

- *Neither you nor the world knows what you can do until you have tried. --
Ralph Waldo Emerson*



Bisectors, Medians, Altitudes

Chapter 5 Section 1

*Learning Goal: Understand and Draw the
4 special segments of a Triangle*

Bisectors

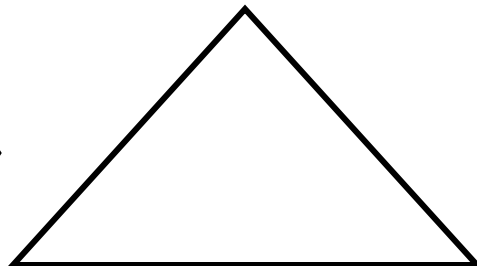
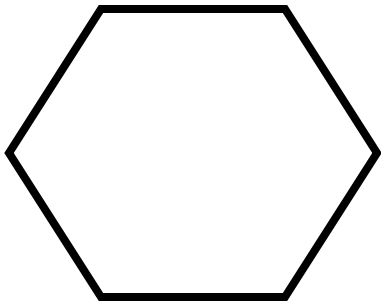
There are 2 different types of bisectors
(draw the indicated bisector of each figure)

Segment Bisector

A line, segment or ray that cuts a segment in half

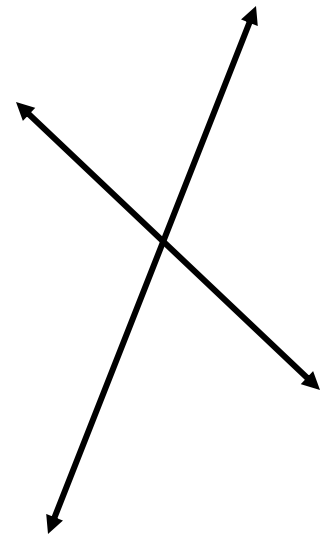
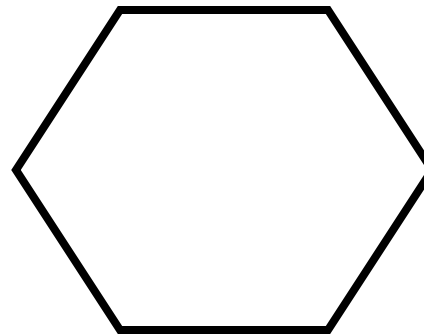
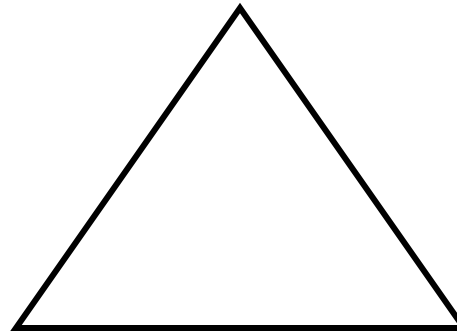


Perpendicular Bisector



Angle Bisector

A line, segment or ray that cuts an angle in half



Perpendicular Bisector

THEOREMS

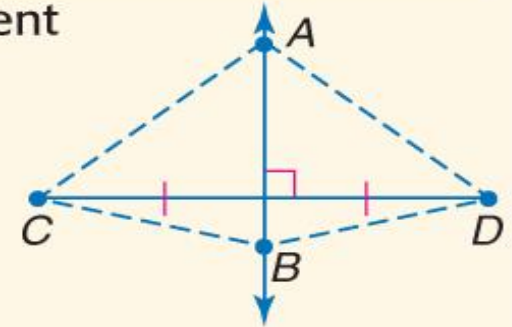
Points on Perpendicular Bisectors

5.1 Any point on the perpendicular bisector of a segment is equidistant from the endpoints of the segment.

Example: If $\overline{AB} \perp \overline{CD}$ and \overline{AB} bisects \overline{CD} , then $AC = AD$ and $BC = BD$.

