CV Guarantee- Integrated Math 3

Big Idea: To graph, describe, and write equations for functions.

Standard:
CCSS.MATH.CONTENT.HSF.IF.B.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.
CCSS.MATH.CONTENT.HSF.IF.A.1
CCSS.MATH.CONTENT.HSF.IF.A.2
CCSS.MATH.CONTENT.HSF.IF.B.5
CCSS.MATH.CONTENT.HSF.IF.B.6
CCSS.MATH.CONTENT.HSF.IF.C.7
CCSS.MATH.CONTENT.HSF.IF.C.8
CCSS.MATH.CONTENT.HSF.IF.C.9

Timeline: Semester 1 and Semester 2

Key Vocabulary:

- Locator point
- Vertex
- Asymptote
- Complete graph
- Expression
- Parent function
- Absolute Value
- Cubic
- Exponential
- Minimum
- Function
- Equation
- Parameter (a,h, and k)
- Polynomial
- Solution
- Variable
- Quadratic equation
- Hyperbola
- Model
- Maximum
- Range
- Domain
- Family of functions
- Infinity
- Output
- Input
- Point of intersection
- Square Root
- Increasing
- Decreasing

Knowledge	Reasoning	Performance Skills	Product Examples
● I can interpret functions that arise in applications of the context ● I can identify the name of the function by looking at the graph ● I can identify the type of function by looking at the equation ● I can 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.	● I can analyze functions using different representations ● I can use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	● I can graph functions expressed symbolically and show key features of the graph ● I can build a function that models the relationship between two quantities ● I can build new functions from existing functions ● I can construct and compare linear, quadratic and exponential models and solve problems	● I can graph a variety of functions (linear, quadratic, exponential, absolute value, cubic, square root, and hyperbolas) given an equation in graphing form. ● I can name the vertex or locator point for each graph. ● Given a graph I can write the equation in graphing, factored, or standard form ● I can describe the graph using key vocabulary

Resources: CPM Textbook, Desmos, YouTube, Other online websites and review packets

CV Guarantee- Integrated Math 3

Big Idea: Inverse functions and logarithms

Standard:
HSF-BF.B.4 Find inverse functions.
HSF-LE.A.4 For exponential models, express as a logarithm the solution to $ab^{ct} = d$ where a, c, and d are numbers and the base b is 2, 10, or e; evaluate the logarithm using technology.
HSF-IF.C.7.e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

Timeline: Semester 1 and Semester 2

Key Vocabulary:

- Inverse function
- Logarithm
- Restricted domain
- Change of base
- Base (of a logarithm)
- Logarithmic function
- Invertible/Non-invertible
- Product Property of logs
- Composition
- End behavior
- Quotient Property of logs
- Power Property of logs

Knowledge	Reasoning	Performance Skills	Product Examples
● I can define Key Vocabulary above ● I can identify the base in a logarithmic equation ● I recognize when a function's domain must be restricted to make it invertible ● I can identify how much a logarithmic function is shifted or scaled.	● I can infer the base in a word problem involving logarithms or exponentials. ● I understand that exponential functions and logarithmic functions are inverses of each other	● I can calculate the logarithm of a number to a specified base without a calculator (integers only) ● I can solve an equation of the form y = f(x) for x to find $f^{-1}(x)$ ● I can verify by composition that a function pair are inverses of each other. ● I can make a non-invertible function invertible by restricting the domain. ● I can read values of an inverse function from a graph or table ● I can use logarithms to solve equations involving exponential functions.	● Forensic Analysis (CPM Text Section 7.1.4) ● Pregnancy Analysis (CPM Text Section 7.1.3) ● I can graph logarithmic functions ● I can apply the product, quotient, and power properties of logarithms ● I can change logarithm bases ● I can find the inverse of a function graphically

Resources:
CPM Integrated III Text (Chapters 5 & 7.1), Desmos

CV Guarantee- Integrated Math 3

Big Idea: Come up with the best solution to a problem with constraints

Standard:	**Timeline:** Semester 1
A-CED.3 Represent constraints by equations or inequalities, and by systems of equations and/or inequalities, and interpret solutions as viable or nonviable options in a modeling context.	

