3.2 Constructing Perpendicular Bisectors

Objectives:

- **I CAN discover a method of constructing perpendicular bisectors and midpoints.**
- **I CAN make conjectures about perpendicular bisectors.**

Sketch, Draw, Construct

When you _____ an equilateral triangle, you should use you geometry tools for accuracy. *You may use a protractor to measure angles and a ruler to measure the sides.*

draw

When you _____ an equilateral triangle, you freehand a triangle that looks like an equilateral triangle. *No geometry tools needed.*

sketch

When you _____ an equilateral triangle with a compass and straightedge, you don't rely on measurements from a protractor or a ruler. *This guarantees that you triangle is equilateral.*

construct

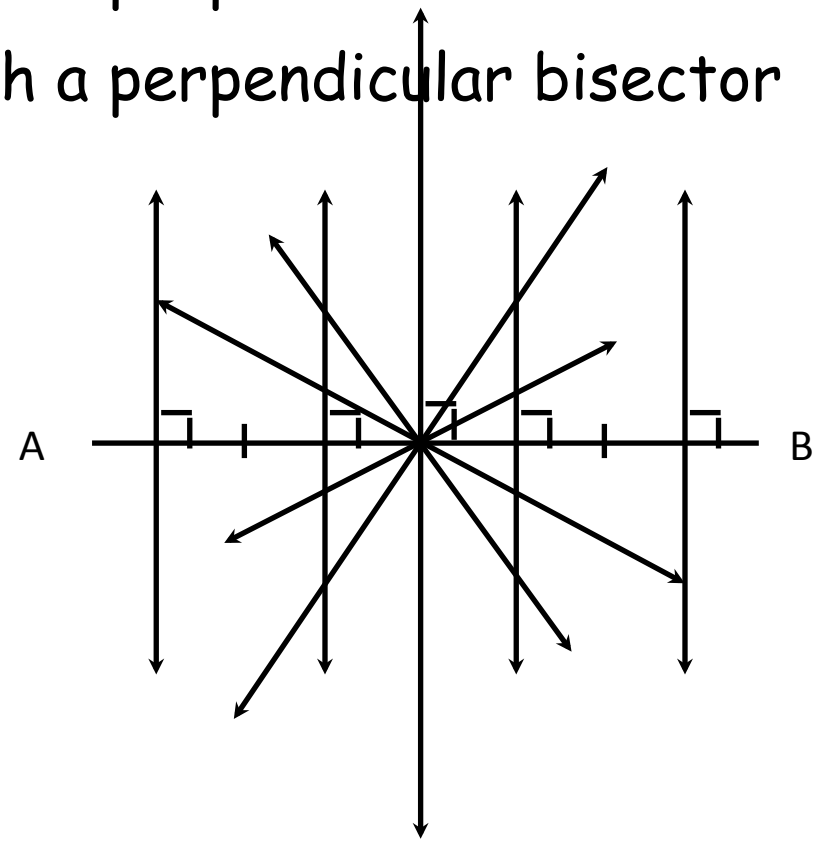
Definitions

Segment Bisector: A line, ray, or segment in a plane that passes through the midpoint of a segment in a plane.

Perpendicular Bisector: A line, ray, or segment in a plane that cuts a line segment into two equal parts at 90°.

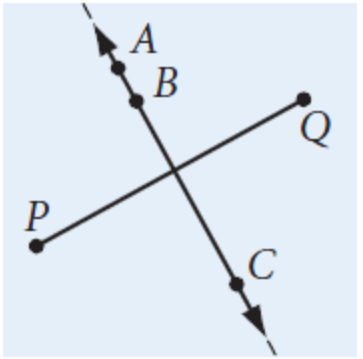
The Perpendicular Bisector

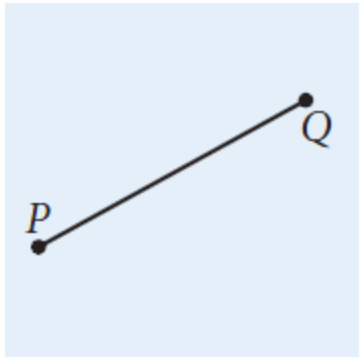
1. Sketch a segment bisector.
2. Sketch a perpendicular.
3. Sketch a perpendicular bisector