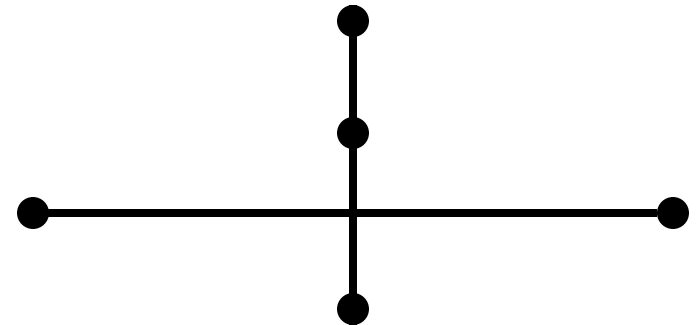
5.2 Any point equidistant from the endpoints of a segment lies on the perpendicular bisector of the segment.

Example: If $AC = AD$, then A lies on the perpendicular bisector of \overline{CD} .
If $BC = BD$, then B lies on the perpendicular bisector of \overline{CD} .



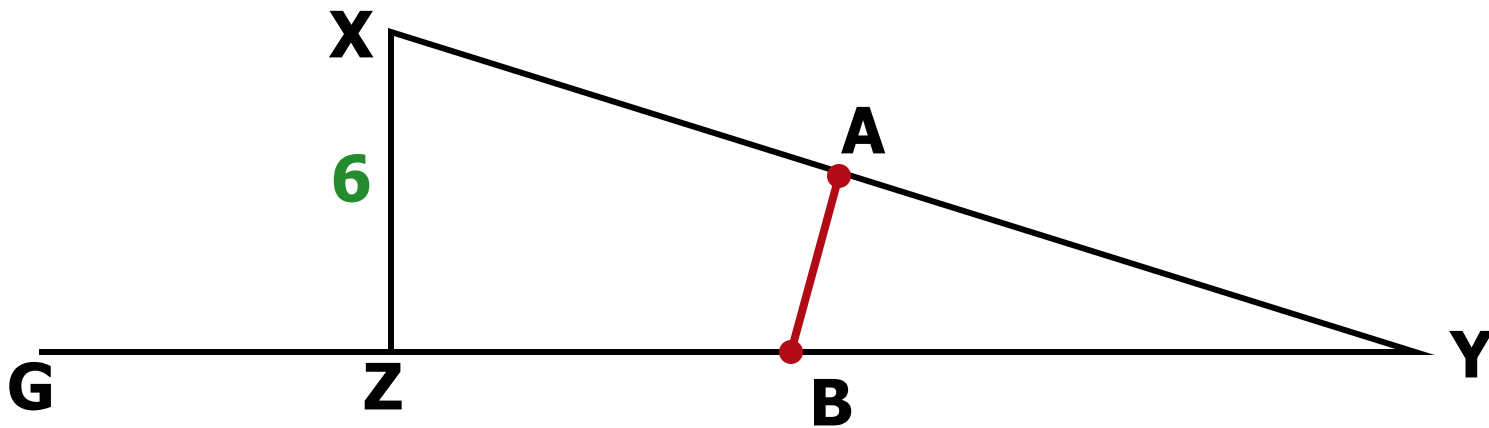
Given: \perp Bisector

Show: distance from a point
on the bisector to the endpoints



Perpendicular Bisector

- If \overline{AB} is the \perp bisector of \overline{XY} , $ZY = 8$, and $\triangle ZXY$ is a right triangle, find XA



- If \overline{XZ} intersects \overline{GB} , and $ZB = 3$, what is GZ ?