Key Vocabulary:

● Linear programming ● Optimization ● Constraint	● Extraneous solution ● System of inequalities	● Boundary point ● Boundary line

Knowledge	**Reasoning**	**Performance Skills**	**Product Examples**
● I can define the vocab words above ● I can recognize whether a graph represents an equation or an inequality ● I can interpret the use of shading and different line types in a graph of inequalities	● I can recognize when it's appropriate to use an inequality vs an equation. ● I can recognize when a system of equations is needed ● I can recognize whether a proposed solution is viable or not	● I can model real-life situations using equations and inequalities ● I can solve a system of equations ● I can graph a system of equations	● I can produce a solution to a linear programming problem, including equations and graphs.

Resources:
CPM text (or e-text), Desmos, Graphing calculator, Kahoot, Quizlet

Big Idea: I can use the unit circle to find values for sine, cosine, and tangent without using a calculator.

CV Guarantee- Integrated Math 3

Standard:
HSF.TF.A.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.
HSF.TF.A.3 Use special triangles to determine geometrically the values of sine, cosine, tangent
Other Standards also included in this big idea:
HSF.TF.A.2
HSF.TF.A.4
HSF.TF.B.7
HSF.TF.C.8
HSF.TF.C.9

Timeline: Semester 1 and Semester 2

Key Vocabulary:

- cosecant
- cotangent
- identity
- reciprocal
- Pythagorean identity
- Degrees
- Reference angle
- Cycle
- 30-60-90 right triangle
- trigonometric function
- unit circle
- secant
- sine
- cosine
- radian
- 45-45-90 right triangle
- inverse
- inverse cosine
- inverse sine
- inverse tangent
- theta
- tangent
- period
- special right triangle

Knowledge	Reasoning	Performance Skills	Product Examples
● I can identify a special right triangle ● I can memorize the height and base length of the two special right triangles in the unit circle ● I can find radian and degree measurements on the unit circle ● I can understand that sine represents the y-values on the unit circle and cosine represents the x-values on the unit circle ● I can define all the key vocabulary words above	● I can understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle. ● I can prove the Pythagorean identity and the addition and subtraction formulas. ● I can know when I should use the unit circle versus the coordinate graph to find values for sine and cosine ● I can realize when I can solve a trig problem without using a calculator. ● I can find the inverse of sine, cosine and tangent.	● I can covert degrees to radians ● I can use special triangles to determine geometrically the values of sine, cosine, tangent for $\frac{\pi}{3}, \frac{\pi}{4}\ and \frac{\pi}{6}$ ● I can use the unit circle to explain symmetry (odd and even) and periodicity of trigonometric functions. ● I can use inverse functions to solve trig equations that arise in modeling contexts.	● I can create the sine graph and label important points ● I can create the cosine graph and label important points ● I can create the tangent graph and label important points ● I can solve equations involving sine, cosine, and tangent without using a calculator ● I can use the Pythagorean identity and addition and subtraction formulas to solve problems.

Resources:
CPM Integrated III Text, Desmos

CV Guarantee- Integrated Math 3

Big Idea: Factor polynomials and graph them in factored form

Standard: HSA.APR.B.2 Know and apply the Remainder Theorem.
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.
HSF.IF.B.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.
HSF.IF.C.7.C Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior
HSA.SSE.A.2 Use the structure of an expression to identify ways to rewrite it.
HSA.APR.D.6 Rewrite simple rational expressions in different forms
HSN.CN.C.9 Know the Fundamental Theorem of Algebra; show that it is true for quadratic polynomials.

