Inspect

CCR Performance Task

Geometry: Constructions

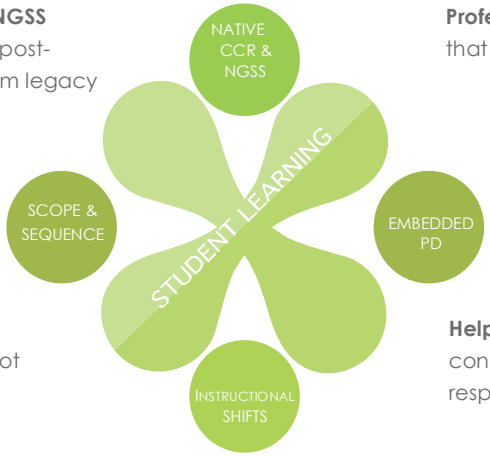
Inspect offers the following assessment products:

Content Bank for English/Language Arts and Math Grades 2 – High School	▪ More than 36,000 items ▪ More 1500 complex texts, including authentic permissioned texts ▪ Includes Literacy in History, Social Science, Science, and Technical Subjects
Quick Checks for English/Language Arts and Math Grades 2 – High School	▪ Fixed-form assessments with five to seven items including constructed response ▪ Key instructional concepts embedded in standards (clusters for Math, staircase of text complexity for ELA)
Focused Interim Assessments for English/Language Arts and Math Grades 3 – High School	▪ Prebuilt assessments with up to 15 items that focus on groups of related standards within a Claim or domain ▪ More focused than summative assessments ▪ Flexible and customizable ▪ Mirrors SBAC IAB blueprints
NGSS Formative Assessments Grades 5 – High School	▪ Prebuilt assessments with items linked to experimental contexts that assess the three dimensions of science learning ▪ Flexible and customizable ▪ Addresses the California Course Models and NGSS Bundles
Observational Tasks for English/Language Arts and Math Grades K - 1	▪ Developmentally appropriate for individual students and small groups

Inspect Assessment Content is available through a variety of assessment administration and data analysis platforms.

Inspect assessment content offers these benefits:

Native college- and career-ready and NGSS content prepares students to meet their post-secondary goals. Content re-aligned from legacy standards cannot do this.



Professional development embedded within content that

- shows the relationship between specific skills and higher-order thinking
- includes authentic, permissioned texts of appropriate complexity
- and documents student progress using DOK and learning progressions

Content that addresses your scope and sequence so that your assessments do not waste valuable instruction time

Help for teachers addressing the instructional shifts with content that elicits evidence of learning from each response

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CCR Performance Tasks

Geometry: Constructions

Student Test Booklet

Name:

Student Rubric

This problem is meant to test if you can:
- Use a straightedge and compass to copy a line segment, construct an equilateral triangle, and construct an inscribed hexagon;
- Describe how the constructions are related to each other.

Your teacher will rate your answer as a level 4, 3, 2, 1, or 0. The descriptions below explain the types of answers expected at each level.

Level 4:
Your answer is correct and complete. Your answer includes:
- A correct copy of a line segment, with construction marks shown;
- A correct construction of an equilateral triangle, with construction marks shown;
- A correct construction of an inscribed hexagon, with construction marks shown;
- A correct and complete description of how the constructions are related and how they use the same basic techniques.

Level 3:
Your answer is correct but your explanation is incomplete. Your answer includes:
- A correct copy of a line segment, with construction marks shown;
- A correct construction of an equilateral triangle, with construction marks shown;
- A correct construction of an inscribed hexagon, with construction marks shown;
- An incomplete description of how the constructions are related and how they use the same basic techniques.

Level 2:
You have answered two parts correctly, but you made mistakes in one part and the explanation is missing or weak. Your answer includes:
- A correct copy of a line segment, with construction marks shown;
- A correct construction of an equilateral triangle, with construction marks shown;
- A partially correct construction of an inscribed hexagon, with construction marks shown. The construction may be incomplete or contain errors;
- A vague, partially correct, or missing description of how the constructions are related and how they use the same basic techniques.

Level 1:
Your answers are incorrect. Your answer includes:
- A correct copy of a line segment, with construction marks shown;
- An incorrect or incomplete construction of an equilateral triangle, with construction marks shown;
- An incorrect, incomplete, or missing construction of an inscribed hexagon, with construction marks shown. The construction may be incomplete or contain errors;
- An incorrect or missing description of how the constructions are related and how they use the same basic techniques.

Level 0:
Your answer is not related to the question, the teacher cannot understand your answer, or you do not write anything.

Name:_____

Geometry: Constructions

Complete all the tasks in the test booklet.

