

The animation shows the geometric construction of an angle bisector.

Use the steps in the construction to prove that  $\overline{AD}$  bisects  $\angle BAC$ .

Cut Paste Undo Redo

Geometry and Math III	Geometric Construction Connection
Item Type	Type II – 3 points
Evidence Statement	<p><b>HS.C.14.3:</b> Construct, autonomously, chains of reasoning that will justify or refute geometric propositions or conjectures.</p> <p>Content scope: G-CO.D</p>
Most Relevant Standards for Mathematical Content	<p><b>G-CO.D: Make geometric constructions</b></p> <p>12. Make formal geometric constructions with a variety of tools and methods (compass and straightedge, string, reflective devices, paper folding, dynamic geometric software, etc.). <i>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.</i></p> <p>13. Construct an equilateral triangle, a square, and a regular hexagon inscribed in a circle.</p> <p>This standard is supporting content in the course based on the PARCC</p>

	Model Content Frameworks.
Most Relevant Standards for Mathematical Practice	PARCC highlights MP.3 and MP.6 through Subclaim C. These items require students to construct viable arguments through precisely written mathematical statements. This item requires the student to construct a chain of reasoning that will justify an angle bisector. In addition, students may refer to the animation of the construction of the angle bisector to support their reasoning and find structure within the geometric relationships needed to prove the conjecture (MP.7).
Item Description and Assessment Qualities	<p>This conceptual understanding task requires students to construct, autonomously, chains of reasoning that will justify that the construction shown in the animation actually creates a bisector of the given angle. The technology allows students to replay the video as needed, so that they can use precise mathematical language to make claims.</p> <p>These chains of reasoning need to be written precisely and ordered logically to receive full credit. Unlike traditional multiple choice, it is difficult to guess the correct answer or use a choice elimination strategy, and the item is scored using a clearly defined rubric that awards partial credit for a variety of valid partial responses.</p>
Scoring Information	<p>Task is worth 3 points. Task can be scored as 0, 1, 2, or 3.</p> <p>This task contains 1 reasoning component, worth 3 points.</p> <ul style="list-style-type: none"> <li>• Student reasons that the marks from the construction form the following:           <p style="margin-left: 40px;">The first mark, using one compass setting, makes <math>\overline{AB} \cong \overline{AC}</math>.</p> <p style="margin-left: 40px;">The second mark, using the same compass setting at B and C to mark off D, makes <math>\overline{BD} \cong \overline{CD}</math>.</p> <p style="margin-left: 40px;">The third mark, joining points A and D, makes a shared side of two triangles (by the reflexive property <math>\overline{AD} \cong \overline{AD}</math>).</p> </li> <li>• Student reasons that the triangles are congruent by SSS, <math>\triangle ABD \cong \triangle ACD</math>.</li> <li>• Student reasons that the angle is bisected.</li> </ul>

Since,  $\triangle ABD \cong \triangle ACD$  then  $\angle ABD \cong \angle CAD$  by CPCTC  
(Corresponding Parts of Congruent Triangles are Congruent).  
Since these two angles are congruent, then  $\overrightarrow{AD}$  bisects  $\angle BAC$ .

NOTES:

The student may combine the first two reasoning steps into one step.  
The reasoning must include the triangle congruency statement and  
how the steps in the construction form the pairs of congruent sides.

Task score: The task score is the sum of the points awarded in each  
component.