Mathematics Content Guide for the New Jersey Graduation Proficiency Assessment (NJGPA)

Contents

Overview of Mathematics Component of NJGPA

The mathematics component of the NJGPA:

- Consists of NJSLA-Algebra I and NJSLA-Geometry items, exclusively—Type I, Type II and Type III.
- Includes 30 items for a total of 55 points.
- Consists of two 90-minute units—the same number of units and time structure as NJSLA-Algebra I and NJSLA-Geometry.
- Measures only Algebra I and Geometry content:
    - New Jersey Student Learning Standards for Mathematics (nj.gov).
    - Instructional Units for Mathematics (nj.gov).
- Provides students with access to the TI-84 calculator for calculator-active items. Reference sheet and allowable mathematics tools for the NJGPA are the same available for NJSLA-Algebra I and NJSLA-Geometry.
- Utilizes TestNav—the same online testing platform used for NJSLA.
- Generates an Individual Student Report (ISR) that will report on Graduation Readiness and the subclaims reported for NJSLA.
- Offers practice tests, available on the NJSLA Resource Center, to help students and educators familiarize themselves with assessment format, item types, and item functionality.

Mathematics Assessment Claims

A process consistent with the principles of Evidence-Centered Design (ECD) was used to develop claims or inferences about graduation readiness in mathematics. These claims are derived from the mathematics content standards and mathematical practices to be assessed.
This master claim is further explicated by four subclaims:

- **Subclaim A: Major content**
- **Subclaim B: Additional and supporting content**
- **Subclaim C: Expressing mathematical reasoning**
- **Subclaim D: Modeling and applying mathematics**

The subclaims are designed to elicit additional data in support of the master claim and provide data that helps educators focus instruction on key priorities.

Figure 1: Claim with Subclaims

Master Claim: New Jersey High School Graduation Readiness in Mathematics
The degree to which a student is ready for high school graduation in mathematics
The student solves Algebra I and Geometry problems in mathematics as set forth in the Standards for Mathematical Content with connections to the Standards for Mathematical Practice.

Subclaim A
Major Content with Connections to Practices
The student solves problems involving the Major Content in Algebra I and Geometry, with connections to the Standards for Mathematical Practice.

Subclaim B
Additional & Supporting Content with Connections to Practices
The student solves problems involving the Additional and Supporting Content in Algebra I and Geometry, with connections to the Standards for Mathematical Practice.

Subclaim C
Highlighted Practices MP.3 and MP.6 with Connections to Content (expressing mathematical reasoning)
The student expresses Algebra I and Geometry course-level appropriate mathematical reasoning by constructing viable arguments, critiquing the reasoning of others (MP.3), and/or attending to precision when making mathematical statements (MP.6).

Subclaim D
Highlighted Practice MP.4 with Connections to Content (modeling/application)
The student solves real-world problems by applying knowledge and skills articulated in the standards for Algebra I and Geometry, engaging particularly in the Modeling practice, and where helpful making sense of problems and persevering to solve them (MP.1), reasoning abstractly and quantitatively (MP.2), using appropriate tools strategically (MP.5), looking for and making use of structure (MP.7), and/or looking for and expressing regularity in repeated reasoning (MP.8).

Evidence statements are aligned directly to the master mathematics claim, via the subclaims, and provide the foundation for all mathematics task development.

They are derived from the mathematics standards and practices, and are written for discrete content, or combinations of content and connect to the mathematical practices, as shown in Figure 1. Evidence Statements are designed to accomplish the following:

- Ground measurement of student performance in observable products elicited by high-quality tasks and items.
- Integrate standards in ways that demonstrate rigor, depth, and logical cohesion.
- Inform how to distinguish between partial and full expressions of the knowledge and skill(s) embedded in a standard.

Task Types

The Evidence Statements Tables for the New Jersey Graduation Proficiency Assessment are provided in Appendix A of this document. The list of evidence statements is organized by item type and by claim.

Type I Items (Subclaims A and B):

1. **Machine-scored**
    - Technology-Enhanced (TE).
    - Multiple Choice and Multiple Select (MC and MS).
    - Fill in the blank (FIB) and Equation Editor (EE).
2. **Points**
    - 1.1 (Type I item, worth 1 point).
    - 1.2 (Type I item, worth 2 points).
3. **Single Prompt**
    - Worth 1 point or 2 points (EE only).
4. **Multiple Prompts**
    - Two prompts, each worth 1 point.
    - Both parts are related but are not dependent.

Type II Items (Subclaim C: Reasoning):

1. **Machine- and/or Human-scored**
    - Assesses the explanation/reasoning of a skill.
    - Each prompt must meet the Evidence Statement and cohere to the content clarifications and limitations.
    - At least 50% of the overall points must align to the reasoning/explanation of the evidence statement(s).

  - Must include 1 human-scored element that requires explanations of reasoning and/or other viable arguments.

2. **Points**
   - 2.3 (3 points) or 2.4 (4 points).
3. **Single Prompt** or **Multiple Prompts**
   - All parts must be related.

Type III Items (Subclaim D: Modeling):

1. **Machine- and/or Human-scored**
   - Solves real-world problems with a degree of difficulty appropriate to the grade/course.
   - Each part must meet the Evidence Statement and cohere to the content clarifications and limitations.
   - At least 50% of the total points must align to the modeling aspect of the evidence statement(s).
     - Must include 1 human-scored element that requires explanations of modeling and/or other viable arguments.
2. **Points**
   - 3.3 (3 points) or 3.6 (6 points).
3. **Single Prompt or Multiple Prompts**
   - All parts must be related.

The mathematics component of the assessment will involve three primary types of tasks: Type I, II, and III. Each task type is described based on several factors, principally the purpose of the task in generating evidence for certain subclaims.

Table 1: Overview of Task Types

Task Type	Description of Task Type
I. Tasks assessing **concepts, skills and procedures**	• Balance of conceptual understanding, fluency, and application. • Can involve any or all mathematical practice standards. • Machine scorable including innovative, computer-based formats. • Subclaims A and B.
II. Tasks assessing **expressing mathematical reasoning**	• Each task calls for written arguments/justifications, critique of reasoning, or precision in mathematical statements (MP.3, 6). • Can involve other mathematical practice standards. • May include a mix of machine-scored and hand-scored responses. • Subclaim C.

