

CMAS Geometry Evidence Statements

(Based on PARCC)

Colorado will continue to use the Evidence Statements that were developed in collaboration with the Partnership for Assessment of Readiness for College and Careers (PARCC) consortium. Evidence statements describe the knowledge and skills that an assessment item/task elicits from students.

The evidence statement keys for grades 3 through 8 begin with the grade number. Together, the five different types of evidence statements described below provide the foundation for ensuring that the full range and depth of the standards are assessed.

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.

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 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[§]** (Integrated across Grade 4)
- **Conceptual Category – F.Int.1[§]** (Integrated across the Functions Conceptual Category)
- **Domain – 4.NBT.Int.1[§]** (Integrated across the Number and Operations in Base Ten Domain)
- **Cluster – 3.NF.A.Int.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:

- 3.C.2[§] -- 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[§] – 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[§] – 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[§] - 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.

[§] 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.

CMAS Geometry Evidence Statements
Listing by Type 1, Type II, and Type III

The Evidence Statements for Geometry are provided starting on the next page. The list has been organized to indicate whether items designed are aligned to an Evidence Statement used for Type I items, Type II items (reasoning), or Type III items (modeling).

Evidence Statements are presented in the order shown below and are color coded:

Peach – Evidence Statement is applicable to Type I items.

Lavender – Evidence Statement is applicable to Type II items.

Aqua – Evidence Statement is applicable to Type III items.

SubClaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MP	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. iii.) 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
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, and flow diagrams).	MP.3, MP.6	Z

SubClaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MP	Calculator
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. <i>Use dissection arguments, Cavalieri's principle, and informal limit arguments.</i>	-	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 MP	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 Sub-Claim 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 Sub-Claim C for this aspect of the standard.	MP.7	Z
A	G-SRT.8	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. 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, P.2, MP.5, MP.6	X
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 https://www.illustrativemathematics.org/ for G-MG.	MP.1, MP.2, P.4, MP.5, MP.6	X

*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)

SubClaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MP	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 MP	Calculator
C	HS.C.15.14	<p>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.</p> <p>Content scope: G-SRT.C</p>	-	MP.3, MP.6	Y
C	HS.C.18.2	<p>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.</p> <p>Content scope: Algebra content from Algebra 1 course; geometry content from the Geometry course.</p>	i.) For the Geometry course, we are reaching back to Algebra 1 to help students synthesize across the two subjects.	MP.3, MP.6	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)

SubClaim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MP	Calculated
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/or 8.G.	-	MP 4, may involve MP.1, MP.2, MP.5, MP.7	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.	<p>i.) Tasks do not cue students to the type of equation or specific solution method involved in the task.</p> <p>For example:</p> <p>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 algebra to show that there is one and only one such right triangle, and determine its side lengths.</p>	MP.1, MP.4, MP.5	Y
D	HS.D.2-2	Solve multi-step contextual problems with degree of difficulty appropriate to the course involving perimeter, area, or volume that require finding an approximate solution to a polynomial equation using numerical/graphical means.	<p>i.) Tasks may have a real world or mathematical context.</p> <p>ii.) Tasks may involve coordinates (G-GPE.7).</p> <p>iii.) Refer to A-REI.11 for some of the content knowledge from the previous course relevant to these tasks.</p> <p>iv.) Cubic polynomials are limited to polynomials in which linear and quadratic factors are available</p> <p>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.</p>	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.	<p>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.</p>	MP.2, MP.4	Y

Sub-Claim	Evidence Statement Key	Evidence Statement Text	Clarifications, limits, emphases, and other information intended to ensure appropriate variety in tasks	Relationship to MP	Calculator
D	HS.D.3-2a	<p>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).</p> <p>Content Scope: Knowledge and skills articulated in the Geometry Type I, Sub-Claim A Evidence Statements.</p>	-	MP 4, may involve MP.1, MP.2, MP.5, MP.7	Y
D	HS.D.3-4a	<p>Reasoned estimates: Use reasonable estimates of known quantities in a chain of reasoning that yields an estimate of an unknown quantity.</p> <p>Content Scope: Knowledge and skills articulated in the Geometry Type I, Sub-Claim A Evidence Statements.</p>	-	MP 4, may involve MP.1, MP.2, MP.5, MP.7	Y

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