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3
The graph below shows a function. Is its inverse a also a function? Graph the inverse.  	Solve $7=e^x$.	Find $f^{-1}(x)$ for $f(x)=\frac{x+1}{x-1}$ *for* $x \neq 1$. Explain your findings and what this tells you about the nature of the original *f(x).* What is the domain of the inverse function?

Seeing Structure in Expressions	**A.SSE**
Build new functions from existing functions.	
1. Interpret expressions that represent a quantity in terms of its context.★	

a. Interpret parts of an expression, such as terms, factors, and coefficients. b. Interpret complicated expressions by viewing one or more of their parts as a single entity. For example, interpret $P(1+r)^n$ as the product of P and a factor not depending on P.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Seeing Structure in Expressions		**A.SSE**
Build new functions from existing functions.		
2. Use the structure of an expression to identify ways to rewrite it. For example, see $x^4 – y^4$ as $(x2)^2 – (y2)^2$, thus recognizing it as a difference of squares that can be factored as $(x^2 – y^2)(x^2 + y^2)$.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Seeing Structure in Expressions		**A.SSE**
Write expressions in equivalent forms to solve problems.		
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. For example, calculate mortgage payments.★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Arithmetic with Polynomials and Rational Expressions		**A.APR**
Perform arithmetic operations on polynomials.		
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.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Arithmetic with Polynomials and Rational Expressions **A.APR**

Understand the relationship between zeros and factors of polynomials.

2. Know and apply the Remainder Theorem: For a polynomial $p(x)$ and a number a, the remainder on division by $x – a$ is $p(a)$, so $p(a) = 0$ if and only if $(x – a)$ is a factor of $p(x)$.

Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Arithmetic with Polynomials and Rational Expressions **A.APR**

Understand the relationship between zeros and factors of polynomials.

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.

Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Arithmetic with Polynomials and Rational Expressions **A.APR**

Use polynomial identities to solve problems.

4. Prove polynomial identities and use them to describe numerical relationships. For example, the polynomial identity $(x^2 + y^2)^2 = (x^2 – y^2)^2 + (2xy)v$ can be used to generate Pythagorean triples.

Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Arithmetic with Polynomials and Rational Expressions **A.APR**

Use polynomial identities to solve problems.

5. Know and apply the Binomial Theorem for the expansion of $(x + y)^n$ in powers of x and y for a positive integer n, where x and y are any numbers, with coefficients determined for example by Pascal's Triangle.[28]

[28] The Binomial Theorem can be proved by mathematical induction or by a combinatorial argument.

Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

The Complex Number System		**N.CN**
Use complex numbers in polynomial identities and equations.		
8. Extend polynomial identities to the complex numbers. *For example, rewrite* $x^2 + 4$ *as* $(x + 2i)/(x – 2i)$.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

The Complex Number System		**N.CN**
Use complex numbers in polynomial identities and equations.		
9. Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Interpreting Functions		**F.IF**
Interpret functions that arise in applications in terms of the context.		
4. For a function that models a relationship between two quantities, interpret key features of graphs and tables in terms of the quantities, and sketch graphs showing key features given a verbal description of the relationship. Key features include: intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; and periodicity. ⋆		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Interpreting Functions	**F.IF**
Interpret functions that arise in applications in terms of the context.	
5. Relate the domain of a function to its graph and, where applicable, to the quantitative relationship it describes. For example, if the function h(n) gives the number of person-hours it takes to assemble n engines in a factory, then the	

positive integers would be an appropriate domain for the function.★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Interpreting Functions		**F.IF**
Interpret functions that arise in applications in terms of the context.		
6. Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval. Estimate the rate of change from a graph.★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Interpreting Functions		**F.IF**
Analyze functions using different representations.		
7. Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ a. Graph linear and quadratic functions and show intercepts, maxima, and minima. b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions. c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior. d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior. e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. f. Draw a curve parametrically and draw its graph.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Interpreting Functions		F.IF
Analyze functions using different representations.		
8. Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. a. Use the process of factoring and completing the square in a quadratic function to show zeros, extreme values, and symmetry of the graph, and interpret these in terms of a context. b. Use the properties of exponents to interpret expressions for exponential functions. For example, identify percent rate of change in functions such as y = (1.02)t, y = (0.97)t, y = (1.01)12t, y = (1.2)t/10, and classify them as representing exponential growth or decay.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Interpreting Functions		F.IF
Analyze functions using different representations.		
9. Compare properties of two functions each represented in a different way (algebra- ically, graphically, numerically in tables, or by verbal descriptions). For example, given a graph of one quadratic function and an algebraic expression for another, say which has the larger maximum.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Quarter 2: SAGE Interim Test during dates of January 4 – 15.

