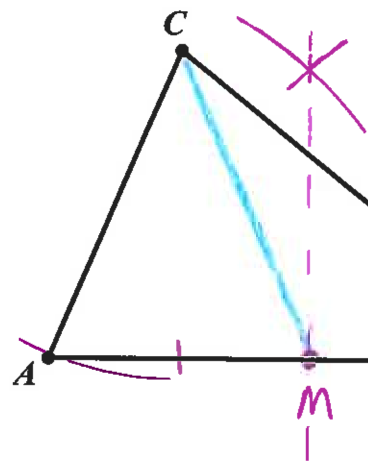
Geometry – Mr. Bo
Unit 5 – Day 1

Name:______________________
Date: ______________________

Triangle Medians, Altitudes, & Midsegments

Triangle Median: a Segment from a vertex to the midpoint of the opposite side.



$\overline{CM}$ is a median.

note: * every $\triangle$ has 3 medians.

Notice:

A triangle **Median** is also a Segment bisector, so the "Rainbow connection" can be used.

Example:

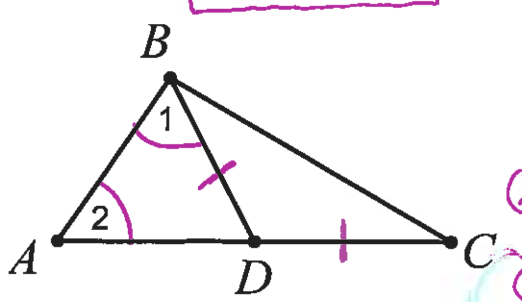
Given: $\angle 1 \cong \angle 2$
$\overline{BD} \cong \overline{CD}$

Prove: $\overline{BD}$ is a median of ΔABC

must get midpt D

must get $\overline{AD} \cong \overline{CD}$

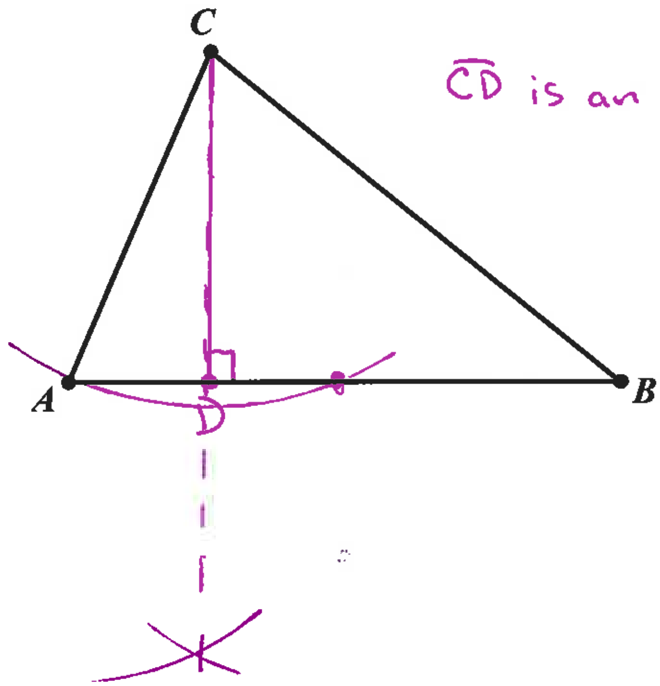
there are no $\cong$ $\triangle$'s to use for this!



Just like the "Rainbow" connection

Statement	Reason
① $\angle 1 \cong \angle 2$, $\overline{BD} \cong \overline{CD}$	① Given
② $\overline{BD} \cong \overline{AD}$	② In a $\triangle$, sides opp. $\cong$ <'s are $\cong$.
③ $\overline{AD} \cong \overline{CD}$	③ Transitive.
④ D midpt of $\overline{AC}$	④ midpoint made from 2 $\cong$ segs.
⑤ $\overline{BD}$ is a median of $\triangle ABC$.	⑤ median goes from vertex to midpt. of opp side.

Triangle Altitude: a segment from a vertex, ⊥ to the opp. side.



