Algebra II Mathematics– Evidence Statements

Overview of the Maryland Comprehensive Assessment Program (MCAP)

The MCAP includes a coherent set of summative mathematics assessments aligned to the Maryland College and Career Ready Standards for Mathematics (MCCRSM). Students are required to take an MCAP mathematics assessment at the end of grades 3 – 8 and at the end of Algebra I. Students may also take an MCAP mathematics assessment at the end of Geometry and Algebra II.

The MCAP mathematics assessment development process is based on Evidence-Centered Design. The ECD process begins by establishing the answer to "What skills and understandings should be assessed?". The MCCRSM describes the skills and understandings that the MCAP mathematics assessments assess. Assessments are then designed to gather evidence that allows inferences to be made. Assessments can be designed to allow inferences of various grain sizes. The MCAP mathematics assessments are summative assessments and are therefore designed to provide evidence that allows only general inferences about a student's mathematical skills and understandings. The MCAP Mathematics Claims Structure describes the grain size of the evidence that the MCAP mathematics assessments will yield. Assessment items are designed to elicit evidence of a student's level of proficiency for each claim.

MCAP MATHEMATICS CLAIMS STRUCTURE

Master Claim

The student is college and career ready or is on track to being college and career ready in mathematics.

Subclaims

Content - The student solves problems related to all content of the grade/course related to the Standards for Mathematical Practice.

Reasoning - The student expresses grade/course level appropriate mathematical reasoning.

Modeling - The student solves real-world problems with a degree of difficulty appropriate to the grade/course.

OVERVIEW OF MCAP MATHEMATICS ASSESSMENT TASK TYPES

Item Type	Description	Subclaim	Scoring Method	Number of Operational Items per Form
Type I	Type I items will assess conceptual understanding, procedural skills, reasoning, and the ability to use mathematics to solve real-world problems.	Content Reasoning Modeling	Machine scored	**31**
Type II	Type II items assess a student's ability to reason mathematically. Items may require students to provide arguments or justifications, critique the reasoning of others, and to use precision when explaining their thinking related to mathematics.	Reasoning	Human scored	**2**
Type III	Type III items assess a student's ability to apply their understanding of mathematics when solving real-world contextual problems.	Modeling	Human scored	**2**
			Total	**35**

Overview of the MCAP Mathematics Evidence Statements

MCAP Mathematics Evidence Statements help teachers, curriculum developers, and administrators understand how the MCCRSM will be assessed. Assessment items are designed to elicit the evidence described in the Evidence Statements.

The MCAP Mathematics Evidence Statements for the Content Sub-Claim are organized using the same structure as the Maryland College and Career Ready Standards for Mathematics. The Algebra I, Geometry and Algebra II Content Evidence Statements are organized by Conceptual Category, Domains, Clusters, and then Standards.

Evidence Statements

Evidence statements are provided for each standard to describe the type of evidence that a task addressing the standard should elicit. In some cases, Evidence statements are provided for each standard to describe the type of evidence that a task addressing the standard should elicit. In some cases, the standard clearly describes the type of evidence that an aligned task should elicit. The Evidence Statement for such standards will read “As stated in the standard”. In cases where the wording of a standard does not adequately describe the type of evidence that should be elicited, the Evidence Statement will attempt to better describe the type of evidence items should elicit. In cases where a standard is taught in both Algebra I and Algebra II, the Evidence Statement and/or Item Specification will seek to describe how the items might differ between the two courses.

Clarifications

Clarifications provide additional information to help the reader better understand how a standard might be assessed.

Modeling Standards ★

Modeling is best interpreted not as a collection of isolated topics but rather in relation to other standards. Making mathematical models is a Standard for Mathematical Practice, and specific modeling standards appear throughout the high school standards indicated by a star symbol («).

Calculator Codes

The last column of each table found in the Content Sub-Claim Evidence Statement tables identifies whether items that assess a given standard will allow the use of a calculator. The codes are identified in the Calculator Key below.

Calculator Key:

Y – Yes. A calculator will be available on the tool bar when this standard is assessed.