III. Tasks assessing **modeling/applications**	• Each task calls for modeling/application in a real-world context or scenario (MP.4). • Can involve other mathematical practice standards. • May include a mix of machine-scored and hand-scored responses. • Subclaim D.

Mathematics Blueprint

Table 2: Mathematics Blueprint for NJGPA

Item Types	Number of Items	Points
Type I Total	24	30 (16–18 points from Subclaim A, 12–14 points from Subclaim B)
Type I (1-point items)	18	18
Type I (2-point items)	6	12
Type II Total	3	10 (Subclaim C)
Type II (3-point items)	2	6
Type II (4-point items)	1	4
Type III Total	3	15 (Subclaim D)
Type III (3-point items)	1	3
Type III (6-point items)	2	12
Total of All Types	30	55

Table 3: Mathematics Assessment Unit and Time Structure

Assessment Structure	Unit 1	Unit 2
Description of Unit	Non-calculator & Calculator section	Calculator section
Time	90 minutes	90 minutes

Mathematics Tasks – Scoring Rules

A mathematics task can consist of a single prompt or multiple prompts. The scoring for an individual prompt is one of three types:

- Machine-scored.
- Equation Editor.
- Constructed Response.

Single-prompt tasks are scored as standalone prompts. Multiple-prompt tasks are scored by first scoring each individual prompt, and then summing the score for each prompt. In general, each prompt is scored independently of the other prompts. In limited cases, human-scored prompts and machine-scored tasks may include dependent scoring. This type of scoring is dependent on the scoring rules. The scoring for each type of prompt is outlined below:

Machine-scored Prompts: Machine-scored prompts consist of multiple-choice, multiple-select, fill-in-the-blank, and all technology-enhanced item types with the exception of equation editor. Machine-scored prompts are either right or wrong, and score for either 0 or 1 point for each prompt. This includes multiple select items and items with more than one drop-down menu.

Equation Editor Prompts: Equation editor answer response boxes are similar to what is shown below:

Equation editor prompts are configured so that students may type only numbers and mathematical symbols into the response area. Equation editor prompts are computer-scored by Pearson's Knowledge Technology group based on the rules outlined in the item's corresponding rubric. These prompts can score 0, 1, or 2 points, as specified by the rubric. Items can receive a point with an incorrect response for the first prompt and a correct response to the second prompt that is based on the incorrect response in the first prompt, as long as the scoring rules support this type of scoring.

Constructed Response Prompts: Constructed response answer boxes are similar to what is shown below:

Constructed response prompts are configured so that students may type text, numbers, and mathematical symbols into the response area. These prompts are human scored by Pearson's Performance Scoring group based on the rules outlined in the item's corresponding rubric. Point values for constructed response prompts range from 1 to 6 points, as specified by the rubric.

The total number of points for a task is mandated by the standard. The table below shows the allowable point values for the mathematics component of the NJGPA compared to the NJSLA for Algebra I and Geometry.

Table 5: Mathematics Item Types and Point Values by High School Assessment

Assessment	Type I Item Point Values	Type II and III Item Point Values
Algebra I NJSLA	1pt, 2pts, 4pts	3pts, 4pts, 6pts
Geometry NJSLA	1pt, 2pts	3pts, 4pts, 6pts
NJGPA	1pt, 2pts	3pts, 4pts, 6pts

Appendix A: Evidence Statements

Evidence statements describe the knowledge and skills that an assessment item/task elicits from students. These are derived directly from the standards and support the mathematics claims. They highlight the advances of the standards, especially around their focused coherent nature. The evidence statement keys for grades 3 through 8 will begin with the grade number. High school evidence statement keys will begin with “HS” or with the label for a conceptual category.

Evidence Statement Key

An Evidence Statement might:

1. **Use exact standard language.** For example:
    - 8.EE.1 **–** Know and apply the properties of integer exponents to generate equivalent numerical expressions. *For example,* $3^2 \times 3^{-5} = 3^{-3} = 1/3^3 = 1/27$. This example uses the exact language as standard 8.EE.1.

2. **Be derived by focusing on specific parts of a standard.** For example: 8.F.5-1 and 8.F.5-2 were derived from splitting standard 8.F.5:
    - 8.F.5-1 Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or decreasing, linear or nonlinear).
    - 8.F.5-2 Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

      Note: Together these two evidence statements are standard 8.F.5:

    Describe qualitatively the functional relationship between two quantities by analyzing a graph (e.g., where the function is increasing or 2 decreasing, linear or nonlinear). Sketch a graph that exhibits the qualitative features of a function that has been described verbally.

3. **Be integrative (Int) –** Integrative evidence statements allow for the testing of more than one of the standards on a single item/task without going beyond the standards to create new requirements. An integrative evidence statement might be integrated across all content within a grade/course, all standards in a high school conceptual category, all standards in a domain, or all standards in a cluster. For example:
    - **Grade/Course – 4.Int.2**[1] (Integrated across Grade 4).
    - **Conceptual Category – F.Int.1**[1] (Integrated across the Functions Conceptual Category).
    - **Domain – 4.NBT.Int.1**[1] (Integrated across the Number and Operations in Base Ten Domain).
    - **Cluster – 3.NF.A.Int.1**[1] (Integrated across the Number and Operations – Fractions Domain, Cluster A).

4. **Focus on mathematical reasoning –** A reasoning evidence statement (keyed with C) will state the type of reasoning that an item/task will require and the content scope from the standard that the item/task will require the student to reason about. For example:

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[1] The numbers at the end of the integrated, modeling and reasoning Evidence Statement keys are added for assessment clarification and tracking purposes. For example, 4.Int.2 is the second integrated Evidence Statement in Grade 4.

- 3.C.2[1] – Base explanations/reasoning on the relationship between addition and subtraction or the relationship between multiplication and division.
    - Content Scope: Knowledge and skills are articulated in 3.OA.6.
- 7.C.6.1[1] – Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures.
    - Content Scope: Knowledge and skills are articulated in 7.RP.2.

Note: When the focus of the evidence statement is on reasoning, the evidence statement may also require the student to reason about securely held knowledge from a previous grade.

