

Midpoints & Segment Bisectors Parallel & Perpendicular Lines

Midpoint – A **Midpoint** is a point that is exactly half way between two given points.

midpoint divides a segment into 2 congruent segments.

Segment Bisector – A **segment bisector** is a line, ray, or segment that passes through the midpoint of a given segment.

Perpendicular Bisector – A **perpendicular bisector** is a segment bisector that forms a right angle to a given segment.

Constructing a Midpoint, Segment Bisector, or Perpendicular Bisector:

Construct an Arc

Open the radius of the compass to more than half the length of line segment AB . Use endpoint A as the center and construct an arc.

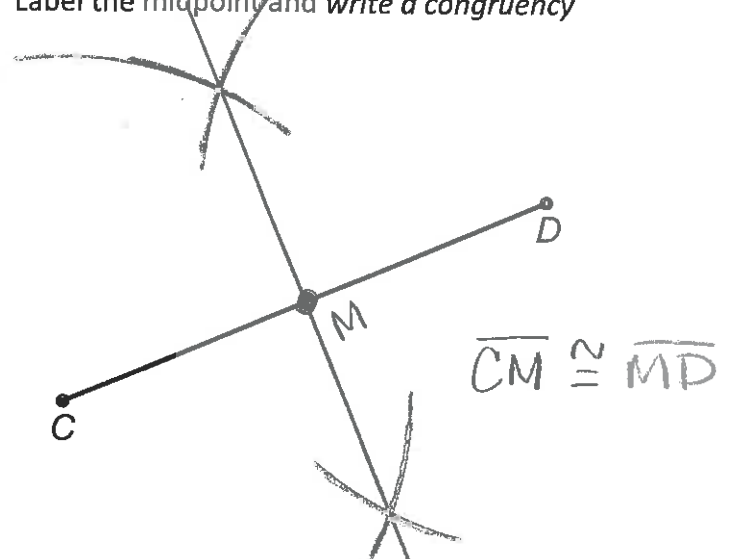
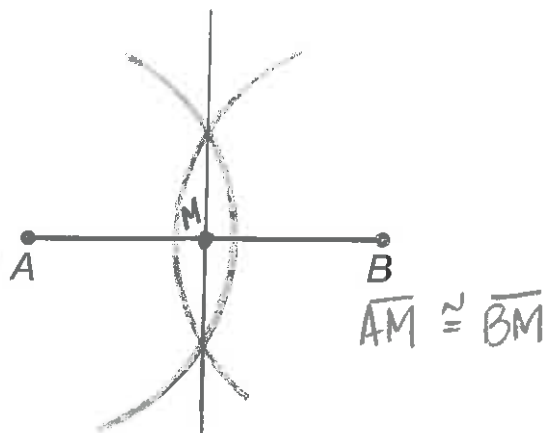
Construct Another Arc

Keep the compass radius and use point B as the center as you construct an arc. Label the points formed by the intersection of the arcs point E and point F .

Construct a Line

Connect points E and F . Line segment EF is the segment bisector of line segment AB . The point M represents the midpoint of AB .

1. Construct the Perpendicular bisector of each segment. Label the midpoint and write a congruency statement based on the construction.