N – No. A calculator will NOT be available on the tool bar when this standard is assessed.

X – The calculator designation will be dependent on the task and will be determined as a Yes or No during content review.

Reasoning Sub-Claim

The MCAP Mathematics Evidence Statements for the Reasoning Sub-Claim have a different structure than the Content Evidence Statements. The codes for the Reasoning Evidence Statements begin with either A1, G or A2 that correspond to Algebra I, Geometry or Algebra II. The letter “R” appears after the course designation in the code to indicate that the statement is a Reasoning Evidence Statement. The Reasoning Evidence Statements may apply to both machine-scored and constructed response items, unless otherwise noted. Reasoning items may align to any of the content standards from a given course.

Modeling Sub-Claim

The MCAP Mathematics Evidence Statements for the Modeling Sub-Claim have a different structure than the Content Evidence Statements. The codes for the Modeling Evidence Statements begin with either A1, G or A2 that correspond to Algebra I, Geometry or Algebra II. The letter “M” appears after the course designation in the code to indicate that the statement is a Modeling Evidence Statement. The Modeling Evidence Statements may apply to both machine-scored and constructed response items, unless otherwise noted. Modeling items may align to any of the content standards from a given course.

Standards for Mathematical Practice

The Standards for Mathematical Practice describe the varieties of expertise that mathematics educators at all levels should seek to develop in their students.

These practice rest on important “processes and proficiencies” with longstanding importance in mathematics education.

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.

Content Subclaim

Number and Quantity

N.RN The Real Number System

N.RN.A Extend the properties of exponents to rational exponents.

N.RN.A.1 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.

Evidence Statement:

- As stated in the standard.

Clarification:

- This standard will be assessed as part of a constructed response Type II reasoning item.

Calculator Code: X

N.RN.A.2 Rewrite expressions involving radicals and rational exponents using the properties of exponents.

Evidence Statement:

- As stated in the standard.

Clarification:

- Rationalizing the denominator not required.
- Items may include items that require comparisons of the magnitudes of numbers written using radicals and rational exponents.

Calculator Code: X

N.Q Quantities

N.Q.A Reason quantitatively and use units to solve problems.

N.Q.A.2 ★ Define appropriate quantities for the purpose of descriptive modeling.

This standard is also taught in Algebra I

Evidence Statement:

- Select an appropriate quantity for a real-world context.

Clarifications:

- Items must have real-world context.
- When this standard is assessed in conjunction with a constructed response item, a precision point would be deducted if units associated with quantities are not provided.

Calculator Code: X

N.CN The Complex Number System

N.CN.A Perform arithmetic operations with complex numbers.

N.CN.A.1 ★ Know there is a complex number i such that $i^2 = -1$, and every complex number has the form $a + bi$ with a and b real.

Evidence Statement:

- As stated in the standard.

Clarifications:

- N/A

Calculator Code: X

N.CN.A.2 Use the relation $i^2 = -1$ and the commutative, associative, and distributive properties to add, subtract, and multiply complex numbers.

Evidence Statement:

- Add, subtract and multiply complex numbers.

Clarifications:

- Do not include division of complex numbers.
- Can include simplifying powers of i.

Calculator Code: X

N.CN.C Use complex numbers in polynomial identities and equations.

N.CN.C.7 Solve quadratic equations with real coefficients that have complex solutions.

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items are limited to equations with non-real solutions.
- Answers can be written with the i before or after the radical.
- Solutions may or may not be simplified.

Calculator Code: X

Algebra

A.SSE Seeing Structure in Expressions

A.SSE.A Interpret the structure of expressions.

A.SSE.A.2 ★ Use the structure of expressions to identify ways to rewrite it.

This standard is also taught in Algebra I

Evidence Statement:

- Rewrite polynomial, rational, radical, logarithmic and exponential expressions.
- Rational expressions should be limited to numerators and denominator with a degree of 1 or 2.