5. **Focus on mathematical modeling –** A modeling evidence statement (keyed with D) will state the type of modeling that an item/task will require and the content scope from the standard that the item/task will require the student to model about. For example:

- 4.D.2[1] – Solve multi-step contextual problems with degree of difficulty appropriate to Grade 4 requiring application of knowledge and skills articulated in 3.OA.A, 3.OA.8, 3.NBT, and/or 3.MD.

Note: The example 4.D.2 is of an evidence statement in which an item/task aligned to the evidence statement will require the student to model on grade level, using securely held knowledge from a previous grade.

- HS.D.5[1] - Given an equation or system of equations, reason about the number or nature of the solutions.
    - Content Scope: A-REI.11, involving any of the function types measured in the standards

Algebra I Evidence Statements – Type I

Type I Items from Algebra I and Geometry Content = 30 of 55 points

Table 6: Algebra I Evidence Statements — Type I

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
A	A-APR.1-1	Add, subtract, and multiply polynomials.	i) The "understand" part of the standard is not assessed here; it is assessed under Subclaim C.	-	Z
B	A-APR.3-1	Identify zeros of quadratic and cubic polynomials in which linear and quadratic factors are available, and use the zeros to construct a rough graph of the function defined by the polynomial.	i) For example, find the zeros of $(x-2)(x^2-9)$. ii) Sketching graphs is limited to quadratics. iii) For cubic polynomials, at least one linear factor must be provided or one of the linear factors must be a GCF.	MP.7	N
A	A-CED.3-1	Solve multi-step contextual problems that require writing and analyzing systems of linear inequalities in two variables to find viable solutions.	i) Tasks have hallmarks of modeling as a mathematical practice (less defined tasks, more of the modeling cycle, etc.). ii) Scaffolding in tasks may range from substantial to very little or none.	MP.1, MP.2, MP.4	X
A	A-CED.4-1	Rearrange linear 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.*	i) Tasks have a real-world context. ii) The quantity of interest is linear in nature.	MP.2, MP.6, MP.7	Z
A	A-CED.4-2	Rearrange formulas that are quadratic in the quantity of interest to highlight the quantity of interest, using the same reasoning as in solving equations.	i) Tasks have a real-world context.	MP.2, MP.6, MP.7	Z
A	A-REI.3	Solve linear equations and inequalities in one variable, including equations with coefficients represented by letters.	i) Tasks do not include absolute value equations or compound inequalities.	MP.7	X
A	A-REI.4a-1	Solve quadratic equations in one variable. a) Use the method of completing the square to transform any quadratic equation in *x* into an equation of the form $(x-p)^2=q$ that has the same solutions.	i) The derivation part of the standard is not assessed here; it is assessed under Subclaim C.	MP.1, MP.7	X

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
A	A-REI.4b-1	Solve quadratic equations in one variable. b) 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.	i) Tasks should exhibit variety in initial forms. Examples of quadratic equations with real solutions: $t^2 = 49$, $3a^2 = 4$, $7 = x^2$, $r^2 = 0$, $\frac{1}{2}y^2 = \frac{1}{5}$, $y^2 - 8y + 15 = 0$, $2x^2 - 16x + 30 = 0$, $2p = p^2 + 1$, $t^2 = 4t$, $7x^2 + 5x - 3 = 0$, $\frac{3}{4}c(c - 1) = c$, $(3c - 2)^2 = 6x - 4$ ii) Methods are not explicitly assessed; strategy is assessed indirectly by presenting students with a variety of initial forms. iii) For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required; however, students will not be penalized if they simplify the radicals correctly. iv) Prompts integrate mathematical practices by not indicating that the equation is quadratic. (e.g., “Find all real solutions of the equation $t^2 = 4t$.”... not, “Solve the quadratic equation $t^2 = 4t$.”)	MP.5, MP.7	X
A	A-REI.4b-2	Solve quadratic equations in one variable. b) Recognize when the quadratic formula gives complex solutions.	i) Writing solutions in the form a ± bi is not assessed here. (Assessed under N-CN.7.)	MP.5, MP.7	X
B	A-REI.6-1	Solve multi-step contextual problems that require writing and analyzing systems of linear equations exactly and approximately (e.g., with graphs), focusing on pairs of linear equations in two variables.	i) Tasks have hallmarks of modeling as a mathematical practice (less defined tasks, more of the modeling cycle, etc.). ii) Scaffolding in tasks may range from substantial to very little or none.	MP.1, MP.2, MP.4	X
A	A-REI.10	Understand that the graph of an equation in two variables is the set of all its solutions plotted in the coordinate plane, often forming a curve (which could be a line).	-	MP.7	X
A	A-REI.11-1	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. Limit *f(x)* and/or *g(x)* to linear and quadratic functions.★	i) The “explain” part of standard A-REI.11 is not assessed here. For this aspect of the standard, see Subclaim C.	MP.1, MP.5	Y

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
A	A-REI.12	Graph the solutions to a linear inequality in two variables as a half-plane (excluding the boundary in the case of a strict inequality), and graph the solution set to a system of linear inequalities in two variables as the intersection of the corresponding half-planes.	-	MP.1, MP.5, MP.6	N
A	A-SSE.1-1	Interpret exponential expressions, including related numerical 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* $PP(1+rr)^{nn}$ *as the product of P and a factor not depending on P*.	i) See illustrations for A-SSE.1 at Illustrative Mathematics e.g., https://tasks.illustrativemathematics.org/content-standards/tasks/390.	MP.7	Z
A	A-SSE.1-2	Interpret quadratic 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.	i) See illustrations for A-SSE.1 at Illustrative Mathematics, e.g., https://tasks.illustrativemathematics.org/content-standards/tasks/90.	MP.7	Z
A	A-SSE.2-1	Use the structure of numerical expressions and polynomial expressions in one variable to identify ways to rewrite it.	i) Examples: Recognize 532 – 472 as a difference of squares and see an opportunity to rewrite it in the easier-to-evaluate form (53 + 47)(53 – 47). ii) Limit to problems intended to be solved with one step. iii) Tasks do not have a context.	MP.7	Z
A	A-SSE.2-4	Use the structure of a numerical expression or polynomial expression in one variable to rewrite it, in a case where two or more rewriting steps are required.	i) Example: Factor completely: $xx^{22} - 11 + (xx - 11)^{22}$. (A first iteration might give $(xx + 11)(xx - 11) + (xx - 11)^{22}$, which could be rewritten as $(xx - 11)(xx + 11 + xx - 11)$ on the way to factoring completely as $22xx(xx - 11)$. Or the student might first expand, as: $xx^{22} - 11 + xx^{22} - 22xx + 11$, rewriting as $22xx^{22} - 22xx$, then factoring as $22xx(xx - 11)$.) ii) Tasks do not have a real-world context.	MP.1, MP.7	Z