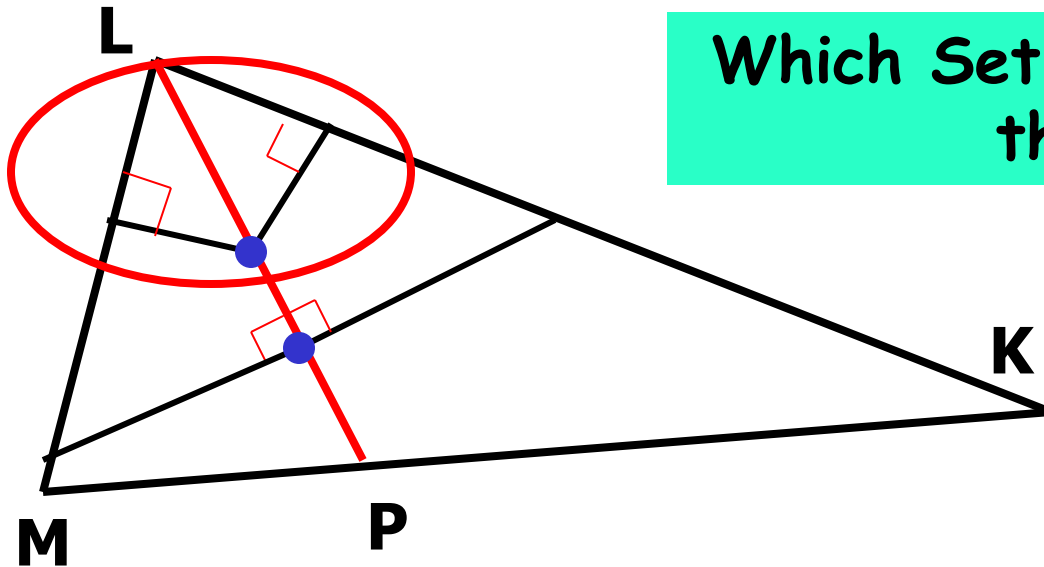
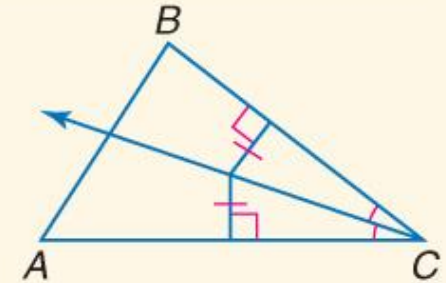
Not Enough
Information !!!

Angle Bisector

THEOREMS

Points on Angle Bisectors

- 5.4** Any point on the angle bisector is equidistant from the sides of the angle.
- 5.5** Any point equidistant from the sides of an angle lies on the angle bisector.



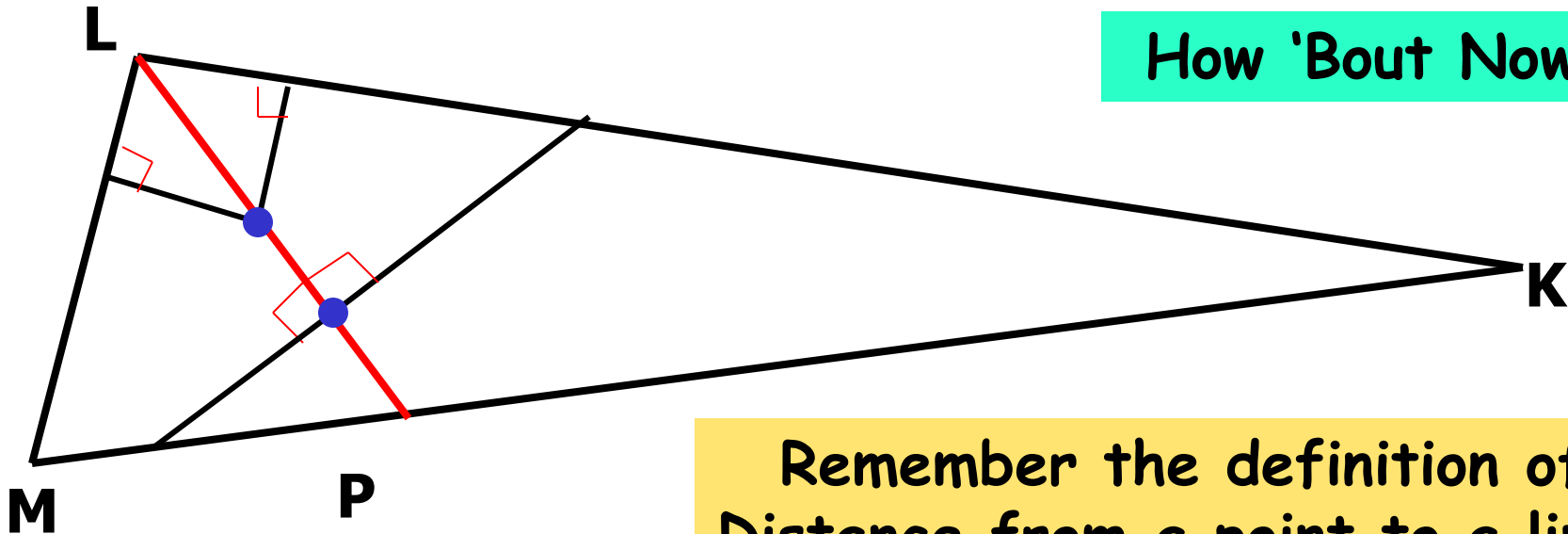
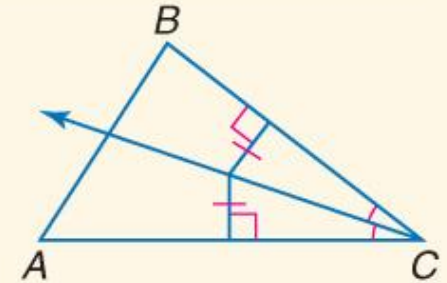
Which Set of Lines demonstrate this Theorem?