Clarifications:

- Items will not include sums and differences of cubes.
- Factoring by grouping is included.
- Factoring of polynomials is included.
- Expressions may have more than one variable. (e.g. $x^4 - y^4$ may be rewritten as $(x^2 - y^2)(x^2 + y^2)$

Calculator Code: X

A.SSE.B Write expressions in equivalent forms to solve problems.

A.SSE.B.3 ★ Choose and produce an equivalent form of an expression **to reveal and explain** properties of the **quantity** represented by the expression.

Evidence Statement:

- This standard is not assessed as a stand-alone standard.

Clarifications:

- This statement serves as the stem for A.SSE.3c.

3c.★ Use the properties of exponents to transform expressions for exponential functions.

This standard is also taught in Algebra I

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items must have real-word context.
- The equivalent form must reveal something about the real-world context.
- Exponentials are limited to rational or real exponents.

Calculator Code: X

A.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. For example, calculate mortgage payments.

Evidence Statement:

- Use the formula for the sum of a finite geometric series to solve multistep contextual problems.

Clarifications:

- Items may require finding the value of a single term as well as the sum.
- The derive portion of this standard is not assessed.

Calculator Code: Y

A.APR Arithmetic with Polynomials and Rational Expressions

A.APR.B Understand the relationship between zeros and factors of polynomials.

A.APR.B.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 $p(x)$.

Evidence Statement:

- As stated in the standard.

Clarifications:

- N/A

Calculator Code: N

A.APR.B.3 Identify zeros of polynomials when suitable factorizations are available and/or use the zeros to construct a rough graph of the function defined by the polynomial.

This standard is also taught in Algebra I

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items will be limited to polynomials of degree 2, 3, 4 or 5
- Items may focus on the relationship between the zeros and factors.

Calculator Code: N

A.APR.C Use polynomial identities to solve problems.

A.APR.C.4 Prove polynomial identities and use them to describe numerical relationships.

Evidence Statement:

- This standard is not assessed as a stand-alone standard.

A.APR.D Rewrite rational expressions.

A.APR.D.6 Rewrite simple rational expressions in different forms; write $\frac{a(x)}{b(x)}$ in the form $q(x) + \frac{r(x)}{b(x)}$ 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.

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items will be simple enough to allow inspection or long division.
- Simple rational expressions are rational expressions whose numerators and denominators have a degree of 1 or 2.

Calculator Code: X

A.CED Creating Equations

A.CED.A Create equations that describe the numbers or relationships.

A.CED.A.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**.

This standard is also taught in Algebra I

Evidence Statement:

- Create simple rational and exponential functions in one variable.

Clarifications:

- Items must have real-world context
- Inequalities in one variable are not in Algebra II.
- Simple rational functions contain a single rational expression whose numerator and denominator are polynomials of degree one or degree two.

Calculator Code: X

A.REI Reasoning with Equations and Inequalities

A.REI.A Understand solving equations as a process of reasoning and explain the reasoning.

A.REI.A.1 Explain each step in solving a simple equation as following from the equality of numbers asserted at the previous step, starting from the assumption that the original equation has a solution. Construct a viable argument to justify a solution method.

This standard is also taught in Algebra I

Evidence Statement:

- Explain why equality holds when performing operations to both sides.

Clarifications:

- Use multiple types of operations such as those required to solve equations stemming from quadratic, simple rational, simple radical or exponential functions.

Calculator Code: X

A.REI.A.2 Solve simple rational and radical equations in one variable, and give examples showing how extraneous solutions may arise.

Note: (A-REI.A.2-1 focuses on rational equations, A-REI.A.2-2 focus is on radical equations)

Evidence Statement:

- Solve simple radical equations in one variable
- Solve simple rational equations in one variable
- Identify equations for which extraneous roots may arise and explain why that is the case.

Clarifications:

- Simple rational equations contain single rational expressions with numerators and denominators of degree 1 or 2 on each side of the equal sign.
- Solving radical equations should not require raising each side of an equation to a reciprocal power more than one time.

Calculator Code: X

A.REI.B Solve equations and inequalities in one variable.

A.REI.B.4 Solve quadratic equations in one variable.