Day-to-day pacing is left to the discretion of the individual collaborative teams. Mappings are to be followed to facilitate district-wide collaboration and correlation.

Standards that require revisiting each quarter according to their applicable portions:*A.CED.1, 2, 3, 4; A.REI.11; F.BF.1, 3, 4; F.IF.4, 5, 7, 8, 9)

Arithmetic with Polynomials and Rational Expressions	A.APR
Rewrite rational expressions.	

6. Rewrite simple rational expressions in different forms; write $a(x)/b(x)$ in the form $q(x) + r(x)/b(x)$, where a(x), b(x), q(x), and r(x) are polynomials with the degree of r(x) less than the degree of b(x), using inspection, long division, or, for the more complicated examples, a computer algebra system.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Arithmetic with Polynomials and Rational Expressions		**A.APR**
Rewrite rational expressions.		
7. Understand that rational expressions form a system analogous to the ratio- nal numbers, closed under addition, subtraction, multiplication, and division by a nonzero rational expression; add, subtract, multiply, and divide rational expressions.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Reasoning with Equations and Inequalities		**A.REI**
Understand solving equations as a process of reasoning and explain the reasoning.		
2. Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Linear, Quadratic, and Exponential Models ★		**F.LE**
Construct and compare linear, quadratic, and exponential models and solve problems.		
3. Observe using graphs and tables that a quantity increasing exponentially eventually exceeds a quantity increasing linearly, quadratically, or (more generally) as a polynomial function.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Linear, Quadratic, and Exponential Models ★		F.LE
Construct and compare linear, quadratic, and exponential models and solve problems.		
4. For exponential models, express as a logarithm the solution to $a b^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Linear, Quadratic, and Exponential Models ★		F.LE
Interpret expressions for functions in terms of the situation they model.		
5. Interpret the parameters in a linear, quadratic, or exponential function in terms of a context.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Reasoning with Equations and Inequalities		A.REI
Represent and solve equations and inequalities graphically.		
11. Explain why the x-coordinates of the points where the graphs of the equations y = f(x) and y = g(x) intersect are the solutions of the equation f(x) = g(x); find the solutions approximately, e.g., using technology to graph the functions, make tables of values, or find successive approximations. Include cases where f(x) and/or g(x) are linear, polynomial, rational, absolute value, exponential, and logarithmic functions.★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Seeing Structure in Expressions	A.SSE
Represent and solve equations and inequalities graphically.	
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. For example, calculate mortgage payments.★	

Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Geometric Measurement and Dimensions		**G.GMD**
Visualize relationships between two-dimensional and three-dimensional objects.		
4. Identify the shapes of two-dimensional cross-sections of three-dimensional objects, and identify three-dimensional objects generated by rotations of two-dimensional objects.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Modeling with Geometry		**G.MG**
Visualize relationships between two-dimensional and three-dimensional objects.		
1. Use geometric shapes, their measures, and their properties to describe objects (e.g., mod- eling a tree trunk or a human torso as a cylinder).★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Modeling with Geometry		**G.MG**
Visualize relationships between two-dimensional and three-dimensional objects.		
2. Apply concepts of density based on area and volume in modeling situations (e.g., persons per square mile, BTUs per cubic foot) . ★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Modeling with Geometry		**G.MG**
Visualize relationships between two-dimensional and three-dimensional objects.		
3. Apply geometric methods to solve design problems (e.g., designing an object or structure to satisfy physical		

constraints or minimize cost; working with typographic grid systems based on ratios). ★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Quarter 3: District Benchmark test during dates of March 18 - 25. Tests returned to district office March 25.

