

Precision Pathways

Make constructions and leave the compass work visible.

HIGH SCHOOL • HSG-CO.D.12

CCSS.Math.Content.HSG-CO.D.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..."

NAME _____

DATE _____

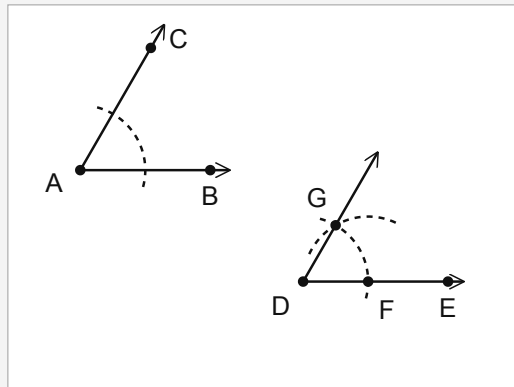
You will need: Pencil; Compass; Straightedge (no measuring marks needed); Loose paper for a folding comparison

CONSTRUCT, THEN EXPLAIN

Construct directly on the supplied canvases; do not estimate angles or replace compass work with a written plan. Keep your arcs visible. Equal compass widths give equal distances, which justify the resulting congruent segments, bisectors and perpendicular lines.

WORKED EXAMPLE

Copy the given angle CAB onto ray DE. The key idea is to transfer an arc radius and then its chord.

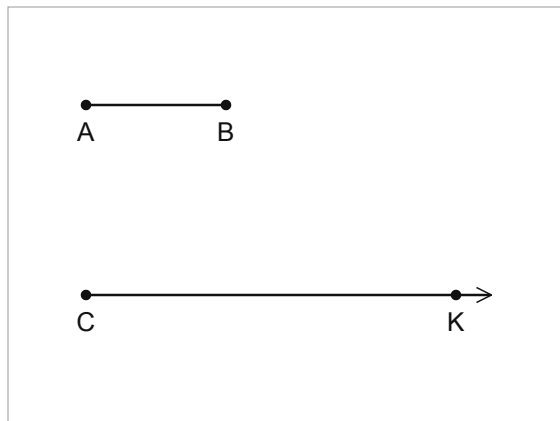


1. Draw an arc centered at A across both rays. Use that same radius to draw an arc centered at D; it meets DE at F.
2. Set the compass to the distance between the two crossings on the original angle. From F, mark that distance on the new arc at G above DE.
3. Draw ray DG. Equal radii and the copied chord form congruent triangles, so the copied angle has the same measure.

Answer: Angle EDG is congruent to angle BAC.

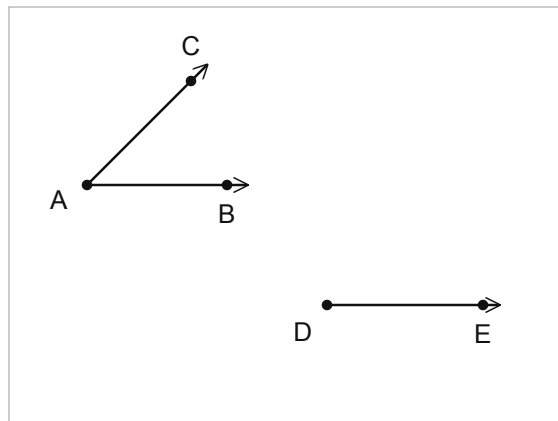
PRACTICE 4 problems

- 1** Copy segment AB onto ray CK . Mark L so $CL=AB$. Leave the compass arc; state what distance you transferred.