Evidence Statement:

- This standard is not assessed as a stand-alone standard.

Clarifications:

- This statement serves as the stem for A.REI.B.4b.

4b. Solve quadratic equations with rational number coefficients by inspection (e.g., for $x^2=49$), taking square roots, completing the square, the quadratic formula and factoring, as appropriate to the initial form of the equation. Recognize when the quadratic formula gives complex solutions.

This standard is also taught in Algebra I

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items that require pr
  oviding complex solutions to quadratic equations align to N.CN.C.7.

Calculator Code: X

A.REI.C Solve Systems of Equations.

A.REI.C.7 Solve a simple system consisting of a linear equation and a quadratic equation in two variables algebraically and graphically.

Evidence Statement:

- As stated in the standard.

Clarifications:

- Limit quadratic expressions to those that have only one variable squared. (no circles)

Calculator Code: X

A.REI.D Represent and solve equations and inequalities graphically.

A.REI.D.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.

This standard is also taught in Algebra I

Evidence Statement:

- Find the solutions of where the graphs of the equations $y=f(x)$ and $y=g(x)$ intersect, e.g. using technology to graph the functions, make tables of values or find successive approximations.

Clarifications:

- Any combination of the function types listed in the standard may be used for items that involve approximation of the solutions using technology.

Calculator Code: X

Functions

F.IF Interpreting Functions

F.IF.A Understand the concept of a function and use function notation.

F.IF.A.3 Recognize that sequences are functions, sometimes defined recursively, whose domain is a subset of the integers. For example, the Fibonacci sequence is defined recursively by $f(0) = f(1) = 1$, $f(n+1) = f(n) + f(n-1)$ for $n \geq 1$.

This standard is also taught in Algebra I

Evidence Statement:

- Create an explicit function rule for a sequence.
- Create recursive rules for a sequence.
- Explain the differences and similarities between explicitly and recursively defined sequences.
- Transform an explicitly defined function to a recursively defined function and vice versa.
- Determine the value of a specific term in a sequence defined either explicitly or recursively.
- Provide the domain and range of functions that represent sequences.

Clarifications:

- Limit sequences to arithmetic or geometric seq
  uences.

Calculator Code: X

F.IF.B Interpret functions that arise in applications in terms of the context.

F.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

This standard is also taught in Algebra I

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items must have real-world context
- Limit function types to: exponential, root, logarithmic, polynomial, and trigonometric functions
- Key features include intercepts; intervals where the function is increasing, decreasing, positive, or negative; relative maximums and minimums; symmetries; end behavior; periodicity.
- Do not include polynomials with double roots.

Calculator Code: X

F.IF.B.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.

Note: (F.IF.B.6-1 focuses on functions presented as graphs, F.IF.B.6-2 focuses on functions presented as tables, F.IF.B.6-3 focuses on functions presented as equations)

This standard is also taught in Algebra I

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items must have real-world context
- Limit function types to: exponential, logarithmic, polynomial, and trigonometric functions
- Items with higher cognitive demand must address the “interpret” part of the standard.

Calculator Code: X

F.IF.C Analyze functions using different representations.

F.IF.C. 7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Evidence Statement:

- This standard is not assessed as a stand-alone standard.

Clarifications:

- This statement serves as the stem for F.IF.C.7c and F.IF.7e

7c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.

Evidence Statement:

- As stated in the standard.

Clarifications:

- Polynomial functions should be of degree 2, 3, 4 or 5.

Calculator Code: X

7.e Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude.

Evidence Statement:

- As stated in the standard.

Clarifications:

- Limit trigonometric functions to sine and cosine functions.
- Limit Logarithmic functions to those containing end behavior as $x \to \infty$ (i.e. functions such as $f(x) = ln(-x-1)$ should not be included).

Calculator Code: X

F.IF.C.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function.

8b. Use the properties of exponents to interpret expressions for exponential functions

Evidence Statement

- As stated in the standard.

Clarifications

- N/A

Calculator Code: X

F.IF.C.9 Compare properties of two functions each represented in a different way (algebraically, graphically, numerically in tables, or by verbal descriptions).