1 **A. Use a compass and straightedge to copy the line segment shown below.**

B. Use a compass and straightedge to construct an equilateral triangle with edges congruent to the line segment in part A. Do not erase your pencil marks.

Name:_____

C. Use a compass and straightedge to construct a hexagon inscribed in a circle. Make the diameter of the circle congruent to the line segment in part A. Do not erase your pencil marks.

D. Describe how all three constructions are related and use the same basic construction techniques. Use the back of this page if you need more space to write your answer.

CCR Performance Tasks

Geometry: Constructions

Teacher Guide

About the Teacher Guide

This document contains support materials for “Geometry: Constructions.”
This includes:

(a) The task
(b) The standards and depth of knowledge level of the task
(c) The scoring rubric
(d) Discussion questions
(e) Extension activities

These specifications have been included to help you connect the task to the Common Core content standards and the standards for mathematical practice. The rubric is designed to help you look for the development of mathematical practices in student work. It is also here to help you look for consistencies in student content errors that can help guide intervention and re-teach strategies.

Test Definition File

Item #	Correct Answer	Practice Standard	Content Standards
1	See Scoring Rubric	Mathematical Practice 8	G-CO.12, G-CO.13

SBAC Claims	PARCC Sub-Claims
1	A and D

Performance Task

A. Use a compass and straightedge to copy the line segment shown below.

B. Use a compass and straightedge to construct an equilateral triangle with edges congruent to the line segment in part A. Do not erase your pencil marks.

C. Use a compass and straightedge to construct a hexagon inscribed in a circle. Make the diameter of the circle congruent to the line segment in part A. Do not erase your pencil marks.

D. Describe how all three constructions are related and use the same basic construction techniques. Use the back of this page if you need more space to write your answer.

Standards Alignment

Practice Standards

MP8 > DOK 3

Look for and express regularity in repeated reasoning.-- Mathematically proficient students notice if calculations are repeated, and look both for general methods and for shortcuts. Upper elementary students might notice when dividing 25 by 11 that they are repeating the same calculations over and over again, and conclude they have a repeating decimal. By paying attention to the calculation of slope as they repeatedly check whether points are on the line through (1, 2) with slope 3, middle school students might abstract the equation $(y – 2)/(x – 1) = 3$. Noticing the regularity in the way terms cancel when expanding $(x – 1)(x + 1)$, $(x – 1)(x^2 + x + 1)$, and $(x – 1)(x^3 + x^2 + x + 1)$ might lead them to the general formula for the sum of a geometric series. As they work to solve a problem, mathematically proficient students maintain oversight of the process, while attending to the details. They continually evaluate the reasonableness of their intermediate results.

Content Standards

G-CO.12

Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). *Copying a segment; copying an angle; bisecting a segment; bisecting an angle; constructing perpendicular lines, including the perpendicular bisector of a line segment; and constructing a line parallel to a given line through a point not on the line.*

G-CO.13

Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.

SBAC Claim

Mathematics Claim #1:
Concepts and Procedures. Students can explain and apply mathematical concepts and interpret and carry out mathematical procedures with precision and fluency.

Mathematics Claim #3:
Communicating Reasoning. Students can clearly and precisely construct viable arguments to support their own reasoning and to critique the reasoning of others.

PARCC Sub-Claims

Sub-Claim A:
Major Content with Connections to Practices. The student solves problems involving the Major Content for her grade/course with connections to the Standards for Mathematical Practice.

Sub-Claim D:
Highlighted Practice MP.4 with Connections to Content: Modeling/Application. The student solves real-world problems with a degree of difficulty appropriate to the grade/course by applying knowledge and skills articulated in the standards for the current grade/course (or, for more complex problems, knowledge and skills articulated in the standards for previous grades/courses), 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).

Scoring Rubric

4 Point Response:
The response demonstrates a high level of understanding. A level 4 response is characterized by:

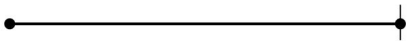
- A strong ability to construct figures using a straightedge and compass;
- A strong understanding of how the constructions are related and how basic techniques are put together to create more complex constructions.

A level 4 response should include:

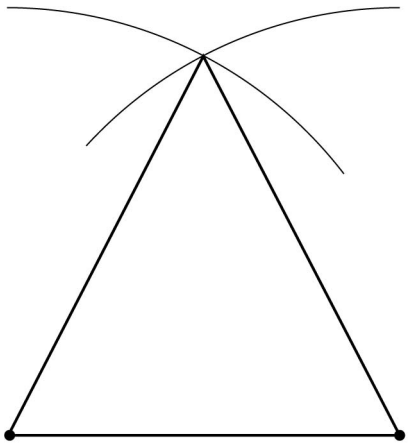
- A correct copy of the line segment, with construction marks shown;
- A correctly constructed equilateral triangle, with construction marks shown;
- A correctly constructed inscribed hexagon, with construction marks shown;
- A correct and complete description of how the constructions are related, including the use of copying line segments in all the constructions and the use of equilateral triangles in the construction of the hexagon.