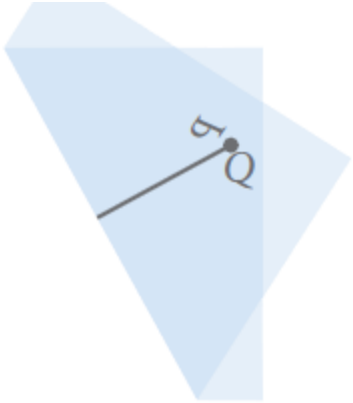
Construct a Perpendicular Bisector

- With Patty Paper

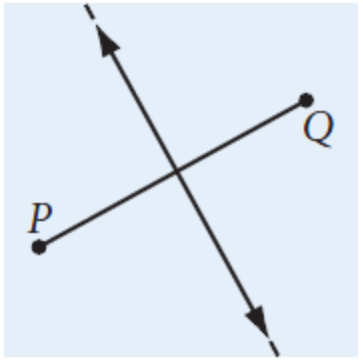




Step 1



Step 2

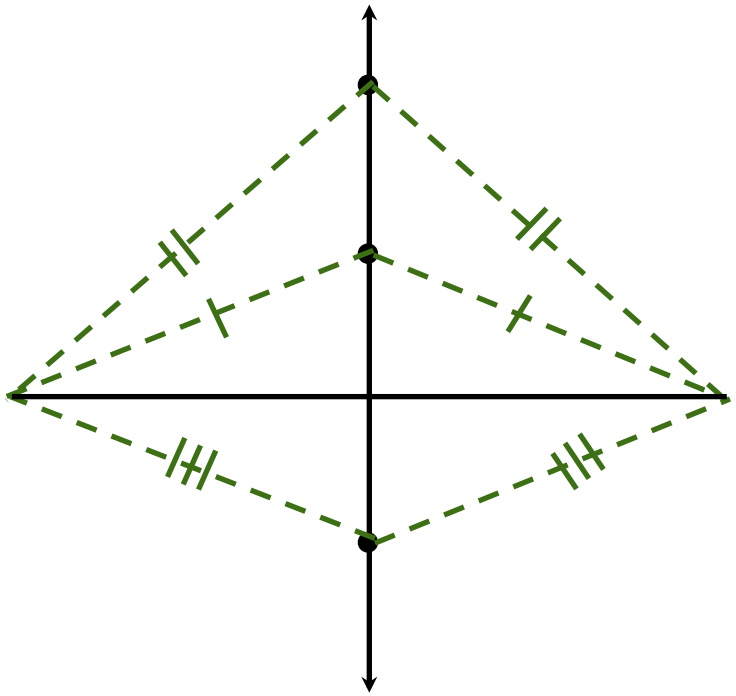


Step 3

Investigation 1 - Finding the Right Bisector

1. Fold your paper so the two halves of the line segment meet. What do you notice about the crease?

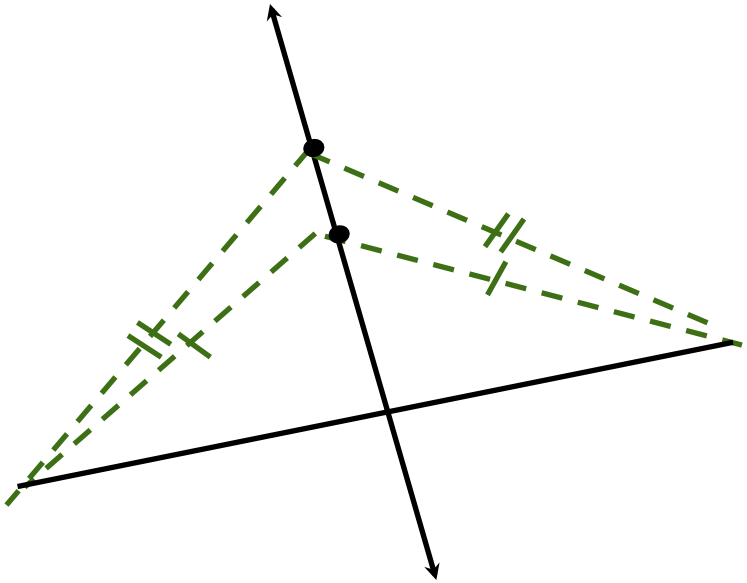
2. Put three dots along the perpendicular bisector. What do you notice about their distance from the endpoints?