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
B	A-SSE.3a	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ a) Factor a quadratic expression to reveal the zeros of the function it defines.	i) The equivalent form must reveal the zeroes of the function. ii) Tasks require students to make the connection between the equivalent forms of the expression.	MP.7	Z
B	A-SSE.3b	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression.★ b) Complete the square in a quadratic expression to reveal the maximum or minimum value of the function it defines.	i) Tasks require students to make the connection between the equivalent forms of the expression.	MP.7	Z
B	A-SSE.3c-1	Choose and produce an equivalent form of an expression to reveal and explain properties of the quantity represented by the expression, where exponentials are limited to integer exponents.★ c) Use the properties of exponents to transform expressions for exponential functions.	i) Tasks have a real-world context. ii) The equivalent form must reveal something about the real-world context. iii) Tasks require students to make the connection between the equivalent forms of the expression.	MP.1, MP.2, MP.4, MP.7	X
B	F-BF.3-1	Identify the effect on the graph of replacing $ff(xx)$ by $ff(xx) + kk$, $kkff(xx)$, $ff(kkxx)$, and $ff(xx + kk)$ for specific values of *k* (both positive and negative); find the value of *k* given the graphs limiting the function types to linear and quadratic functions.	i) Tasks do not involve recognizing even and odd functions. ii) Experimenting with cases and illustrating an explanation are not assessed here. They are assessed under Subclaim C. iii) Tasks may involve more than one transformation.	MP.3, MP.5, MP.7	X
B	F-BF.3-4	Identify the effect on the graph of a quadratic function of replacing $ff(xx)$ by $ff(xx) + kk$, $kkff(xx)$, $ff(kkxx)$, and $ff(xx + kk)$ for specific values of *k* (both positive and negative); find the value of *k* given the graphs. Experiment with cases using technology.	i) Illustrating an explanation is not assessed here. Explanations are assessed under Subclaim C.	MP.3, MP.5, MP.8	X
A	F-IF.1	Understand that a function from one set (called the domain) to another set (called the range) assigns to each element of the domain exactly one element of the range. If *f* is a function and *x* is an element of its domain, then $ff(xx)$ denotes the output of *f* corresponding to the input *x*. The graph of *f* is the graph of the equation $yy = ff(xx)$.	-	MP.2	Z

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
A	F-IF.2	Use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a context.	i) See illustrations for F-IF.2 at Illustrative Mathematics.	MP.6, MP.7	X
A	F-IF.4-1	For a linear or quadratic 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; end behavior; and symmetries.*★	i) See illustrations for F-IF.4 at Illustrative Mathematics e.g., https://tasks.illustrativemathematics.org/content-standards/tasks/649, https://tasks.illustrativemathematics.org/content-standards/tasks/637, https://tasks.illustrativemathematics.org/content-standards/tasks/639.	MP.4, MP.6	X
A	F-IF.5-1	Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to linear functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute-value functions), and exponential functions with domains in the integers. *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 this function.*★	i) Tasks have a real-world context.	MP.2	Z
A	F-IF.5-2	Relate the domain of a function to a graph and, where applicable, to the quantitative relationship it describes, limiting to quadratic functions. *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 this function.*★	i) Tasks have a real-world context.	MP.2	Z
A	F-IF.6-1a	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to linear, exponential (with domains in the integers), and quadratic functions.★	i) Tasks have a real-world context. ii) Tasks must include the interpret part of the evidence statement.	MP.1, MP.4, MP.5, MP.7	X

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
A	F-IF.6-1b	Calculate and interpret the average rate of change of a function (presented symbolically or as a table) over a specified interval with functions limited to square root, cube root, and piecewise-defined (including step and absolute value functions) functions.★	i) Tasks have a real-world context. ii) Tasks must include the interpret part of the evidence statement.	MP.1, MP.4, MP.5, MP.7	X
A	F-IF.6-6a	Estimate the rate of change from a graph of linear functions and quadratic functions.★	i) Tasks have a real-world context.	MP.1, MP.4, MP.5, MP.7	X
A	F-IF.6-6b	Estimate the rate of change from a graph of linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and/or exponential functions with domains in the integers.★	i) Tasks have a real-world context.	MP.1, MP.4, MP.5, MP.7	X
B	F-IF.7a-1	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 functions and show intercepts.	-	MP.1, MP.5, MP.6	X
B	F-IF.7a-2	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 quadratic functions and show intercepts, maxima, and minima.	-	MP.1, MP.5, MP.6	X
B	F-IF.7b	Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.★ b) Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.	i) Discontinuities are allowed as key features of the graph.	MP.1, MP.5, MP.6	X

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
B	F-IF.8a	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.	i) Tasks have a real-world context.	MP.2	Y
B	F-IF.9-1	Compare properties of two functions each represented in a different way (algebraically, 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.* Function types should be limited to linear functions, quadratic functions, square root functions, cube root functions, piecewise-defined functions (including step functions and absolute value functions), and exponential functions with domains in the integers.	i) Tasks may have a real-world context.	MP.1, MP.3, MP.5, MP.6, MP.8	X
A	F-IF.A.Int.1	Understand the concept of a function and use function notation.	i) Tasks require students to use function notation, evaluate functions for inputs in their domains, and interpret statements that use function notation in terms of a real-world context. ii) About a quarter of tasks involve functions defined recursively on a domain in the integers.	MP.2	X
B	F-LE.2-1	Construct linear 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).	i) Tasks are limited to constructing linear and exponential functions with domains in the integers, in simple real-world context (not multi-step).	MP.1, MP.2, MP.5	X
B	F-LE.2-2	Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing linear and/or exponential function models, where exponentials are limited to integer exponents.★	i) Prompts describe a scenario using everyday language. Mathematical language such as "function," "exponential," etc. is not used. ii) Students autonomously choose and apply appropriate mathematical techniques without prompting. For example, in a situation of doubling, they apply techniques of exponential functions.	MP.1, MP.2, MP.4, MP.6	X