Angle Bisector

THEOREMS

Points on Angle Bisectors

- 5.4** Any point on the angle bisector is equidistant from the sides of the angle.
- 5.5** Any point equidistant from the sides of an angle lies on the angle bisector.

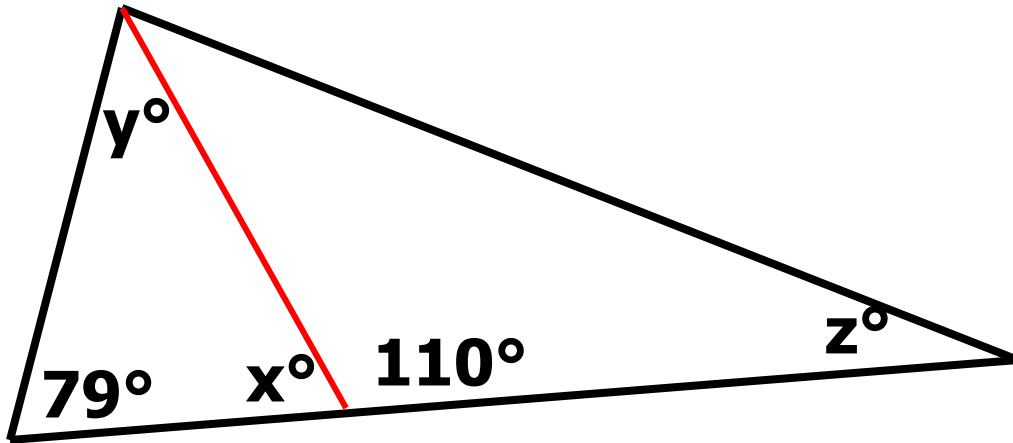


How 'Bout Now?

Remember the definition of Distance from a point to a line.

Angle Bisectors

Find the value of each variable, given the angle bisector.