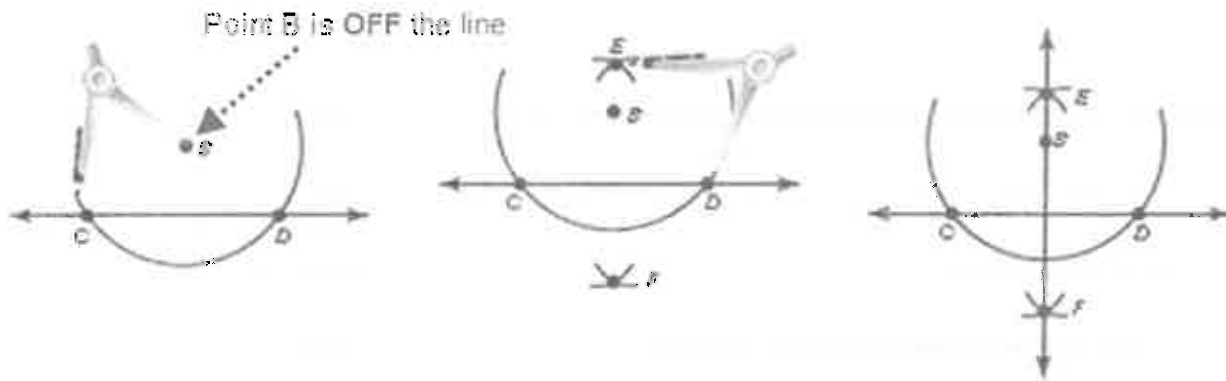


Perpendicular Postulate: *Given a line and a point, there is only 1 line through the point, perpendicular to the line.*

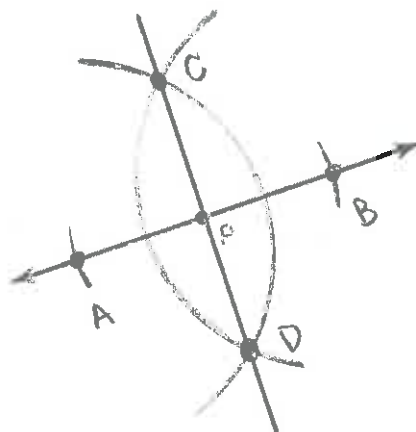
Case 1: The point is on the given line:



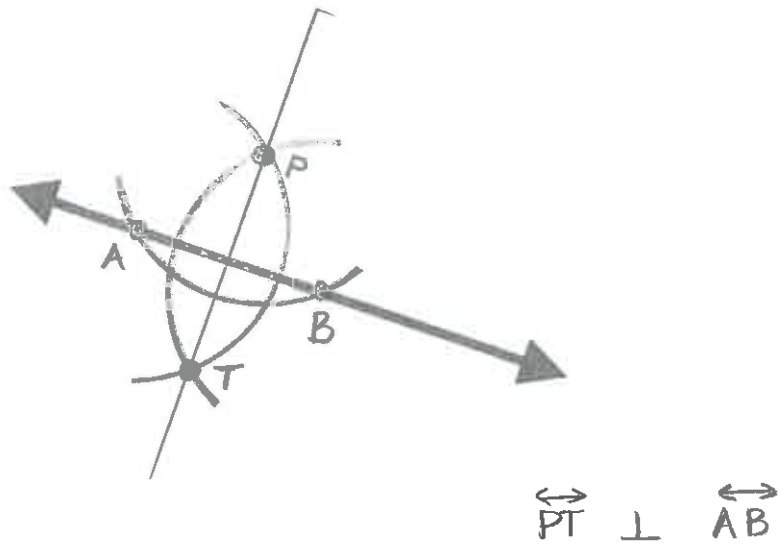
Case 2: The point is **not** on the given line:



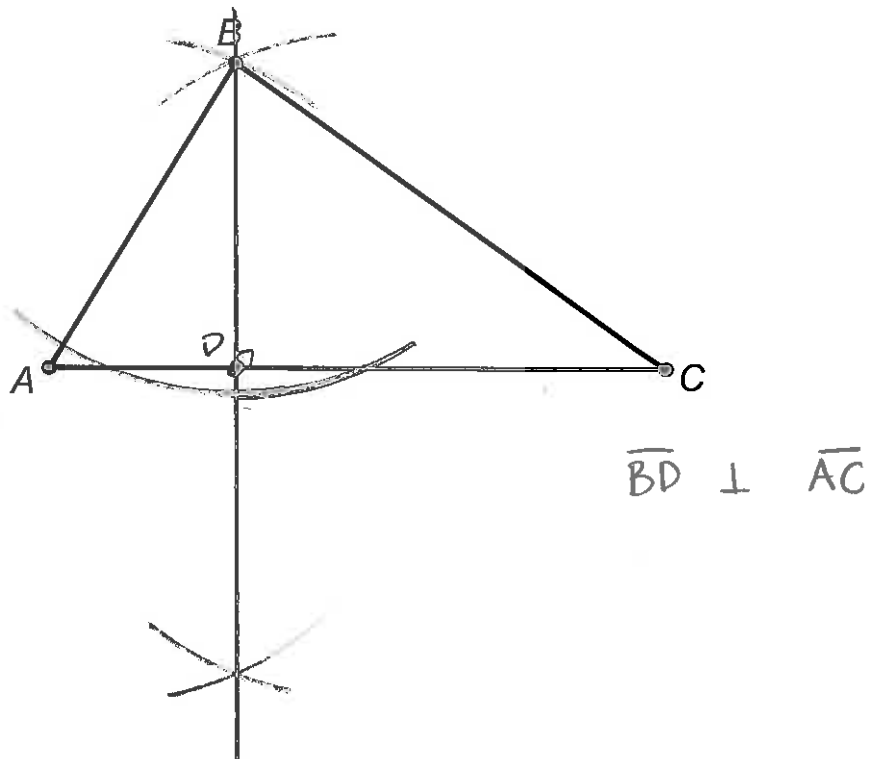
- Practice: Construct and label a line that is perpendicular to the given line and passes through point P. Use geometry symbols to write a statement about the lines being perpendicular.



