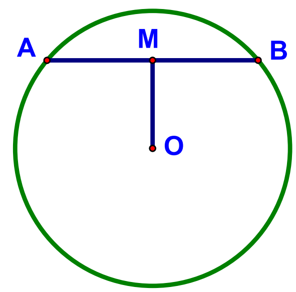
Beyond CPCTC - Lesson 3-4

Here's today's warmup!

Given: $\odot O$
$\overline{AM} \cong \overline{BM}$

Prove: $\angle AMO \cong \angle BMO$

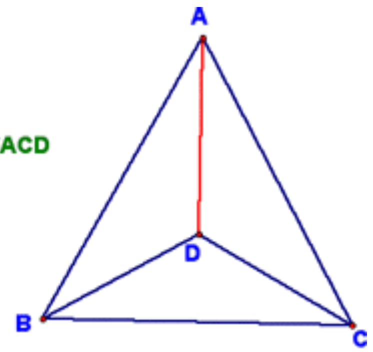


Statements	Reasons

In order to do this warmup, you need to be able to use "auxiliary lines"

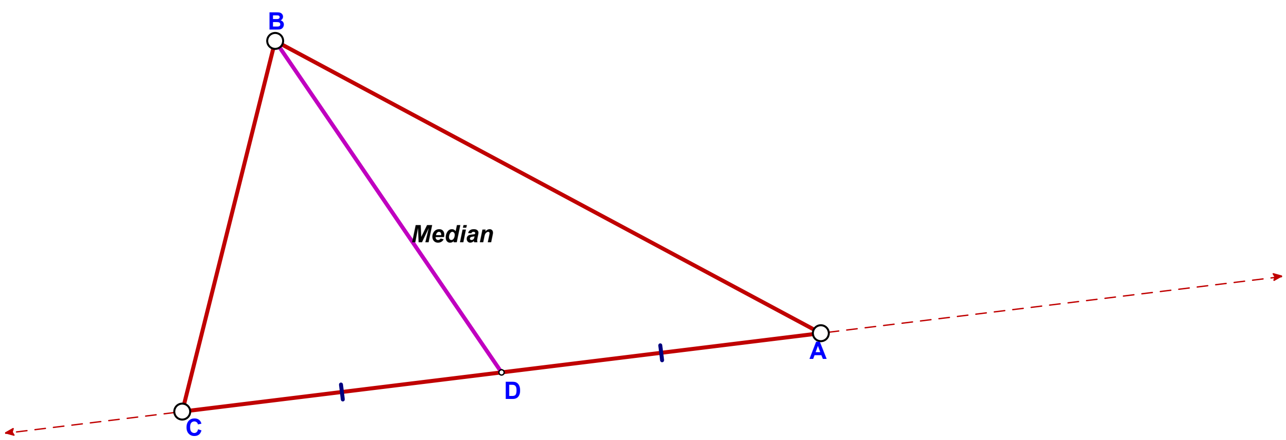
Given: $\overline{AB} \cong \overline{AC}$, $\overline{BD} \cong \overline{CD}$