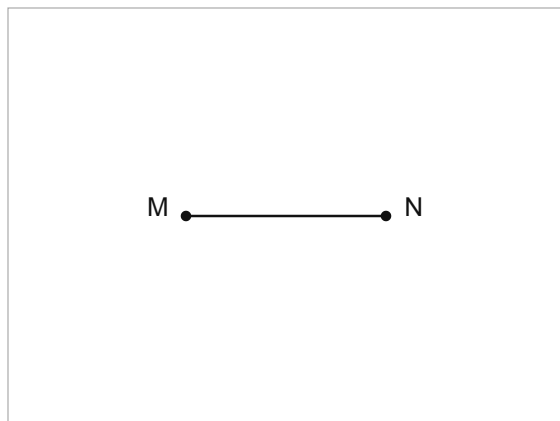
ANSWER _____

- 2** Construct a copy of angle CAB on ray DE , above DE . Label its new ray DG and keep the two-radius/chord construction visible.



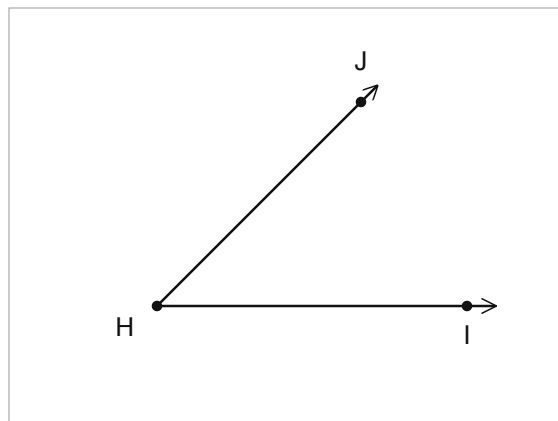
ANSWER _____

- 3** Construct the perpendicular bisector of MN . Mark its midpoint. Then copy MN onto loose paper and fold M onto N ; compare the crease with your constructed line.



ANSWER _____

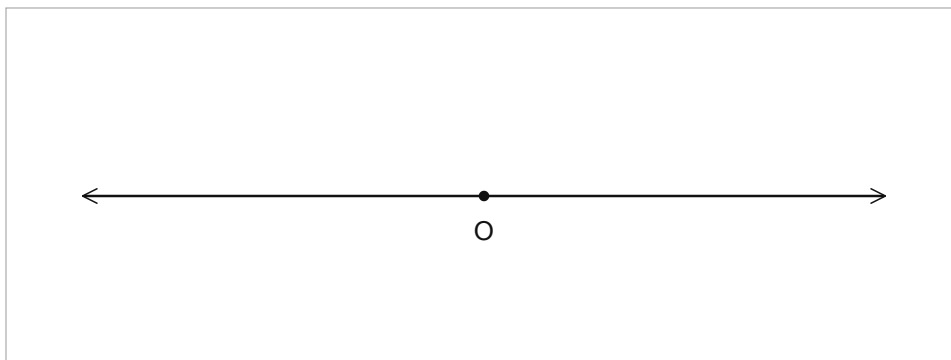
- 4** Bisect angle IHK with a compass and straightedge. Leave the arcs and label a point T on the bisecting ray. Explain why the two angles match.



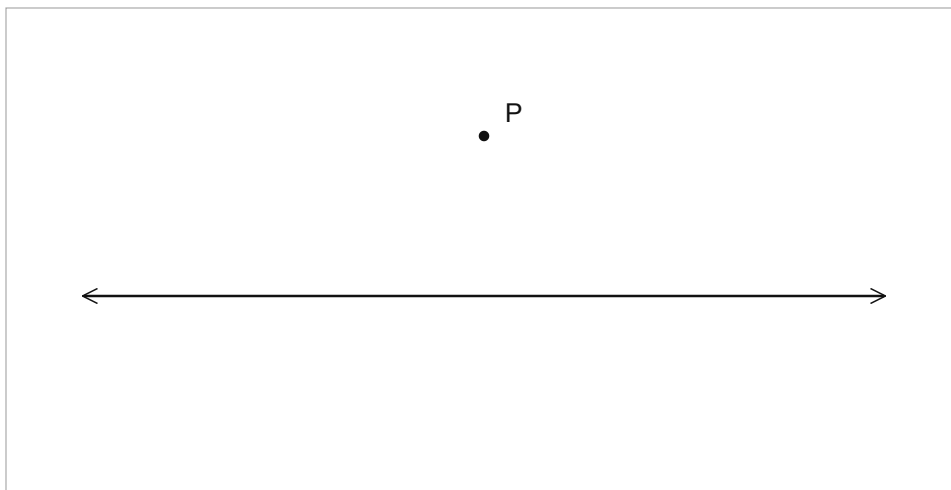
ANSWER _____

APPLY IT Show your work

- 1** A carpenter needs a perpendicular guide through O on the printed line. Construct it, keeping the compass arcs. Explain why your final line is perpendicular.