Day-to-day pacing is left to the discretion of the individual collaborative teams. Mappings are to be followed to facilitate district-wide collaboration and correlation.

Standards that require revisiting each quarter according to their applicable portions:*A.CED.1, 2, 3, 4; A.REI.11; F.BF.1, 3, 4; F.IF.4, 5, 7, 8, 9)

Similarity, Right Triangles, and Trigonometry		**G.SRT**
Apply trigonometry to general triangles.		
9. Derive the formula A = 1⁄2 absin(C) for the area of a triangle by drawing an auxiliary line from a vertex perpendicular to the opposite side.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Similarity, Right Triangles, and Trigonometry		**G.SRT**
Apply trigonometry to general triangles.		
10. Prove the Laws of Sines and Cosines and use them to solve problems.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Similarity, Right Triangles, and Trigonometry	**G.SRT**
Apply trigonometry to general triangles.	
11. Understand and apply the Law of Sines and the Law of Cosines to find unknown measurements in right and non-right triangles (e.g., surveying problems, resultant forces).	

Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Trigonometric Functions		**F.TF**
Extend the domain of trigonometric functions using the unit circle.		
1. Understand radian measure of an angle as the length of the arc on the unit circle sub- tended by the angle.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Trigonometric Functions		**F.TF**
Extend the domain of trigonometric functions using the unit circle.		
2. 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.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Trigonometric Functions		**F.TF**
Extend the domain of trigonometric functions using the unit circle.		
3. Use special triangles to determine geometrically the values of sine, cosine, tangent for π /3, π/4 and π/6, and use the unit circle to express the values of sine, cosine, and tangent for π-x, π+x, and 2π-x in terms of their values for x, where x is any real number.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Trigonometric Functions		**F.TF**
Model periodic phenomena with trigonometric functions.		
5. Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Trigonometric Functions		**F.TF**
Model periodic phenomena with trigonometric functions.		
7. Use inverse functions to solve trigonometric equations that arise in modeling contexts; evaluate the solutions using technology, and interpret them in terms of the context.★		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Quarter 4: SAGE Summative Test during dates of March 28 – May 20. Strive to have math tested April 25 – May 13, so that make-up can take place May 16 – May 20.

Day-to-day pacing is left to the discretion of the individual collaborative teams. Mappings are to be followed to facilitate district-wide collaboration and correlation.

Standards that require revisiting each quarter according to their applicable portions:*A.CED.1, 2, 3, 4; A.REI.11; F.BF.1, 3, 4; F.IF.4, 5, 7, 8, 9)

Interpreting Categorical and Quantitative Data		**S.ID**
Summarize, represent, and interpret data on a single count or measurement variable.		
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 tables to estimate areas under the normal curve.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Making Inferences and Justify Conclusions		**S.IC**
Understand and evaluate random processes underlying statistical experiments.		
1. Understand statistics as a process for making inferences to be made about population parameters based on a random		

sample from that population.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Making Inferences and Justify Conclusions		**S.IC**
Understand and evaluate random processes underlying statistical experiments.		
2. Decide if a specified model is consistent with results from a given data-generating process, e.g., using simulation. For example, a model says a spinning coin falls heads up with probability 0.5. Would a result of 5 tails in a row cause you to question the model? (removed)		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Making Inferences and Justify Conclusions		**S.IC**
Make inferences and justify conclusions from sample surveys, experiments, and observational studies.		
3. Recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Making Inferences and Justify Conclusions		**S.IC**
Make inferences and justify conclusions from sample surveys, experiments, and observational studies.		
4. Use data from a sample survey to estimate a population mean or proportion; develop a margin of error through the use of simulation models for random sampling.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Making Inferences and Justify Conclusions		**S.IC**
Make inferences and justify conclusions from sample surveys, experiments, and observational studies.		

5. Use data from a randomized experiment to compare two treatments; use simulations to decide if differences between parameters are significant. (removed)		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3

Making Inferences and Justify Conclusions		**S.IC**
Make inferences and justify conclusions from sample surveys, experiments, and observational studies.		
6. Evaluate reports based on data.		
Depth of Knowledge Level 1	Depth of Knowledge Level 2	Depth of Knowledge Level 3