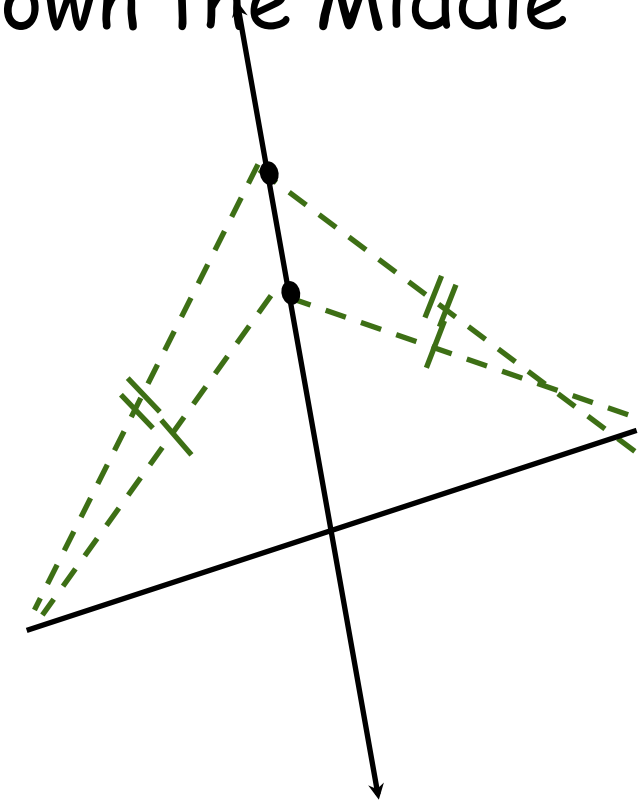


C5 Perpendicular Bisector Conjecture

If a point is on the perpendicular bisector of a segment, then it is equidistant from the endpoints.

Investigation 2 – Right Down the Middle



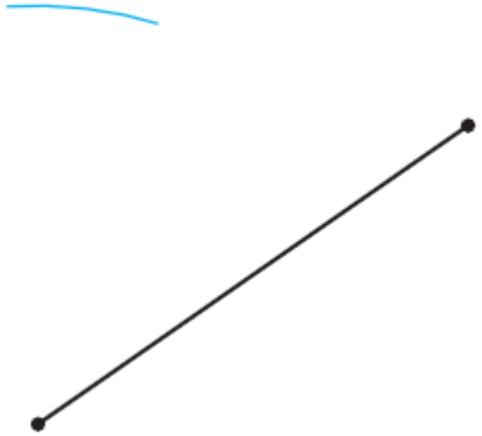


C6 Converse of the Perpendicular Bisector Conjecture

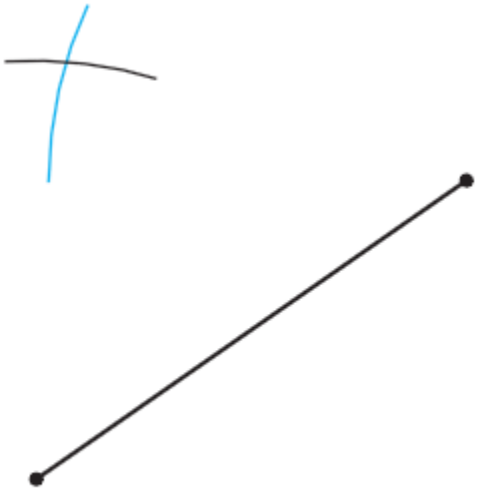
If a point is equidistant from the endpoints of a segment, then it is on the Perpendicular bisector of the segment.