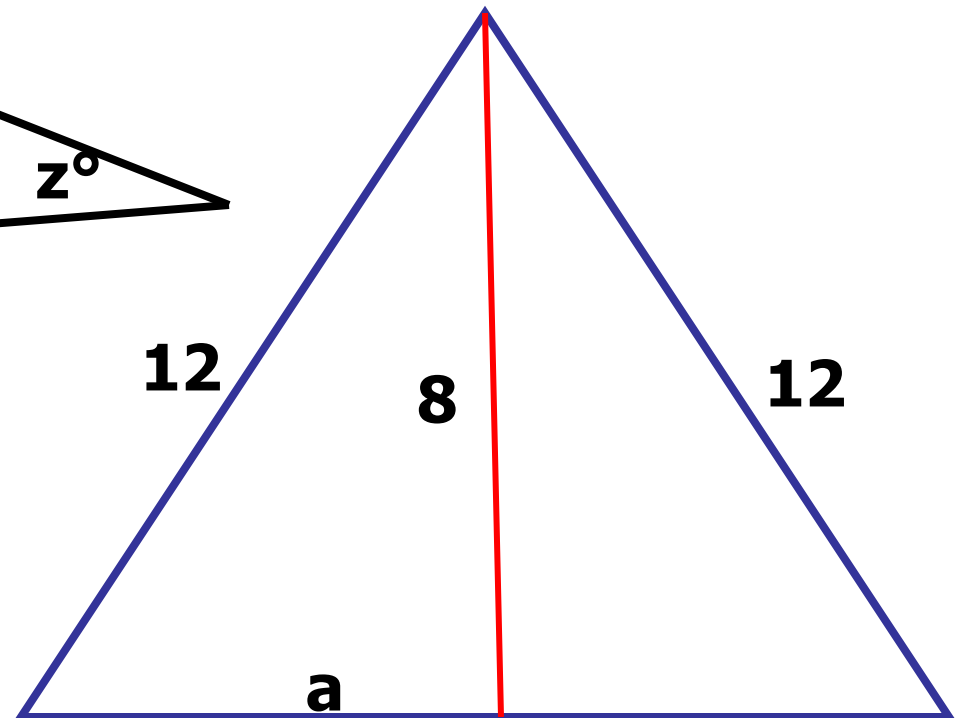


$$x = 70^\circ$$

$$y = 31^\circ$$

$$z = 39^\circ$$

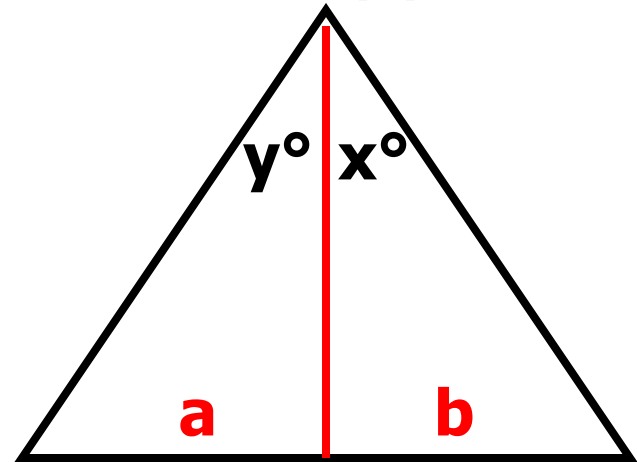
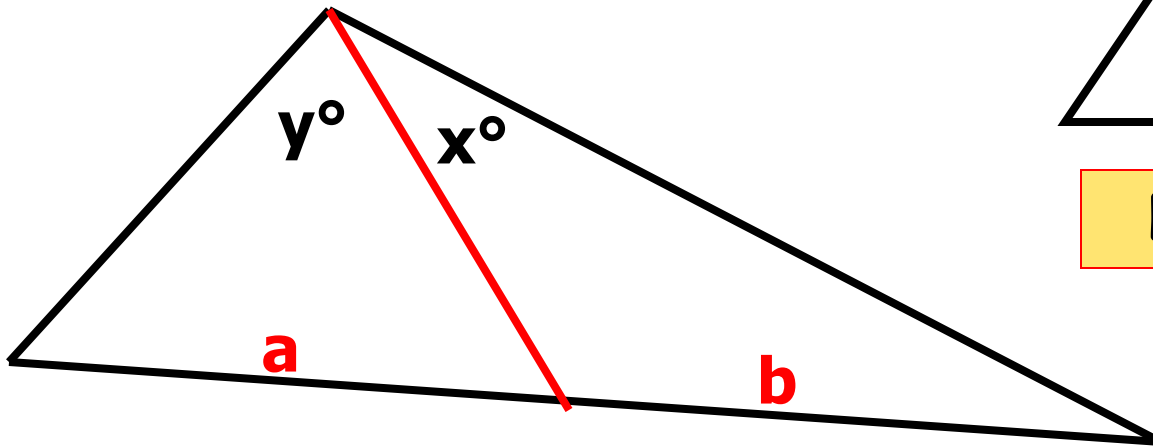
$$a = \sqrt{80}$$