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
Ψ	F-Int.1-1	Given a verbal description of a linear or quadratic functional dependence, write an expression for the function and demonstrate various knowledge and skills articulated in the Functions category in relation to this function.	i) Given a verbal description of a functional dependence, the student would be required to write an expression for the function and then, e.g., identify a natural domain for the function given the situation; use a graphing tool to graph several input-output pairs; select applicable features of the function, such as linear, increasing, decreasing, quadratic, nonlinear; and find an input value leading to a given output value. – e.g., a functional dependence might be described as follows: "The area of a square is a function of the length of its diagonal." The student would be asked to create an expression such as $ff(xx) = \frac{1}{2}xx^2$ for this function. The natural domain for the function would be the positive real numbers. The function is increasing and nonlinear. And so on. – e.g., a functional dependence might be described as follows: "The slope of the line passing through the points (1, 3) and (7, y) is a function of y." The student would be asked to create an expression such as $ss(yy) = (3 - yy)/(1 - 7)$ for this function. The natural domain for this function would be the real numbers. The function is increasing and linear. And so on.	MP.1, MP.2, MP.8	X
Ψ	S-ID.Int.1	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to linear functions and exponential functions with domains in the integers.	i) Tasks should go beyond 6.SP.4. ii) For tasks that use bivariate data, limit the use of time series. Instead use data that may have variation in the y-values for given x-values, such as pre- and post-test scores, height and weight, etc. iii) Predictions should not extrapolate far beyond the set of data provided. iv) Line of best fit is always based on the equation of the least squares regression line either provided or calculated through the use of technology. v) To investigate associations, students may be asked to evaluate scatter plots that may be provided or created using technology. Evaluation includes shape, direction, strength, presence of outliers, and gaps. vi) Analysis of residuals may include the identification of a pattern in a residual plot as an indication of a poor fit.	MP.1, MP.2, MP.4, MP.5, MP.6	Y

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
Ψ	S-ID.Int.2	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in S-ID, excluding normal distributions and limiting function fitting to quadratic, linear, and exponential (with domains in the integers) functions with an emphasis on quadratic functions.	i) Tasks should go beyond 6.SP.4. ii) For tasks that use bivariate data, limit the use of time series. Instead use data that may have variation in the y-values for given x-values, such as pre- and post-test scores, height and weight, etc. iii) Predictions should not extrapolate far beyond the set of data provided. iv) To investigate associations, students may be asked to evaluate scatter plots that may be provided or created using technology. Evaluation includes shape, direction, strength, presence of outliers, and gaps. v) Analysis of residuals may include the identification of a pattern in a residual plot as an indication of a poor fit. Quadratic models may assess minimums/maximums, intercepts, etc.	MP.1, MP.2, MP.4, MP.5, MP.6	Y
B	S-ID.5	Summarize categorical data for two categories in two-way frequency tables. Interpret relative frequencies in the context of the data (including joint, marginal, and conditional relative frequencies). Recognize possible associations and trends in the data.	i) Tasks must have at least one of the categorical variables with more than two sub-categories. ii) "Total" rows and columns will be provided but may be missing the data. iii) Associations should be investigated based on relative frequencies, not counts.	MP.1, MP.5, MP.7	Y
B	N-RN.B-1	Apply properties of rational and irrational numbers to identify rational and irrational numbers.	i) Tasks should go beyond asking students to only identify rational and irrational numbers. ii) This evidence statement is aligned to the cluster heading. This allows other cases besides the three cases listed in N-RN.3 to be assessed. iii) Quotients of rational and irrational numbers can be assessed.	MP.6	N

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
Ψ	HS-Int.1	Solve multi-step contextual problems with degree of difficulty appropriate to the course by constructing quadratic function models and/or writing and solving quadratic equations.	i) A scenario might be described and illustrated with graphics (or even with animations in some cases). ii) Solutions may be given in the form of decimal approximations. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required; however, students will not be penalized if they simplify the radicals correctly. Some examples: – A company sells steel rods that are painted gold. The steel rods are cylindrical in shape and 6 cm long. Gold paint costs $0.15 per square inch. Find the maximum diameter of a steel rod if the cost of painting a single steel rod must be $0.20 or less. You may answer in units of centimeters or inches. Give an answer accurate to the nearest hundredth of a unit. – As an employee at the Gizmo Company, you must decide how much to charge for a gizmo. Assume that if the price of a single gizmo is set at P dollars, then the company will sell $1000 - 0.2PP$ gizmos per year. Write an expression for the amount of money the company will take in each year if the price of a single gizmo is set at P dollars. What price should the company set in order to take in as much money as possible each year? How much money will the company make per year in this case? How many gizmos will the company sell per year? (Students might use graphical and/or algebraic methods to solve the problem.) – At $tt = 0$, a car driving on a straight road at a constant speed passes a telephone pole. From then on, the car's distance from the telephone pole is given by $CC(tt) = 30tt$, where t is in seconds and C is in meters. Also at $tt = 0$, a motorcycle pulls out onto the road, driving in the same direction, initially 90 m ahead of the car. From then on, the motorcycle's distance from the telephone pole is given by $MM(tt) = 90 + 2.5\,tt^2$, where t is in seconds and M is in meters. At what time t does the car catch up to the motorcycle? Find the answer by setting C and M equal. How far are the car and the motorcycle from the telephone pole when this happens? (Students might use graphical and/or algebraic methods to solve the problem.)	MP.1, MP.2, MP.4, MP.5, MP.6	Y

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
Ψ	HS-Int.2	Solve multi-step mathematical problems with degree of difficulty appropriate to the course that requires analyzing quadratic functions and/or writing and solving quadratic equations.	i) Tasks do not have a real-world context. ii) Exact answers may be required or decimal approximations may be given. Students might choose to take advantage of the graphing utility to find approximate answers or clarify the situation at hand. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required. Some examples: – Given the function $f(x) = x^2 + x$, find all values of *k* such that $f(3 - k) = f(3)$. (Exact answers are required.) – Find a value of *c* so that the equation $2x^2 - cx + 1 = 0$ has a double root. Give an answer accurate to the tenths place.	MP.1, MP.2, MP.5, MP.6	Y
Ψ	HS-Int.3-1	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, A-CED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.★	i) F-LE.A, Construct and compare linear, quadratic, and exponential models and solve problems, is the primary content and at least one of the other listed content elements will be involved in tasks as well.	MP.2, MP.4	Y
Ψ	HS-Int.3-2	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-LE, A-CED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear, quadratic, and exponential functions.★	i) F-LE.A, Construct and compare linear, quadratic, and exponential models and solve problems, is the primary content and at least one of the other listed content elements will be involved in tasks as well. For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required; however, students will not be penalized if they simplify the radicals correctly.	MP.2, MP.4	Y

★ Modeling standards appear throughout the high school standards. Evidence statements addressing these modeling standards are indicated by a star symbol (★)

Ψ These integrated evidence statements support the Graduation Ready Master Claim.