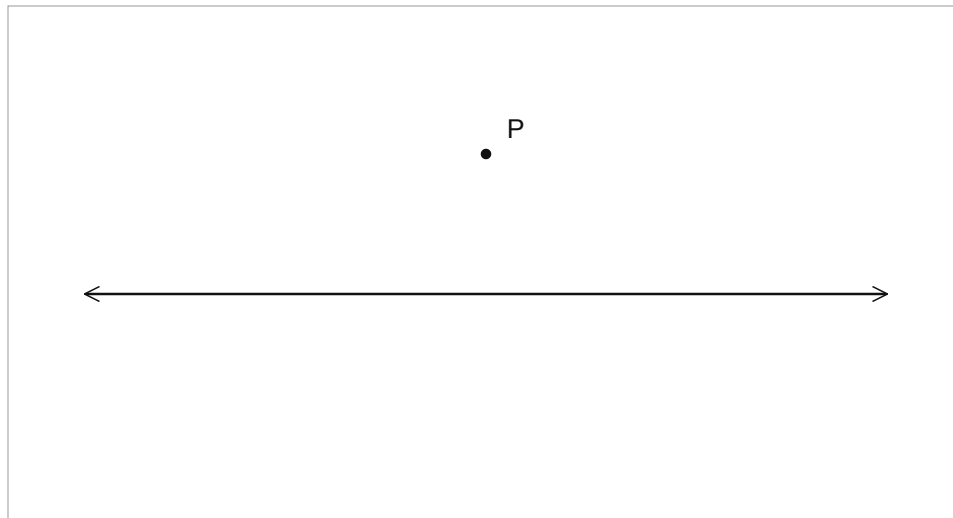
**REASONING AND ANSWER**

- 2** A post P lies off a boundary line. Construct the perpendicular from P to that line. Keep two equal-distance intersections visible and explain why the perpendicular passes through P.

**REASONING AND ANSWER**

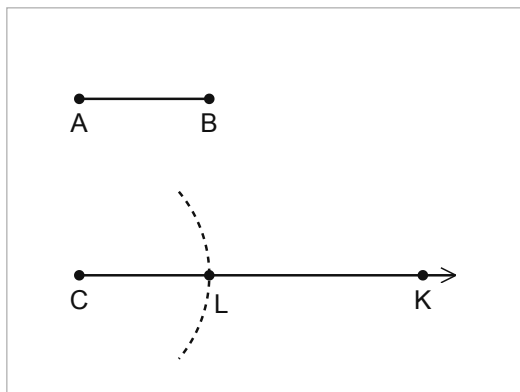
CHALLENGE One step up

Construct a parallel to the printed line through P using TWO perpendicular constructions. Leave the arcs visible and explain why the result must be parallel.

**REASONING AND ANSWER**

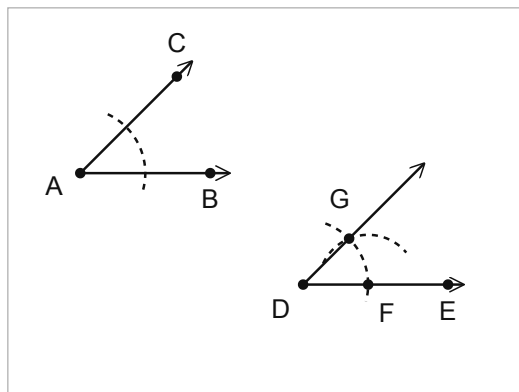
PRACTICE 1

Set the compass to AB , draw an arc centered at C and mark its crossing with CK as L . $CL=AB$.