Timeline: Semester 2

Key Vocabulary:

- Degree of a polynomial
- General equation (of a polynomial)
- Complex conjugate
- Remainder Theorem
- Root
- Real root
- Double root
- Factorable
- Stretch factor
- End behavior
- Fundamental Theorem of Algebra
- Sum or Difference of Cubes
- Difference of squares

Knowledge	Reasoning	Performance Skills	Product Examples
● I can define the Key Vocabulary ● I can recognize whether a function is a polynomial and what its degree is ● I can write the General Equation for a polynomial of any degree ● I can describe graphs of polynomial functions, including end behavior.	● I can predict how many roots a polynomial equation will have ● I understand that complex roots come in conjugate pairs	● I can identify zeros of a polynomial expression and use them to sketch its graph, including end behavior ● I can use the zeros of a polynomial to write an equation for the polynomial ● I can divide 2 polynomials ● I can use the Remainder Theorem to find the remainder you will get if you divide 2 polynomials	● A report to document the solution of an optimization problem (CPM Text Section 8.3.3) ● Analysis of Polydoku Game (CPM Text Section 8.3.1) ● Model of Roller Coaster Track (CPM Text Sections 8.1.1, 8.1.3)

Resources:
CPM Integrated III Text Chapter 8, Desmos

CV Guarantee- Integrated Math 3

Big Idea: Simplifying and combining rational expressions.

Standard:
CCSS.MATH.CONTENT.HSA.APR.B.2 Know and apply the Remainder Theorem
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.
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.

Timeline:

Quarter 4

Chapter 11- section 1

Duration: 2 weeks

Key Vocabulary:

- Rational number
- Numerator
- Distribute
- Simplify
- Denominator
- Common denominator
- Rational expression
- Closed set
- Least common multiple

Knowledge	Reasoning	Performance Skills	Product Examples
● I can understand the relationship between zeros and factors of polynomials ● I can define the key vocabulary listed above ● I can recognize a rational expression ● I can multiply binomials ● I can find a common denominator	● I can study the properties of the number 1 and recognize when and how to use it to rewrite and simplify rational expressions ● I can determine that rational expressions are closed under addition, subtraction, and multiplication	● I can know and apply the remainder theorem ● I can add, subtract, multiply, and divide rational expressions	● I can simplify a variety of rational expressions

Resources:
CPM Integrated III Text, Desmos

CV Guarantee- Integrated Math 3

Big Idea: I will be able to interpret categorical and quantitative data and use it to make inferences, justify conclusions, and to make decisions.

Standard:
CCSS.MATH.CONTENT.HSS.IC.B.6
CCSS.MATH.CONTENT.HSS.IC.A.1S-IC.3
CCSS.MATH.CONTENT.HSS.IC.B.4S-IC.6
CCSS.MATH.CONTENT.HSS.IC.A.2
CCSS.MATH.CONTENT.HSS.ID.A.4
CCSS.MATH.CONTENT.HSS.IC.B.3
CCSS.MATH.CONTENT.HSS.IC.B.5
CCSS.MATH.CONTENT.HSS.MD.B.6
CCSS.MATH.CONTENT.HSS.MD.B.7

Timeline: Semester 1 and Semester 2

Key Vocabulary:

- probability area model
- bound (lower/upper)
- claim
- conditional probability
- control limit
- false positive
- hypothesis test
- in/out of control
- Law of Large Numbers
- margin of error
- population
- statistical process control
- quality control
- random number
- control chart
- sample-to-sample variability
- bias
- cause and effect
- closed question
- cluster sample
- convenience sample
- desire to please
- experiment
- histogram
- lurking variable
- mean
- normal distribution
- sampling distribution
- simulation
- statistical hypothesis test
- upper/lower control
- limit x-bar process
- Census
- observational study
- open question
- parameter
- percentile
- placebo
- population
- preface
- question order
- random sample
- relative frequency sample
- standard deviation
- statistic
- survey
- treatment
- two questions in one

Knowledge	Reasoning	Performance Skills	Product Examples
● I can understand statistics as a process for making inferences about population parameters based on a random sample from that population ● I can understand the above vocabulary words	● I can recognize the purposes of and differences among sample surveys, experiments, and observational studies; explain how randomization relates to each ● I can decide if a model is consistent with results from a given data-generating process ● I can 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	● I can use data from a randomized experiment to compare two treatments ● I can 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.	● I can evaluate reports based on data to make sensible decisions ● I can use the mean and standard deviation of a data set to fit it to a normal distribution and to estimate population percentages.

Resources:
CPM Integrated III Text: Chapter 4 Part 1 and Chapter 6, Graphing Calculators

CV Guarantee- Integrated Math 3