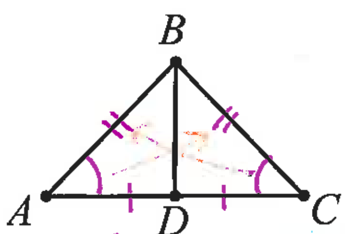
$\overline{CD}$ is an Altitude.

Example:

Given: $\angle A \cong \angle C$

$\overline{AD} \cong \overline{CD}$

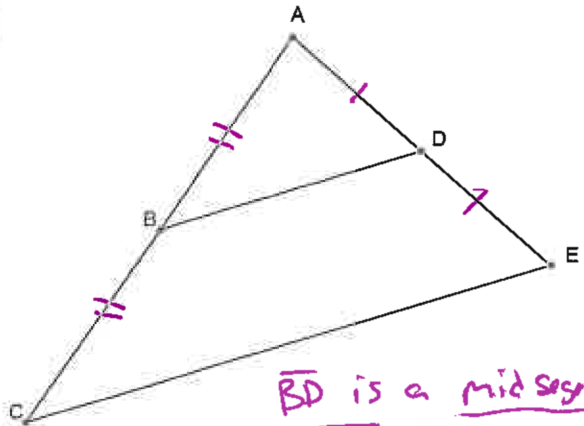
Prove: $\overline{BD}$ is an $\boxed{\text{altitude of } \Delta ABC}$ ← need $\boxed{\overline{BD} \perp \overline{AC}}$ ← need $\boxed{\angle ADB \cong \angle CDB}$ ← $\boxed{\text{use the } \cong \Delta\text{'s}}$ SAS



SAS

Statement	Reasons
① $\angle A \cong \angle C$ $\overline{AD} \cong \overline{CD}$	① Given
② $\overline{AB} \cong \overline{CB}$	② In a Δ, sides opp. ≅ <'s are ≅.
③ $\Delta ABD \cong \Delta CBD$	③ SAS
④ $\angle ADB \cong \angle CDB$	④ Corr. parts ≅ Δ's are ≅.
⑤ $\overline{AC} \perp \overline{BD}$	⑤ 2 lines that intersect and make ≅ adj <'s are ⊥.
⑥ $\overline{BD}$ is an altitude of ΔABC.	⑥ An altitude goes from a vertex ⊥ to the opp. side.

Triangle Midsegment: Connects the midpoints of 2 sides of a triangle.



Triangle Midsegment Theorem:

If a segment joins the midpoints of two sides of a triangle, then the segment is:

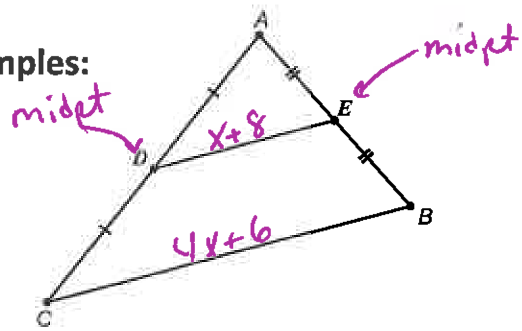
1. parallel to the third side.
2. $\frac{1}{2}$ as long as the third side.

$\overline{BD}$ is a midsegment

So: (1) $\overline{BD} \parallel \overline{CE}$

(2) $2(BD) = CE$

Examples:



a)

$DE = x + 8$

$CB = 4x + 6$

Find CB

$\overline{DE}$ is a midsegment.

$2(DE) = CB$

$2(x+8) = 4x+6$

$2x + 16 = 4x + 6$

$10 = 2x$

$\boxed{x = 5}$

$\boxed{CB = 26}$

b)

$m\angle ADE = 4y - 56$

$m\angle ACB = 6y - 102$

Find $m\angle ACB$

$\overline{DE}$ is a midsegment.

$\rightarrow \overline{DE} \parallel \overline{CB}$

$\rightarrow \angle ADE \cong \angle ACB$ (corr. ∠'s ≅)

$4y - 56 = 6y - 102$

$2y = 46$

$y = 23$

$m\angle ACB = 6(23) - 102 = \boxed{36^\circ}$