Prove: $\angle ABD \cong \angle ACD$

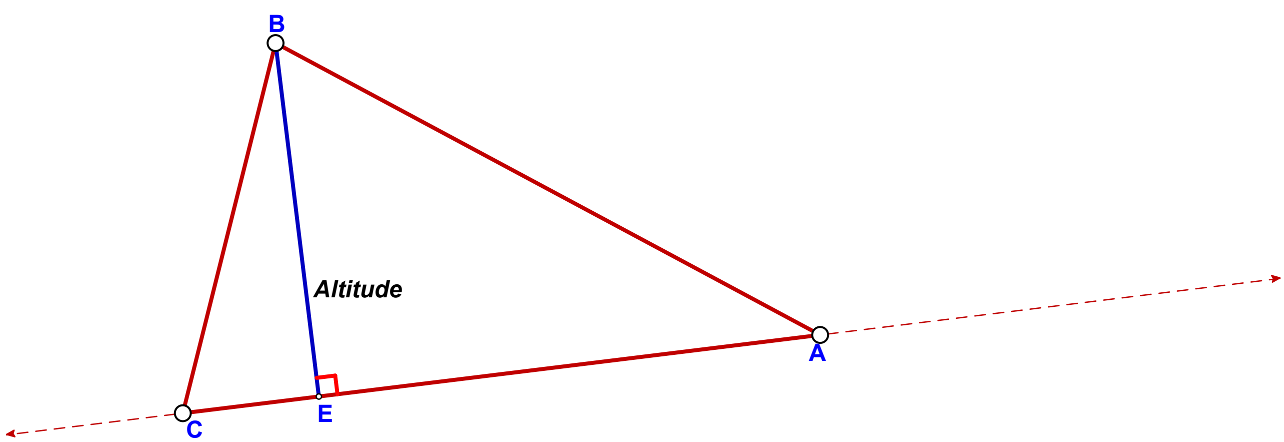


Two points determine a line (or ray or segment).

We'll start today by learning a couple of new definitions:

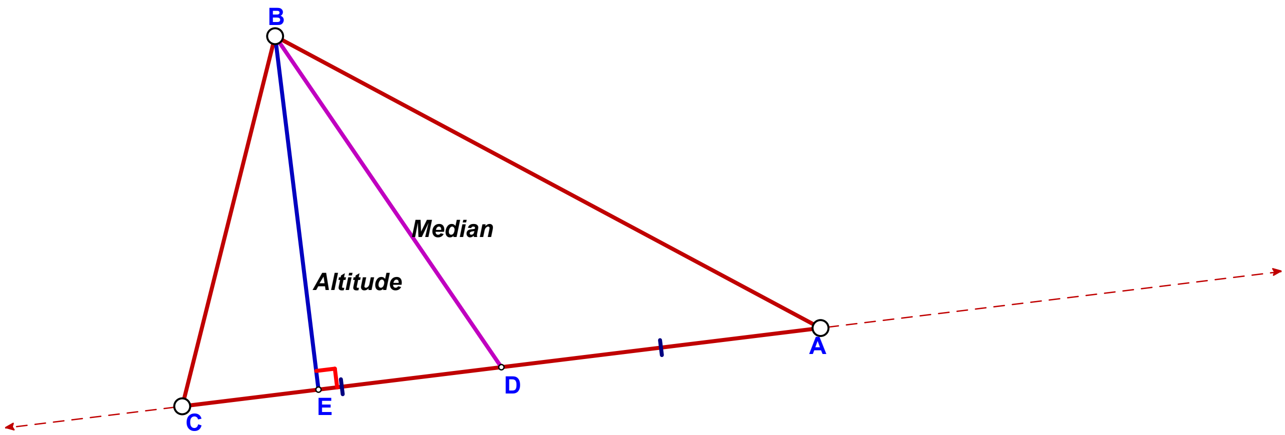


A ***median of a triangle*** is a segment connecting the midpoint of a side to the opposite vertex.