Construct a Perpendicular Bisector

- With Compass and Straight Edge



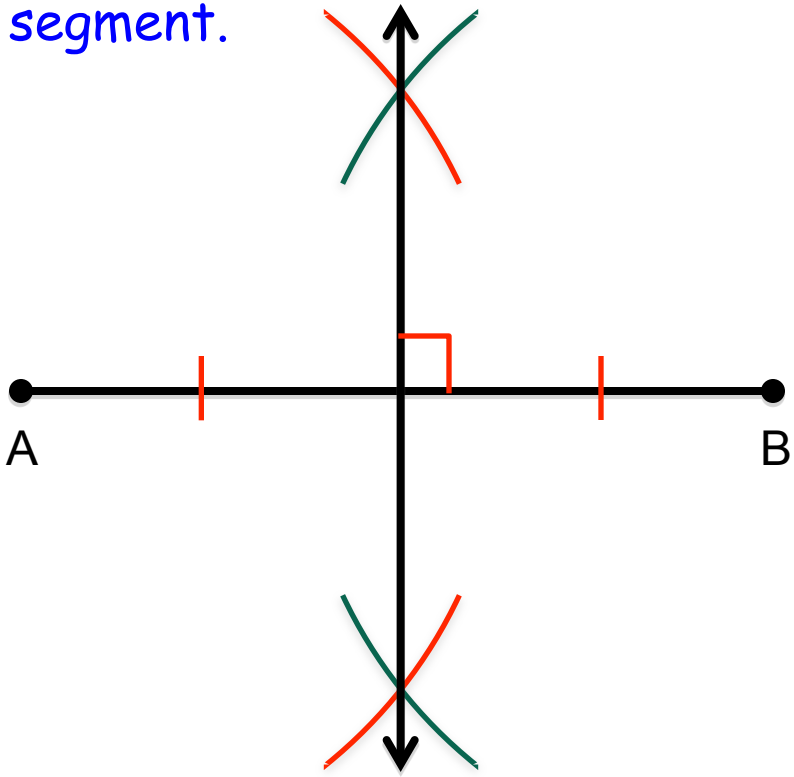
Step 1



Step 2

Construction 3: Perpendicular Bisector

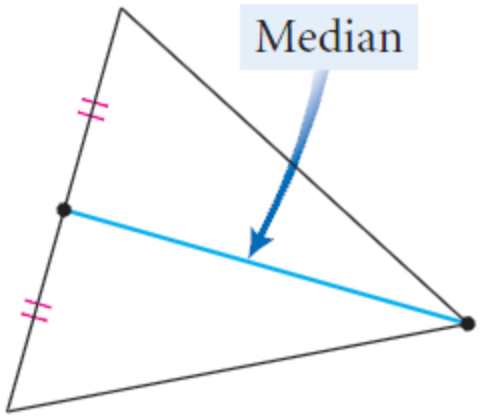
1. Draw a line segment with endpoints A and B.
2. Put the point of the compass on A. Stretch out the compass until it's more than half the length of AB.
3. Draw an arc on either side of the line segment.
4. Without changing the compass, put the point on B and draw an arc on either side of the segment.
5. Connect the X's.



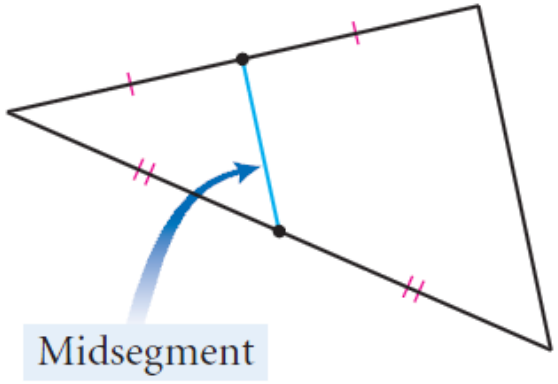
http://www.mathopenref.com/constbisectline.html

More Definitions

Median: The segment connecting the vertex of a triangle to the midpoint of its opposite side.



Midsegment: The segment that connects the midpoint of two sides of a triangle.



With Patti Paper

- Construct triangle DCS.
- Construct the perpendicular bisectors of each side.
- What do you notice about the three bisectors?

With Patti Paper

- Construct triangle ABC.
- Construct medians AM, BN, and CL.
- Do you notice anything special?

With Patti Paper

- Construct triangle DEF

- Construct midsegment GH, where
  G is the midpoint of side DE
  H is the midpoint of side DF.

- What do you notice about the relationship between segments EF and GH?