This standard is also taught in Algebra I

Evidence Statement

- As stated in the standard.

Clarifications

- Function types should be limited to polynomial functions of degree 2 or higher, exponential, logarithmic and trigonometric functions.
- Limit trigonometric functions to sine and cosine.
- Items may or may not have real-world context.

Calculator Code: X

F.BF Building Functions

F.BF.A Build a function that models a relationship between two quantities.

F.BF.A.1★ Write a function that describes a relationship between two quantities.

1a. Determine an explicit expression, a recursive process, or steps for calculation from a real-world context.

This standard is also taught in Algebra I

Evidence Statement:

- Write a function based on an observed pattern in a real-world scenario.

Clarifications:

- Items must have real-world context.
- Limit to linear, quadratic, and exponential functions.
- Linear functions should be more complex than those in slope intercept form.
- Similar to creating a function from a scatterplot but for this standard the relationship between the two quantities is clear from the context and regression is not needed.

Calculator Code: X

1b. 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.

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items must have real-world context.
- Limit to linear, quadratic, exponential and trigonometric functions.
- Items may include functions that are algebraic combinations of linear, quadratic, and exponential functions.

Calculator Code: X

F.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.

Evidence Statement:

- Create an explicit function rule for a sequence.
- Create recursive rules for a sequence.
- Translate between explicit and recursive formulas.

Clarifications:

- Items must have real-world context.
- Limit to geometric sequences.

Calculator Code: X

F.BF.B Build new functions from existing functions.

F.BF.B.3 Identify the effect on the graph of replacing $f(x)$ by $f(x)+k$, $kf(x)$, $f(kx)$, 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.

Note: F.BF.3-1 focus is on even and odd functions, F.BF.3-2 focuses on the effects of on the graph of a function

This standard is also taught in Algebra I

Evidence Statement:

- As stated in the standard.

Clarifications:

- Limit to polynomial, exponential, logarithmic, and trigonometric functions.
- The experiment part of the standard is not assessed.
- Items may require identification of even and odd functions graphically and/or algebraically.

Calculator Code: X

F.BF.B.4 Find inverse functions.

Evidence Statement:

- This standard is not assessed as a stand-alone standard.

Clarifications:

- This statement serves as the stem for F.BF.B.4a.

4a. 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.

Evidence Statement:

- Find the inverse of power functions, linear and simple rational functions.
- Find inverse functions to solve contextual problems.

Clarifications:

- Limit to functions that are one-to-one
- Solve an equation of the form $f(x) = c$ for a function that has an inverse. (e.g. The formula for volume of a sphere is $V = \frac{4}{3}\pi r^3$. This formula has an inverse. Given that the volume equals a given constant, determine the radius.)
- Items may ask student to write a formula that represents an invertible function in terms of the independent variable. (e.g. Write the formula for the volume of a sphere in terms of the radius.)

Calculator Code: X

F.LE Linear, Quadratic, and Exponential Functions

F.LE.A Construct and compare linear, quadratic, and exponential models and solve problems.

F.LE.A.2★ Construct linear, quadratic and exponential functions, including arithmetic and geometric sequences, given a graph, a description of a relationship, or two input-output pairs (include reading these from a table).

Note: F.LE.A.2-1 focus is on exponential functions, F.LE.A.2-2 focus is on linear functions.

This standard is also taught in Algebra I

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items must have real-world context
- Items do not tell the student what type of function to construct.
- Most items will focus on exponential functions.
- Items can go beyond constructing functions.

Calculator Code: X

F.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.

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items may include real-world context
- Items may require solutions be provided in exact form as a logarithm that has a base of 2, 10 or *e*.
- Items may require solutions be approximated by using technology to find a decimal approximation of a logarithmic expression.

Calculator Code: X

F.LE.B Interpret expressions for functions in terms of the situation they model.

F.LE.B.5★ Interpret the parameters in a linear or exponential function in terms of a context.

