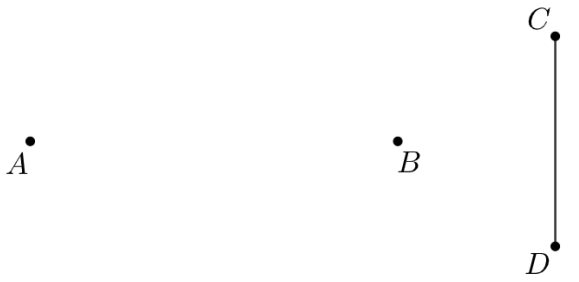
Name: _____

Lesson 1.03
Constructing Bisectors

Geometry GT

Experiment

Here are two points labeled A and B, and line segment $\overline{CD}$.



A. Mark 5 points that are a distance CD away from point A. How could you describe all points that are a distance CD away from point A?

B. Mark 5 points that are a distance CD away from point B. How could you describe all points that are a distance CD away from point B?

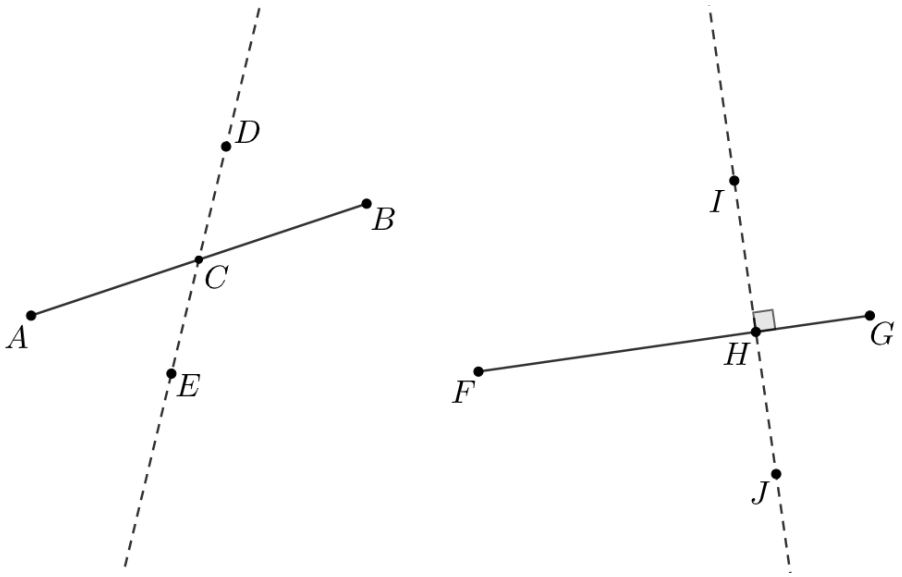
C. In a different color, mark all the points that are a distance CD away from both A and B at the same time.

Definitions

Perpendicular lines: two lines that intersect at a point to create right angles
Perpendicular bisector: a line through the midpoint of a segment that is perpendicular to the segment

Explore

Examine the two figures below.



Explain why each dashed line is *not* a perpendicular bisector of the segment it intersects.

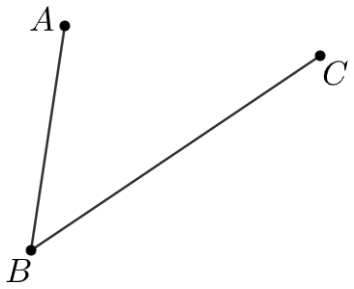
Use compass and straightedge moves to construct the perpendicular bisector of segment $\overline{PQ}$.

Definition

Angle bisector: a line through the vertex of an angle that divides it into two equal angles

Discuss

Here is angle $\angle ABC$.



Use compass and straightedge moves to construct a ray that divides $\angle ABC$ into 2 congruent angles. Then, on another sheet of paper, draw another angle and have your neighbor attempt to bisect it.

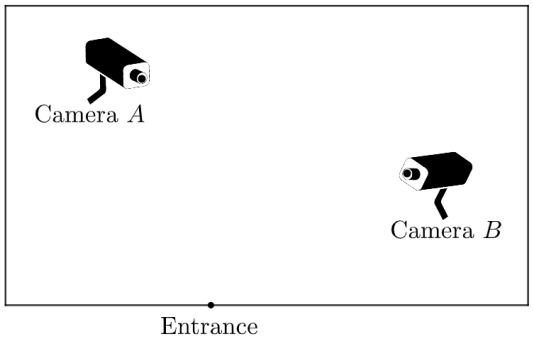
Write precise instructions for constructing a perpendicular bisector and angle bisector below.