$$\overleftrightarrow{AB} \perp \overleftrightarrow{CD}$$



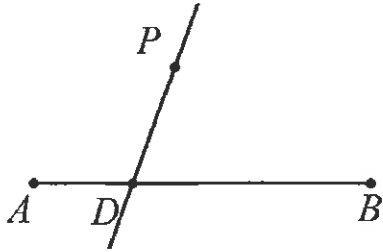
2. Use the previous construction to construct the **Altitude** of triangle ABC. The altitude is a line segment perpendicular to side AC and has vertex B as one of its endpoints.



Parallel Postulate: Given a line and a point NOT on the line, there is only 1 line through the point, parallel to the line.

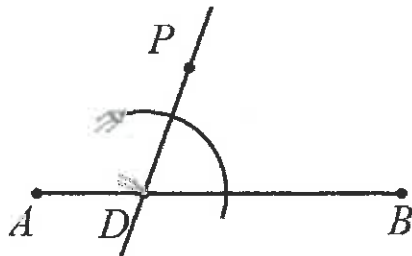
STEP 1

With your straight edge, draw line \overline{PD} .



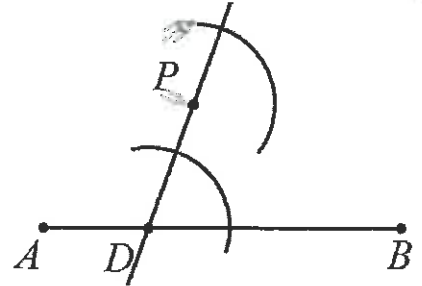
STEP 2

With your compass draw an arc centered at D.



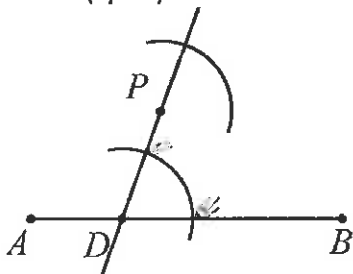
STEP 3

Using the same compass measure, draw another arc centered at P.



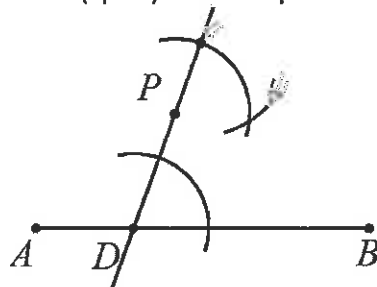
STEP 4

With your compass, measure the width (span) of the first arc.



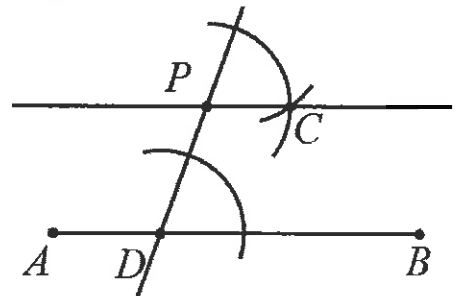
STEP 5

Draw a new arc using the same width (span) from step 5.



STEP 6

With your straight edge, connect points P and C to form the parallel line.



3. Construct and label a line that is parallel to the given line and passes through point P. Use geometry symbols to write a statement about the lines being parallel.