*Calculator Key:

Y – Yes; Assessed on Calculator Section
X – Calculator is Specific to Item
N – No; Assessed on Non-Calculator Sections
Z – Calculator Neutral (Could Be on Calculator or Non-Calculator Sections)

Algebra I Evidence Statements – Type II

Type II Items from Algebra I and Geometry Content = 10 of 55 points

Table 7: Algebra I Evidence Statements — Type II

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
C	HS-C.2.1	Base explanations/reasoning on the properties of rational and irrational numbers. Content Scope: N-RN.3	i) For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required; however, students will not be penalized if they simplify the radicals correctly.	MP.3	Y
C	HS-C.5.5	Given an equation or system of equations, reason about the number or nature of the solutions. Content Scope: A-REI.4a, A-REI.4b, limited to real solutions only.	-	MP.3	Y
C	HS-C.5.6	Given a system of equations, reason about the number or nature of the solutions. Content Scope: A-REI.5	i) In a system of linear equations, if the two given equations are simultaneous, the solution could be described by students as infinitely many solutions, infinitely many solutions on the line, or all real numbers on the line. A solution of "all real numbers" alone is not sufficient for credit because all points in space are not solutions, only the points on the line.	MP.3	Y
C	HS-C.5.10-1	Given an equation or system of equations, reason about the number or nature of the solutions. Content Scope: A-REI.11, limited to equations of the form $f(x) = g(x)$ where f and g are linear or quadratic.	-	MP.3	Y
C	HS-C.6.1	Base explanations/reasoning on the principle that the graph of an equation and inequalities in two variables is the set of all its solutions plotted in the coordinate plane. Content Scope: A-REI.D, excluding exponential and logarithmic functions.	-	MP.3	Y
C	HS-C.8.1	Construct, autonomously, chains of reasoning that will justify or refute algebraic propositions or conjectures. Content Scope: A-APR.1	-	MP.3	Y

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
C	HS-C.9.1	Express reasoning about transformations of functions. Content Scope: F-BF.3, limited to linear and quadratic functions. Tasks will not involve ideas of even or odd functions.	-	MP.3	Y
C	HS-C.10.1	Express reasoning about linear and exponential growth. Content Scope: F-LE.1a	-	MP.3	Y
C	HS-C.12.1	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about functions. Content Scope: F-IF.8a	i) Tasks involve using algebra to prove properties of given functions. For example, prove algebraically that the function $h(t) = t(t-1)$ has minimum value $\frac{1}{4}$; prove algebraically that the graph of $g(x) = x^2 - x + \frac{1}{4}$ is symmetric about the line $x = \frac{1}{2}$; prove that $x^2 + 1$ is never less than $-2x$. ii) Scaffolding is provided to ensure tasks have appropriate level of difficulty. (For example, the prompt could show the graphs of $x^2 + 1$ and $-2x$ on the same set of axes, and say, "From the graph, it looks as if $x^2 + 1$ is never less than $-2x$. In this task, you will use algebra to prove it." And so on, perhaps with additional hints or scaffolding.) iii) Tasks may have a mathematical or real-world context.	MP.3	Y
C	HS-C.16.2	Given an equation or system of equations, present the solution steps as a logical argument that concludes with the set of solutions (if any). Tasks are limited to quadratic equations. Content Scope: A-REI.1, A-REI.4a, A-REI.4b, limited to real solutions only.	-	MP.3, MP.6	Y
C	HS-C.18.1	Construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about linear equations in one or two variables. Content Scope: 8.EE.B	i) For both Algebra1 and Math 1, we are revisiting content initially introduced in grade 8, from a more mature reasoning perspective.	MP.3, MP.6	Y

*Calculator Key:
Y – Yes; Assessed on Calculator Section
X – Calculator is Specific to Item
N – No; Assessed on Non-Calculator Sections
Z – Calculator Neutral (Could Be on Calculator or Non-Calculator Sections

Algebra I Evidence Statements – Type III

Type III Items from Algebra I and Geometry Content = 15 of 55 points

Table 8: Algebra I Evidence Statements — Type III

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
D	HS-D.1-1	Solve multi-step contextual problems with degree of difficulty appropriate to the course, requiring application of knowledge and skills articulated in 7.RP.A, 7.NS.3, 7.EE, and/or 8.EE.	-	MP.4, may involve MP 1, MP.2, MP.5	Y
D	HS-D.2-5	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear equations and exponential equations with integer exponents.	i) A-CED is the primary content; other listed content elements may be involved in tasks as well.	MP.2, MP.4	Y
D	HS-D.2-6	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in A-CED, N-Q.2, A-SSE.3, A-REI.6, A-REI.12, A-REI.11-1, limited to linear and quadratic equations.	i) A-CED is the primary content; other listed content elements may be involved in tasks as well.	MP.2, MP.4	Y
D	HS-D.2-8	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, A-CED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear functions and exponential functions with domains in the integers.	i) F-BF.1a is the primary content; other listed content elements may be involved in tasks as well.	MP.2, MP.4	Y
D	HS-D.2-9	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in F-BF.1a, F-BF.3, A-CED.1, A-SSE.3, F-IF.B, F-IF.7, limited to linear and quadratic functions.	i) F-BF.1a is the primary content; other listed content elements may be involved in tasks as well.	MP.2, MP.4	Y
D	HS-D.3-1a	Micro-models: Autonomously apply a technique from pure mathematics to a real-world situation in which the technique yields valuable results even though it is obviously not applicable in a strict mathematical sense (e.g., profitably applying proportional relationships to a phenomenon that is obviously nonlinear or statistical in nature). Content Scope: Knowledge and skills articulated in the Algebra I Type I, Subclaim A Evidence Statements.	-	MP.4, may involve MP 1, MP.2, MP.5, MP.7	Y
D	HS-D.3-3a	Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity. Content Scope: Knowledge and skills articulated in the Algebra I Type I, Subclaim A Evidence Statements.	-	MP.4, may involve MP 1, MP.2, MP.5, MP.7	Y