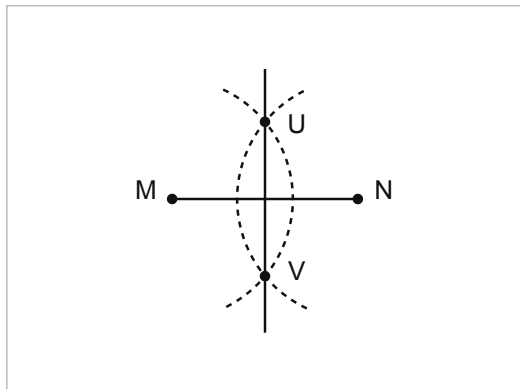
PRACTICE 2

Copy the radius from A to D , then copy the original arc's chord from F to G on the new arc. Draw DG ; angle EDG equals angle BAC .



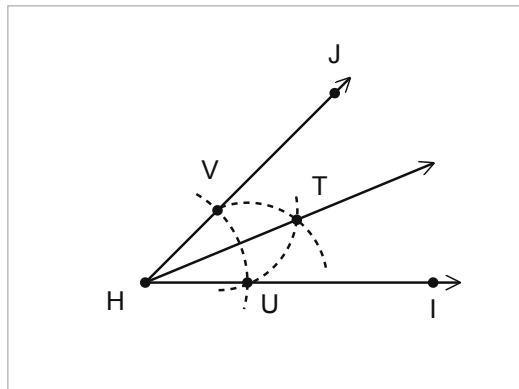
PRACTICE 3

Equal-radius arcs from M and N meet at U and V . Line UV bisects MN at a right angle. Folding M onto N produces the same perpendicular bisector because points on the crease are equally far from M and N .



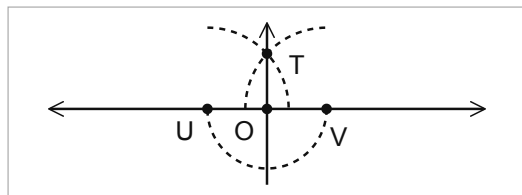
PRACTICE 4

An arc centered at H meets HI at U and HJ at V . Equal-radius arcs from U and V meet at T inside the angle. Draw HT . Triangles HUT and HVT are congruent by SSS, so angle IHT equals THJ .



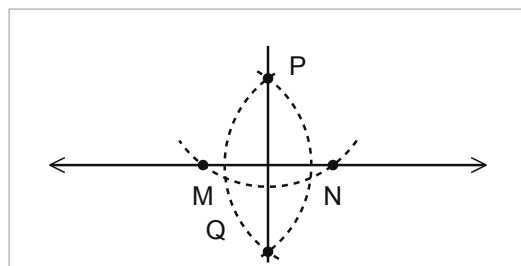
APPLY IT 1

The line through O and T is perpendicular to the given line. An arc centered at O marks U and V at equal distances. Equal-radius arcs from U and V meet at T off the line. Since O and T are both equidistant from U and V, OT is their perpendicular bisector.



APPLY IT 2

Line PQ passes through P and is perpendicular to the boundary. An arc centered at P cuts the line at M and N. With the same radius, arcs centered at M and N meet at Q and at Q' on the other side of the line. P and Q are equidistant from M and N, so PQ is the perpendicular bisector of MN.



CHALLENGE

First construct PQ perpendicular to the original line through P. Then construct a perpendicular to PQ at P. The second line is parallel to the original because two coplanar lines perpendicular to the same line are parallel.

Inspect actual constructions, not just the final lines. Dashed arcs in the sample show valid compass marks; students may choose different radii and labels. Accept equivalent exact constructions with justified steps. The folding comparison supplies a second method for the perpendicular bisector. Practice 2 repeats the method with an uncompleted canvas so every learner actually copies an angle. Midpoints and compass centers must be identifiable. Teacher canvases are smaller reference views; use the student canvases for compass work.