Note: (F.LE.B.5-1. focuses on linear functions, F.LE.B.5-2 focuses on exponential functions)

This standard is also taught in Algebra I

Evidence Statement:

- Explain the meaning of the slope and y-intercept in a linear model.
- Explain the meaning of the base, the exponent and the coefficient in terms of context, given an exponential model.
- Explain the meaning of the parameters in quadratic model given in standard form, vertex form or factored form.

Clarifications:

- Items must have real-world context.

Calculator Code: X

F.TF Trigonometric Functions (F.TF)

F.TF.A Extend the domain of trigonometric functions using the unit circle.

F.TF.A.1 Understand radian measure of an angle as the length of the arc on the unit circle subtended by the angle.

Evidence Statement:

- Determine the measure of a central angle of a circle in radians given an arc length and radius.
- Convert between radian and degrees.

Clarifications :

- N/A

Calculator Code: X

F.TF.A.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.

Evidence Statement:

- Determine the sine, cosine and/or tangent for an angle given in standard position, whose terminal side passes through a given point (x, y).

Clarifications:

- N/A

Calculator Code: X

F.TF.B Model periodic phenomena with trigonometric functions.

F.TF.B.5★ Choose trigonometric functions to model periodic phenomena with specified amplitude, frequency, and midline.

Evidence Statement:

- As stated in the standard.

Clarifications:

- Items must have real-world context.
- Limit to sine and cosine functions.

Calculator Code: Y

F.TF.C Prove and apply trigonometric identities.

F.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.

Evidence Statement:

- Use Pythagorean identities to find the value of $sin(\theta)$, $cos(\theta)$, or $tan(\theta)$ given $sin(\theta)$, $cos(\theta)$, or $tan(\theta)$ and the quadrant of the angle.
- Use the trigonometric ratio and quadrant of a given angle to determine other ratios for the given angle.

Clarifications:

- N/A

Calculator Code: X

Statistics

S.ID Interpreting Categorical and Quantitative Data

S.ID.B Summarize, represent, and interpret data on two categorical and quantitative variables.

S.ID.B.6★ Represent data on two quantitative variables on a scatter plot, and describe how the variables are related.

6a.★ Fit a function to the data; use functions fitted to data to solve problems in the real-world context of the data. Use given functions or choose a function suggested by the real-world context.

This standard is also taught in Algebra I

Evidence Statement:

- As stated in the standard.

Clarifications:

- Predictions should not extrapolate far beyond the set of data provided
- Limit function fitting to quadratic, exponential and trigonometric functions.
- When creating trigonometric regression equations, limit to sine functions only (because of TI-84 functionality).

Calculator Code: Y

Reasoning Subclaim

All reasoning assessment items connect to both the Algebra II reasoning evidence statements and the content evidence statements.

Students must provide evidence of their ability to reason mathematically by responding to Type I and Type II items.

Type I

- Items are machine scored.
- Items are 1 point per item.
- Items may be aligned to any of the content standards.
- Calculators are allowed on all reasoning items.
- Four items from this grouping will appear on each assessment.

Type II

- Items are human scored constructed response.
- Items are 4 points per item.
- Items may be aligned to any of the content standards.
- Calculators are allowed on all reasoning items.
- Two items from this grouping will appear on each assessment.

The following pages provide the reasoning evidence statements and specific clarifications.

Reasoning Evidence Statements

A2.R.1 **Evidence Statement:**

- Given an equation, reason about the number and nature of the solutions.

Clarifications:

- Limit to quadratic, radical and simple rational equations.

A2.R.2 **Evidence Statement:**

- Given a system of equations, reason about the number of solutions.

Clarifications:

- Do not include systems of linear equations.
- A.REI.7 requires students to solve a system a system containing a linear and a quadratic equation.
- Items may provide information about any two functions and the student must reason about the number of solutions such system would have by analyzing the possible number of times the two graphs could intersect. For example, students might be asked how many positive solutions there are to the system $f(x) = e^x$ and $g(x) = x + 2$. The student use understanding pf the behavior of the two functions to reason about the possible number of solutions to the system.

A2.R.3 **Evidence Statement:**

- Reasoning based on the principle that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane.