*Calculator Key:
Y – Yes; Assessed on Calculator Section
X – Calculator is Specific to Item
N – No; Assessed on Non-Calculator Sections
Z – Calculator Neutral (Could Be on Calculator or Non-Calculator Sections

Geometry Evidence Statements – Type I

Type I Items from Algebra I and Geometry Content = 30 of 55 points

Table 9: Geometry Evidence Statements — Type I

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
B	G-C.2	Identify and describe relationships among inscribed angles, radii, and chords and apply these concepts in problem solving situations.	i) Include the relationship between central, inscribed, and circumscribed angles: inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle. ii) This does not include angles and segment relationships with tangents and secants. Tasks will not assess angle relationships formed outside the circle using secants and tangents. ii) Tasks may involve the degree measure of an arc.	MP.1, MP.5	X
B	G-C.B	Find arc lengths and areas of sectors of circles.	i) Tasks involve computing arc lengths or areas of sectors given the radius and the angle subtended; or vice versa.	-	X
B	G-CO.1	Know precise definitions of angle, circle, perpendicular line, parallel line, and line segment, based on the undefined notions of point, line, distance along a line, and distance around a circular arc.	i) Definitions are limited to those in the evidence statement. ii) Plane is also considered an undefined notion.	MP.6	Z
B	G-CO.3	Given a rectangle, parallelogram, trapezoid, or regular polygon, describe the rotations and reflections that carry it onto itself.	-	MP.5, MP.6, MP.7	Z
B	G-CO.5	Given a geometric figure and a rotation, reflection, or translation, draw the transformed figure using, e.g., graph paper, tracing paper, or geometry software. Specify a sequence of transformations that will carry a given figure onto another.	-	MP.5, MP.6, MP.7	Z
A	G-CO.6	Use geometric descriptions of rigid motions to transform figures and to predict the effect of a given rigid motion on a given figure; given two figures, use the definition of congruence in terms of rigid motions to decide if they are congruent.	-	MP.3	Z

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
A	G-CO.C	Prove geometric theorems as detailed in G-CO.C.	i) About 75% of tasks align to G.CO.9 or G.CO.10. ii) Theorems include but are not limited to the examples listed in standards G-CO.9,10,11. iii) Multiple types of proofs are allowed (e.g., two-column proof, indirect proof, paragraph proof, flow diagrams, proofs by contradictions).	MP.3, MP.6	Z
B	G-CO.D	Make and understand geometric constructions as detailed in G-CO.D.	i) About 75% of tasks align to G.CO.12. ii) Tasks may include requiring students to justify steps and results of a given construction.	MP.3, MP.5, MP.6	Z
B	G-GMD.1	Give an informal argument for the formulas for the circumference of a circle, area of a circle, volume of a cylinder, pyramid, and cone. Use dissection arguments, Cavalieri's principle, and informal limit arguments.	-	MP.3, MP.6, MP.7	Z
B	G-GMD.3	Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems. ★	-	MP. 4	X
B	G-GMD.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.	i) If the cross section is a conic section, it will be limited to circles, ellipses, and parabolas. (It will not include hyperbolas.)	MP.7	Z
B	G-GPE.1-1	Complete the square to find the center and radius of a circle given by an equation.	i) The "derive" part of standard G-GPE.1 is not assessed here.	MP.6	Z
B	G-GPE.1-2	Understand or complete a derivation of the equation of a circle of given center and radius using the Pythagorean Theorem; complete the square to find the center and radius of a circle given by an equation.	i) Tasks must go beyond simply finding the center and radius of a circle.	MP.6	Z
A	G-GPE.6	Find the point on a directed line segment between two given points that partitions the segment in a given ratio.	-	MP.1, MP.5	X
A	G-SRT.1a	Verify experimentally the properties of dilations given by a center and a scale factor. a) A dilation takes a line not passing through the center of the dilation to a parallel line, and leaves a line passing through the center unchanged.	-	MP.1, MP.3, MP.5, MP.8	Z
A	G-SRT.1b	Verify experimentally the properties of dilations given by a center and a scale factor. b) The dilation of a line segment is longer or shorter in the ratio given by the scale factor.	-	MP.1, MP.3, MP.5, MP.8	Z

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
A	G-SRT.2	Given two figures, use the definition of similarity in terms of similarity transformations to decide if they are similar.	i) The "explain" part of standard G-SRT.2 is not assessed here.See Subclaim C for this aspect of the standard.	MP.7	Z
A	G-SRT.5	Use congruence and similarity criteria for triangles to solve problems and to prove relationships in geometric figures.	i) For example, find a missing angle or side in a triangle.	MP.7	Z
A	G-SRT.6	Understand that by similarity, side ratios in right triangles are properties of the angles in the triangle, leading to definitions of trigonometric ratios for acute angles.	i) Trigonometric ratios include sine, cosine, and tangent only.	MP.7	Z
A	G-SRT.7-2	Use the relationship between the sine and cosine of complementary angles.	i) The "explain" part of standard G-SRT.7 is not assessed here. See Subclaim C for this aspect of the standard.	MP.7	Z
A	G-SRT.8 (1.1)	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems.	i) The task may have a real world or mathematical context. ii) For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required; however, students will not be penalized if they simplify the radicals correctly.	MP.1, MP.2, MP.5,MP.6	X
A	G-SRT.8 (1.2, 1.4)	Use trigonometric ratios and the Pythagorean Theorem to solve right triangles in applied problems. ★	i) Tasks have multiple steps. ii) The task may have a real world or mathematical context. iii) For rational solutions, exact values are required. For irrational solutions, exact or decimal approximations may be required. Simplifying or rewriting radicals is not required; however, students will not be penalized if they simplify the radicals correctly.	MP.1, MP.2, MP.4,MP.5, MP.6	Y
A	G-Int.1	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in G-MG and G-GPE.7.	i) MG is the primary content. ii) See examples at http://tasks.illustrativemathematics.org/HSG for G-MG.	MP.1, MP.2, MP.4,MP.5, MP.6	X