Medians

- A **Median** is a segment whose endpoints are a vertex and the midpoint of the opposite side of a triangle.

Draw the medians of the triangles below



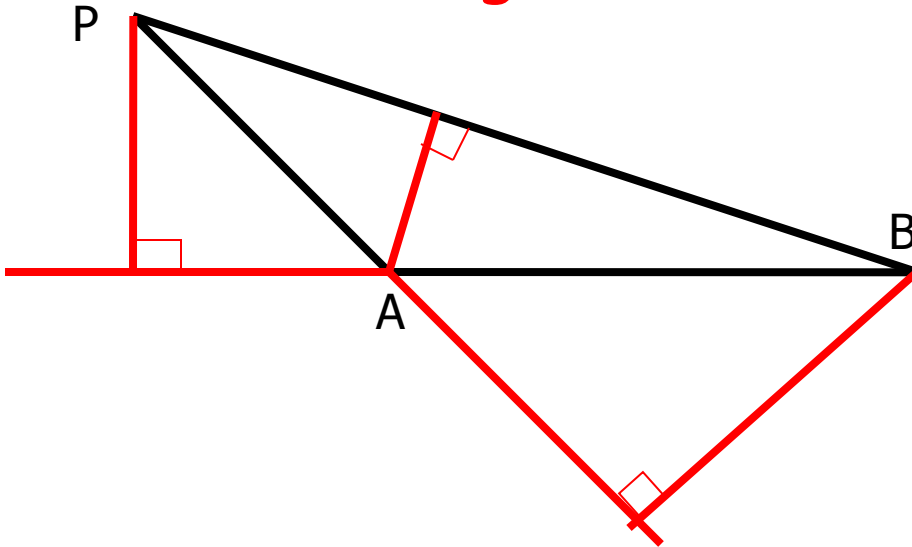
Does $x = y$???

Does $a = b$???

Altitude

The **Altitude** of a triangle is a segment from a vertex to the line containing the opposite side, and perpendicular to that side.

Draw the Altitudes for the Triangle



Remember:

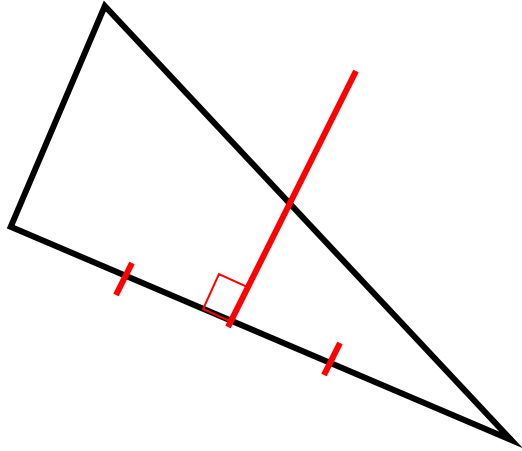
How to find the area of a Triangle

$$A = \frac{1}{2} b h$$

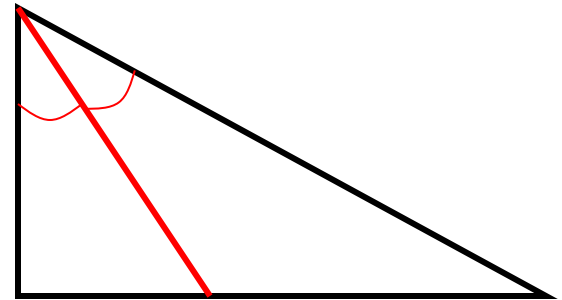
Special Segments

Identify the Special Segment in the picture

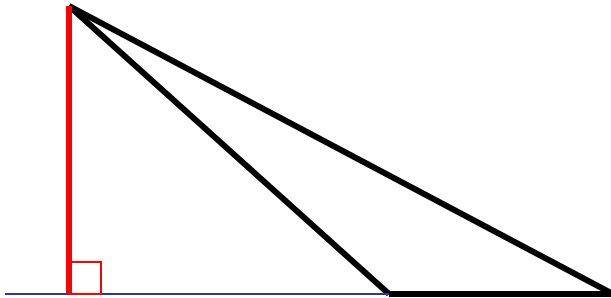
1.



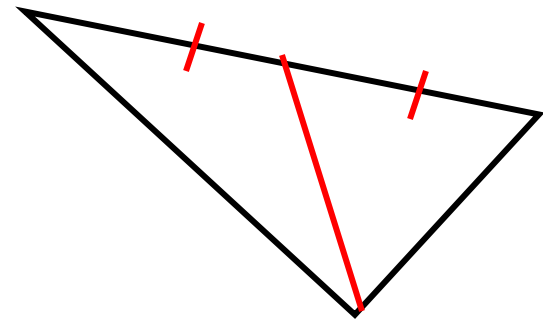
2.



3.

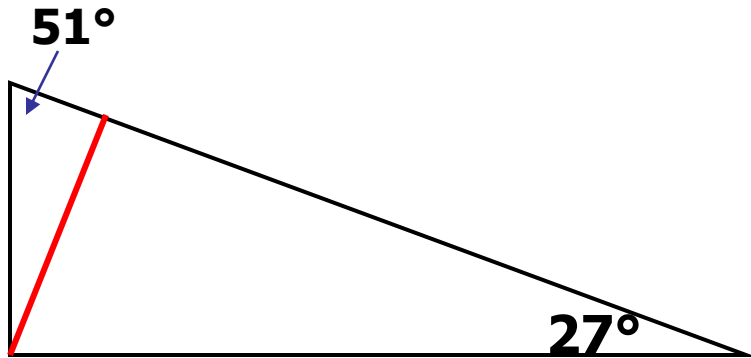


4.

