LESSON MAKER PRO

Split It Exactly

Construct equal halves with arcs and straight lines.

HIGH SCHOOL · MA.912.GR.5.2

MA.912.GR.5.2 "Construct the bisector of a segment or an angle, including the perpendicular bisector of a line segment."

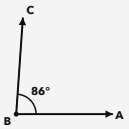
NAME _____ DATE _____

BISECT WITH EQUAL ARCS

A perpendicular bisector crosses a segment at its midpoint and forms a 90° angle. An angle bisector divides one angle into two equal angles. Equal-radius arcs locate points that are the same distance from both sides or endpoints.

WORKED EXAMPLE

Use compass and straightedge to bisect the angle shown.



1. Draw an arc centered at B that crosses both rays.
2. From the two crossing points, draw equal arcs that meet at F.
3. Draw ray BF.
4. 86/2 = 43.

Answer: Ray BF bisects the angle. Angles ABF and FBC are 43° each.

PRACTICE 4 problems

1 Segment MN is 18 cm long. Describe how to construct its perpendicular bisector. Where is its midpoint?

ANSWER _____

2 Angle RST measures 64°. Describe the arc construction for its bisector. What is each new angle?

ANSWER _____

3 A student draws arcs from G and H with different compass openings. Will their intersection always lie on the perpendicular bisector of GH? Explain.

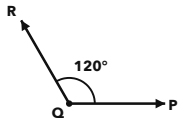
ANSWER _____

4 The perpendicular bisector of UV meets UV at W. If UW = 7/2 cm, find UV.

ANSWER _____

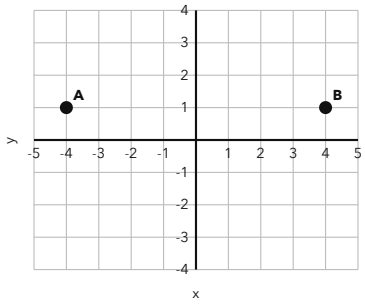
APPLY IT Show your work

1 A concert lighting diagram shows a 120° sweep. Construct the ray that splits the sweep evenly. State the size of each part.



ANSWER _____

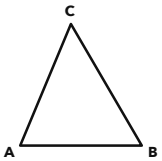
2 A game map shows portals A and B. Construct the divider that is equally far from both portals. Give its equation.



ANSWER _____

CHALLENGE One step up

In triangle ABC, describe how to construct its circumcenter O using only two perpendicular bisectors. Then state what is true about OA, OB, and OC.



WORK SPACE AND ANSWER

ANSWER KEY

Split It Exactly

HIGH SCHOOL · MA.912.GR.5.2

PART 1 · PRACTICE

#	PROBLEM	ANSWER
1	Segment MN is 18 cm long. Describe how to construct its perpendicular bisector. Where is its midpoint?	**Draw equal-radius arcs from M and N, using a radius greater than 9 cm, and join the arc intersections. The midpoint is 9 cm from each endpoint.**
2	Angle RST measures 64°. Describe the arc construction for its bisector. What is each new angle?	**Draw an arc from S across both rays, then equal arcs from those crossings and draw a ray from S through their intersection. Each new angle is 32°.**
3	A student draws arcs from G and H with different compass openings. Will their intersection always lie on the perpendicular bisector of GH? Explain.	**No. The arcs must have equal radii so their intersection is the same distance from G and H.**
4	The perpendicular bisector of UV meets UV at W. If UW = 7/2 cm, find UV.	**7 cm**

PART 2 · APPLY IT

1. **Draw an arc centered at Q across both rays. From the two crossings, draw equal arcs that meet, then draw a ray from Q to that meeting point. Each part is 60°.** An angle bisector creates two equal angles, so 120/2 = 60.
2. **Construct equal-radius arcs centered at A and B, then draw the line through their intersections. The divider is x = 0.** The midpoint of AB is (0, 1), and AB is horizontal, so its perpendicular bisector is the vertical line x = 0.

CHALLENGE

Construct the perpendicular bisectors of AB and AC. Their intersection is O, and OA = OB = OC.

Accept any correct equal-radius arc construction that connects the two arc intersections. For the challenge, accept perpendicular bisectors of any two sides.