Perpendicular bisector

Angle bisector

Demonstrate

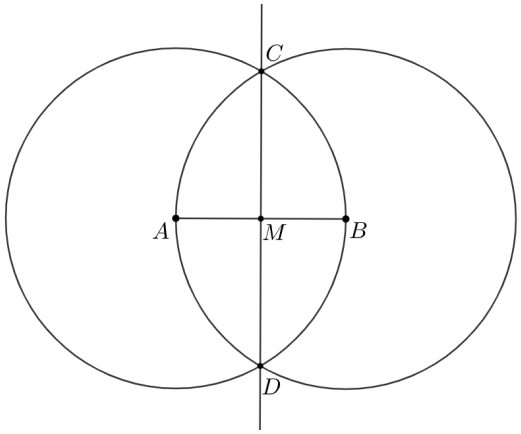
Scenario: You are attempting to covertly sneak through a secure room. There are two security cameras mounted to the ceiling, and they start recording whenever a moving object is closer to one that the other. However, due to some lazy programming, if a moving object is equidistant from both cameras, neither will start recording.



Using a straightedge and compass, map out the path you could take to cross the room without being caught on camera.

Practice

1. This diagram is a straightedge and compass construction. A is the center of one circle, and B is the center of the other. Select **all** the true statements.



A. Line $\overleftrightarrow{CD}$ is perpendicular to segment $\overline{AB}$

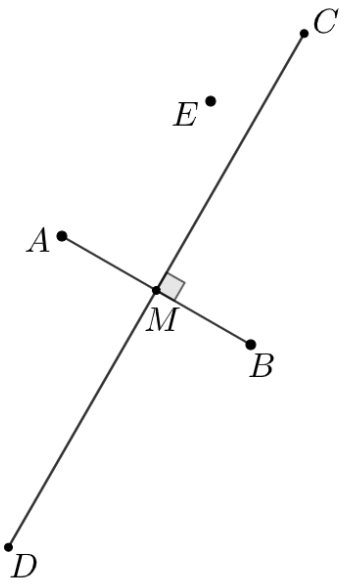
B. Point M is the midpoint of segment $\overline{AB}$

C. The length AB is equal to the length CD

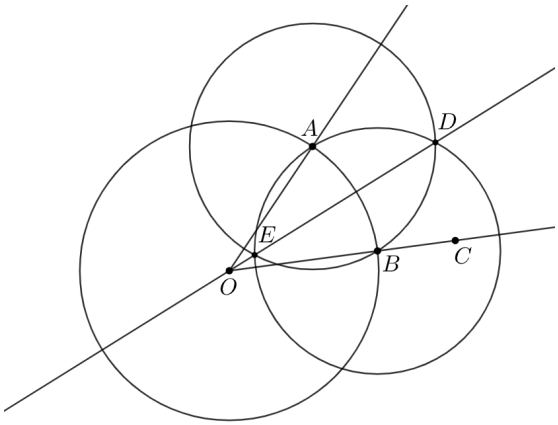
D. Segment $\overline{AM}$ is perpendicular to segment $\overline{BM}$

E. $CB + BD > CD$

2. In this diagram, line segment $\overline{CD}$ is the perpendicular bisector of the line segment $\overline{AB}$. Assume the conjecture that the set of points equidistant from A and B is the perpendicular bisector of $\overline{AB}$ is true. Is point E closer to point A, closer to point B, or the same distance between the points? Explain how you know.



3. This diagram is a straightedge and compass construction. Select **all** true statements.



A. Line $\overleftrightarrow{DE}$ is the bisector of $\angle AOC$

B. Line $\overleftrightarrow{DE}$ is the perpendicular bisector of segment $\overline{AO}$

C. Line $\overleftrightarrow{DE}$ is the perpendicular bisector of segment $\overline{CO}$

D. Line $\overleftrightarrow{DE}$ is the perpendicular bisector of segment $\overline{AB}$

E. Line $\overleftrightarrow{DE}$ is parallel to line $\overleftrightarrow{BC}$