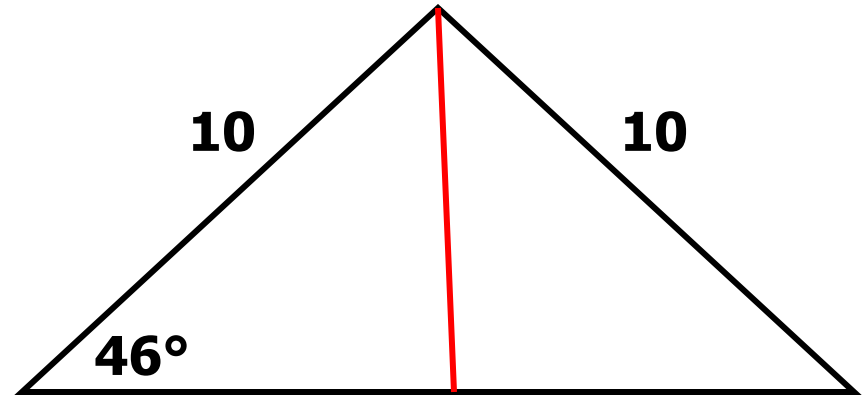


Find Every measurement you can

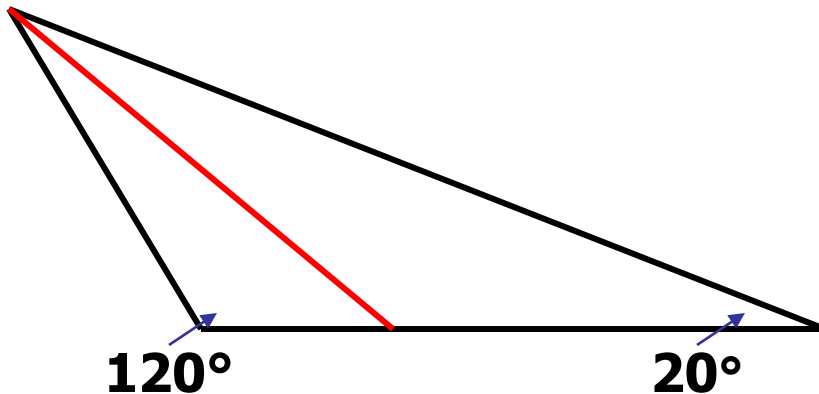
Given an altitude



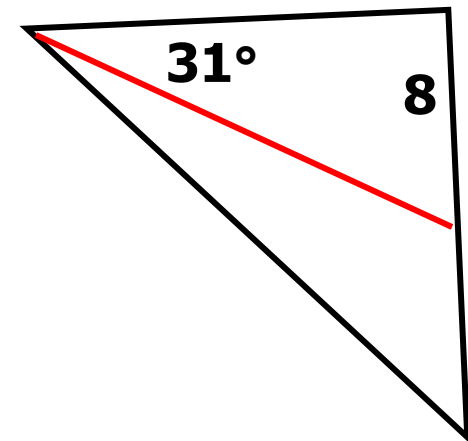
Given the \perp bisector



Given an Angle Bisector



Given a Median



Proof

Given: $m\angle B = 66$ and $m\angle C = 50$

\overline{AD} bisects $\angle BAC$.

Prove: $m\angle ADC = 98$

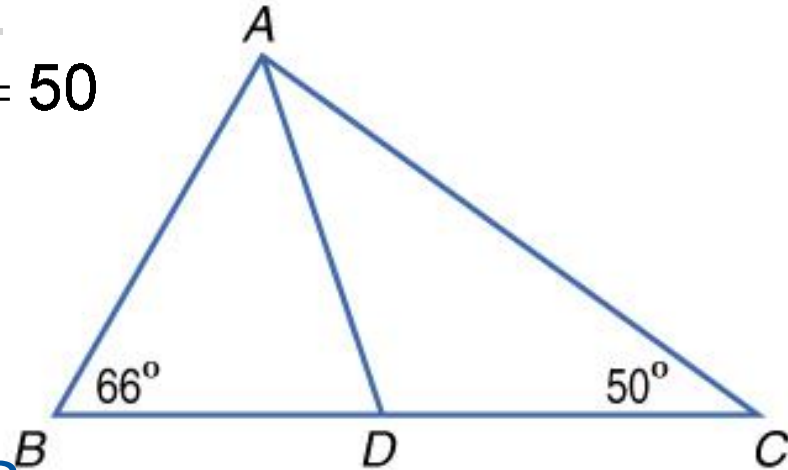
Proof:

Statements

1. $m\angle B = 66$, $m\angle C = 50$, and \overline{AD} bisects $\angle BAC$.
2. $m\angle BAC + m\angle B + m\angle C = 180$
3. $m\angle BAC + 66 + 50 = 180$
4. $m\angle BAC = 180 - 116 = 64$
5. $m\angle DAC = 32$
6. $m\angle DAC + m\angle C + m\angle ADC = 180$
7. $32 + 50 + m\angle ADC = 180$
8. $m\angle ADC = 180 - 82 = 98$

Reasons

1. Given
2. Angle Sum Theorem
3. Substitution
4. Subtraction Property
5. **Definition of Angle Bisector**
6. Angle Sum Theorem
7. Substitution
8. Subtraction Property





Homework

- Pages 275 – 277; #4 – 8 (even), 11, 13, 22, 26, 36, and 37
(9 problems)