★ Modeling standards appear throughout the high school standards. Evidence statements addressing these modeling standards are indicated by a star symbol (★)

*Calculator Key:
Y – Yes; Assessed on Calculator Sections
N – No; Assessed on Non-Calculator Sections
X – Calculator is Specific to Item
Z – Calculator Neutral (Could Be on Calculator or Non-Calculator Sections)

Geometry Evidence Statements – Type II

Type II Items from Algebra I and Geometry Content = 10 of 55 points

Table 10: Geometry Evidence Statements — Type II

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
C	HS-C.13.1	Apply geometric reasoning in a coordinate setting, and/or use coordinates to draw geometric conclusions. Content Scope: G-GPE.6, G-GPE.7	-	MP.3	Y
C	HS-C.13.2	Apply geometric reasoning in a coordinate setting, and/or use coordinates to draw geometric conclusions. Content Scope: G-GPE.4	-	MP.3	Y
C	HS-C.13.3	Apply geometric reasoning in a coordinate setting, and/or use coordinates to draw geometric conclusions. Content Scope: G-GPE.5	-	MP.3	Y
C	HS-C.14.1	Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures. Content Scope: G-CO.9, G-CO.10	i) Theorems include, but are not limited to, the examples listed in standards G-CO.9 & G-CO.10.	MP.3	Y
C	HS-C.14.2	Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures. Content Scope: G-CO.A, G-CO.B	-	MP.3	Y
C	HS-C.14.3	Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures. Content Scope: G-CO.D	-	MP.3	Y
C	HS-C.14.5	Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures. Content Scope: G-SRT.A	-	MP.3	Y
C	HS-C.14.6	Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures. Content Scope: G-SRT.B	-	MP.3	Y

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
C	HS-C.15.14	Present solutions to multi-step problems in the form of valid chains of reasoning, using symbols such as equals signs appropriately (for example, rubrics award less than full credit for the presence of nonsense statements such as 1 + 4 = 5 + 7 = 12, even if the final answer is correct), or identify or describe errors in solutions to multi-step problems and present corrected solutions. Content Scope: G-SRT.C	-	MP.3, MP.6	Y
C	HS-C.18.2	Use a combination of algebraic and geometric reasoning to construct, autonomously, chains of reasoning that will justify or refute propositions or conjectures about geometric figures. Content scope: Algebra content from Algebra I course; geometry content from the Geometry course.	i) For the Geometry course, we are reaching back to Algebra Ito help students synthesize across the two subjects.	MP.3, MP.6	Y

★ Modeling standards appear throughout the high school standards. Evidence statements addressing these modeling standards are indicated by a star symbol (★)

*Calculator Key:
Y – Yes; Assessed on Calculator Sections
N – No; Assessed on Non-Calculator Sections
X – Calculator is Specific to Item
Z – Calculator Neutral (Could Be on Calculator or Non-Calculator Sections)

Geometry Evidence Statements – Type III

Type III Items from Algebra I and Geometry Content = 15 of 55 points

Table 11: Geometry Evidence Statements — Type III

Subclaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MPs	Calculator*
D	HS-D.1-2	Solve multi-step contextual problems with degree of difficulty appropriate to the course, requiring application of knowledge and skills articulated in 6.G, 7.G, and/or8.G.	-	MP.4, may involve MP.1, MP.2, MP.5,	Y
D	HS-D.2-1	Solve multi-step contextual problems with degree of difficulty appropriate to the course involving perimeter, area, or volume that require solving a quadratic equation.	i) Tasks do not cue students to the type of equation or specific solution method involved in the task. For example: An artist wants to build a right-triangular frame in which one of the legs exceeds the other in length by 1 unit, and in which the hypotenuse exceeds the longer leg in length by 1 unit. Use algebrato show that there is one and only one such right triangle and determine its side lengths.	MP.1, MP.4, MP.5	Y
D	HS-D.2-2	Solve multi-step contextual problems with degree of difficulty appropriate to thecourse involving perimeter, area, or volume that require finding an approximate solution to a polynomial equation using numerical/graphical means.	i) Tasks may have a real world or mathematical context. ii) Tasks may involve coordinates (G-GPE.7). iii) Refer to A-REI.11 for some of the content knowledge from the previous course relevant to these tasks. iv) Cubic polynomials are limited to polynomials in which linear and quadratic factors are available. v) To make the tasks involve strategic use of tools (MP.5), calculation and graphing aids are available but tasks do not prompt the student to use them.	MP.1, MP.4, MP.5	Y

D	HS-D.2-11	Solve multi-step contextual word problems with degree of difficulty appropriate to the course, requiring application of course-level knowledge and skills articulated in G- SRT.8, involving right triangles in an applied setting.	i) Tasks may, or may not, require the student to autonomously make an assumption or simplification in order to apply techniques of right triangles. For example, a configuration of three buildings might form a triangle that is nearly, but not quite, a right triangle; then, a good approximate result can be obtained if the student autonomously approximates the triangle as a right triangle.	MP.2, MP.4	Y
D	HS-D.3-2a	Micro-models: Autonomously apply a technique from pure mathematics to a real- world situation in which the technique yields valuable results even though it is obviously not applicable in a strict mathematical sense (e.g., profitably applying proportional relationships to a phenomenon that is obviously nonlinear or statistical in nature). Content Scope: Knowledge and skills articulated in the Geometry Type I, Subclaim A Evidence Statements.	-	MP.4, may involve MP.1, MP.2, MP.5, MP.7	Y
D	HS-D.3-4a	Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity. Content Scope: Knowledge and skills articulated in the Geometry Type I, Subclaim A Evidence Statements.	-	MP.4, may involve MP.1, MP.2, MP.5, MP.7	Y

*Calculator Key:

Y – Yes; Assessed on Calculator Sections

N – No; Assessed on Non-Calculator Sections

X – Calculator is Specific to Item

Z – Calculator Neutral (Could Be on Calculator or Non-Calculator Sections)