Clarifications:

- Do not include linear equations.
- Inequalities are not included in Algebra II.

A2.R.4 **Evidence Statement:**

- Identify an option that would refute a conjecture/claim.

Clarifications:

- N/A

A2.R.5 **Evidence Statement:**

- Identify a correct method and justification given two or more chains of reasoning.

Clarifications:

- N/A

A2.R.6 **Evidence Statement:**

- Given a proposition, determine cases where the proposition is true or false.

Clarifications:

- N/A

A2.R.7 **Evidence Statement:**

- Identify an unstated assumption that would make a problem well posed or make a particular method viable.

Clarifications:

- N/A

A2.R.8 **Evidence Statement:**

- Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any).

Clarifications:

- Items require showing the steps used to solve a problem algebraically.
- Limit to equations to quadratic equations; simple radical equations and simple rational equations.
- Items that require showing to work for solving a system of equations algebraically are limited to systems comprised of a quadratic equation and a linear equation.

A2.R.9 **Evidence Statement:**

- Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about trigonometric functions.

Clarifications:

- See Evidence Statements and Item Specifications for F.TF.1, F.TF.2, F.TF.5 and F.TF.8 for limitations.

A2.R.10 **Evidence Statement:**

- Express reasoning about the relationship between zeros and factors of polynomials.

Clarifications:

- Items will require express reasoning associated with A.APR.B.2 and A.APR.B.3.

A2.R.11 **Evidence Statement:**

- Express reasoning about properties of exponents.

Clarifications:

- N/A

Modeling Subclaim

All modeling assessment items connect to both the Algebra II modeling evidence statements and the content evidence statements.

Students must provide evidence of their ability to apply one or more steps of the modeling cycle by responding to Type I and Type III items.

Type I

- Items are machine scored.
- Items are 1 point per item.
- Items may be aligned to any of the content standards.
- Calculators are allowed on all reasoning items.
- Four items from this grouping will appear on each assessment.

Type II

- Items are human scored constructed response.
- Items are 4 points per item.
- Items may be aligned to any of the content standards.
- Calculators are allowed on all reasoning items.
- Two items from this grouping will appear on each assessment.

Modeling items can have context even if the aligned content evidence statement clarifies that “Items do not have context”.

The following pages provide the modeling evidence statements, specific clarifications.

Modeling Evidence Statements

A2.M.1 **Evidence Statement:**

- Choose between competing mathematical models to solve real-world problems

Clarifications:

- Limit to exponential, polynomials of degree 2 or higher, and trigonometric models.

A2.M.2 **Evidence Statement:**

- Construct a mathematical model to solve a problem.

Clarifications:

- Limit to exponential, polynomials of degree 2 or higher, and trigonometric models.

A2.M.3 **Evidence Statement:**

- Validate a given model and make improvement

Clarifications:

- Limit to exponential, polynomials of degree 2 or higher, and trigonometric models.

A2.M.4 **Evidence Statement:**

- Interpret the solution to a real-world problem in terms of context

Clarifications:

- Limit to exponential, polynomials of degree 2 or higher, and trigonometric models
- May require students to select the most appropriate function to model a situation based on knowledge of the behavior of the function and the typical behavior of the real-world phenomenon.

A2.M.5 **Evidence Statement:**

- Compare the result from a model with real world data.

Clarifications:

- Limit to exponential, polynomials of degree 2 or higher, and trigonometric models.

A2.M.6 **Evidence Statement:**

- Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in the standards.

Clarifications:

- Limit to exponential, polynomials of degree 2 or higher, and trigonometric models

A2.M.7 **Evidence Statement:**

- Make a reasonable assumption about a given scenario and use the assumption to solve a problem

Clarifications:

- Limit to exponential, polynomial of degree 2 or higher, and trigonometric models
- Type I items only

A2.M.8 **Evidence Statement:**

- Provide a reasoned estimate of a quantity needed to solve a problem

Clarifications:

- Limit to exponential, polynomial of degree 2 or higher, and trigonometric models
- Type I items only