A sample level 4 response follows.

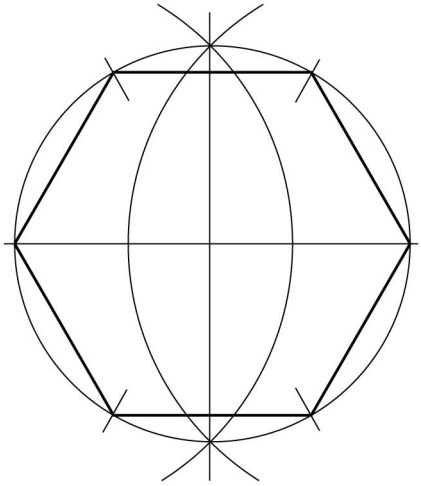
Part A:



Part B:



Part C:



Part D: "Copying a line segment is the basic construction that you use in all three constructions. To make the equilateral triangle, I copied the line segment in part A to make the bottom side of the triangle. Then I copied that line segment twice more to make the two other sides of the triangle. I had to find how to orient the segments so they intersect to make the top point of the triangle. To make the hexagon inscribed in a circle, I used the same idea of copying a segment many times. First I bisected the segment to find the radius of the circle. Bisecting a line segment is similar to constructing an equilateral triangle. I essentially made two isosceles triangles, one on either side of the original segment. I did not draw the edges of the triangles but I did find the location of the vertices. Connecting the opposite angles bisects the line segment in the middle. Then I used the half segment as the radius of the circle and drew the circle with that radius. A hexagon can be partitioned into six equilateral triangles. One side is a radius, which means that each edge of the hexagon is congruent to the radius of the circle. I copied the radius six times to make each side of the hexagon. Copying a line segment is the basis of all three constructions."

3 Point Response:
The response demonstrates a strong understanding, but the work contains minor errors. A level 3 response is characterized by:

- A strong ability to construct figures using a straightedge and compass;
- A basic understanding of how the constructions are related and how basic techniques are put together to create more complex constructions;
- An incomplete explanation in part D.

2 Point Response:
The response demonstrates a basic but incomplete understanding. A level 2 response is characterized by:

- A basic ability to construct figures using a straightedge and compass;
- At least two constructions that are correct and complete, although there may be some errors in the construction of the hexagon;
- A weak understanding of how the constructions are related and how basic techniques are put together to create more complex constructions;
- An explanation in part D that is vague or missing, demonstrating a weak understanding of how the constructions are related.

1 Point Response:
The response demonstrates minimal understanding. A level 1 response is characterized by:

- A weak ability to construct figures using a straightedge and compass;
- Constructions of the triangle and the hexagon that are incomplete or incorrect;
- A lack of understanding of how the constructions are related and how basic techniques are put together to create more complex constructions;
- An explanation in part D that is missing or incorrect.

0 Point Response:
There is no response, or the response is off topic.

Discussion Questions

Use the following questions to help students struggling to access the problem:

1. How do you copy a line segment? Why does the method work?

Possible response: *You copy a line segment by opening the compass so that the point is at one end of the segment and the pencil is at the other end. Then you place the point on a different location on the paper and swing an arc. Connect the point and the arc. All the points on the arc are the same distance from the point, and they are the same distance as the length of the original segment because that is how wide you opened the compass.*

2. How do you bisect a line segment? Why does the method work?

Possible response: *You bisect a line segment by swinging arcs with the same radius from both endpoints. Swing the arcs more than 180 degrees so they intersect above and below the segment. Then connect the two intersections. The segment bisector contains all of the points equidistant from the end points of the segment. You used the arcs to find two of the points equidistant from the end points. You can use two points on a line to define a line, so once you know two points you can draw the line to find other points equidistant from the end points of the segment, including the midpoint of the segment which is really the one you are looking for.*

Extension Activities

1. Do a similar series of related constructions (using a compass and straightedge) with a different focus.

   A. Focus on constructing perpendicular lines.

      Sample: Have students construct perpendicular lines, parallel lines, and a square. Have students explain how all three constructions are similar and use the same basic construction techniques.

   B. Focus on bisection.

      Sample: Have students bisect a segment and bisect an angle. Explain how these two constructions are similar and depend on the same basic construction techniques.

2. Develop new constructions by combining known constructions.

   Sample: Have students experiment with putting together known constructions to develop new constructions. For example, if students know how to construct a 60-degree angle, copy angles, and bisect angles, what other angles can they construct?