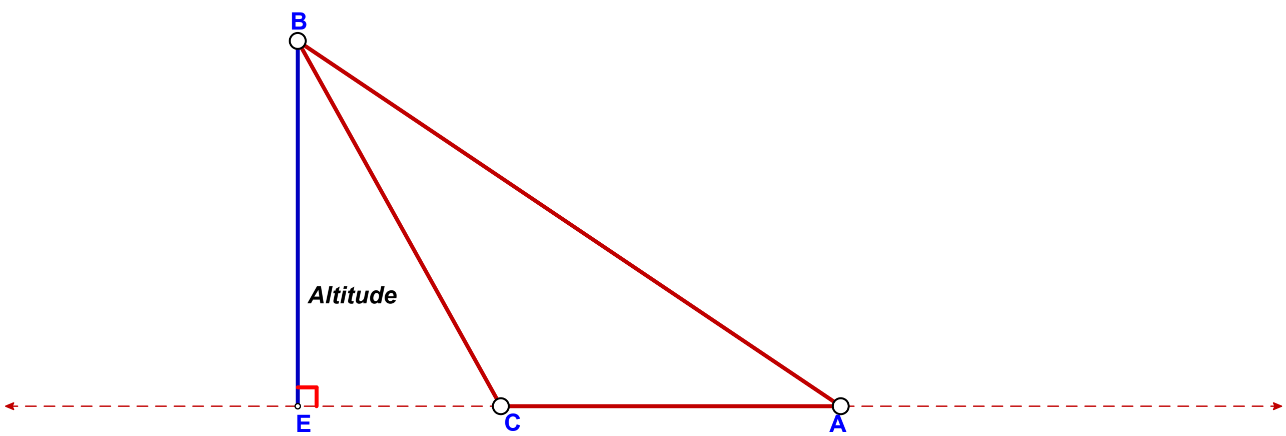


An ***altitude of a triangle*** is a perpendicular segment from a vertex to the opposite side or the line containing the opposite side.

Note that these are not the same thing, as can be seen by the diagram below:

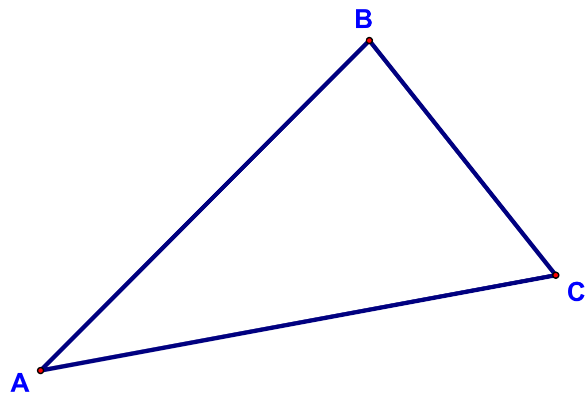


Also note that an altitude can be outside the triangle (if the triangle is obtuse):

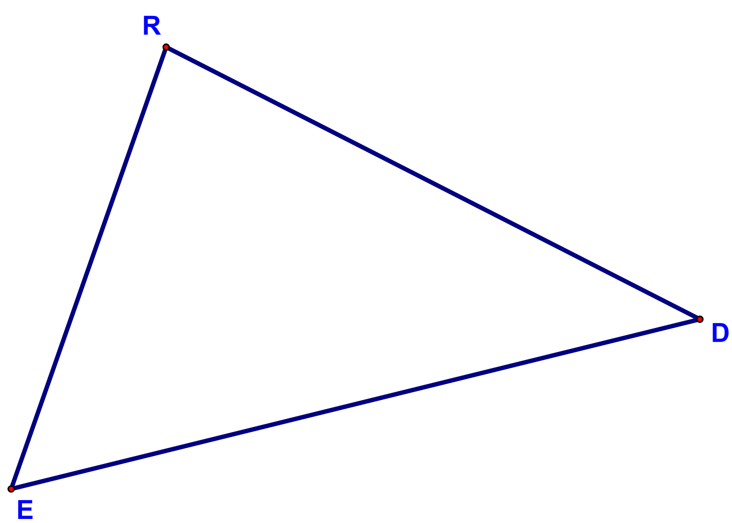


You should also know that there are three altitudes and medians in any triangle.

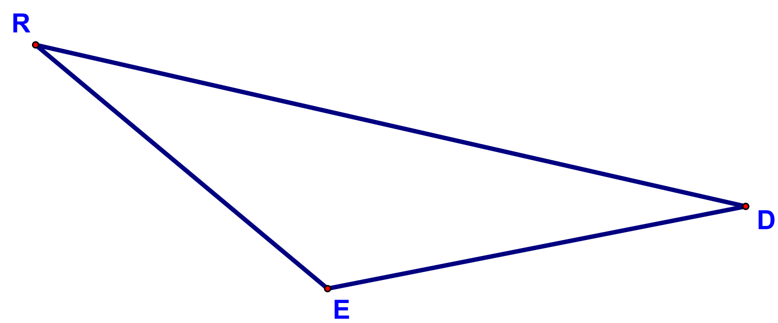
Next, let's learn how to construct these! We'll start by constructing a median. In order to do that, you'll need a triangle (any triangle will do). Follow the instructions on the video to construct median $\overline{BM}$.



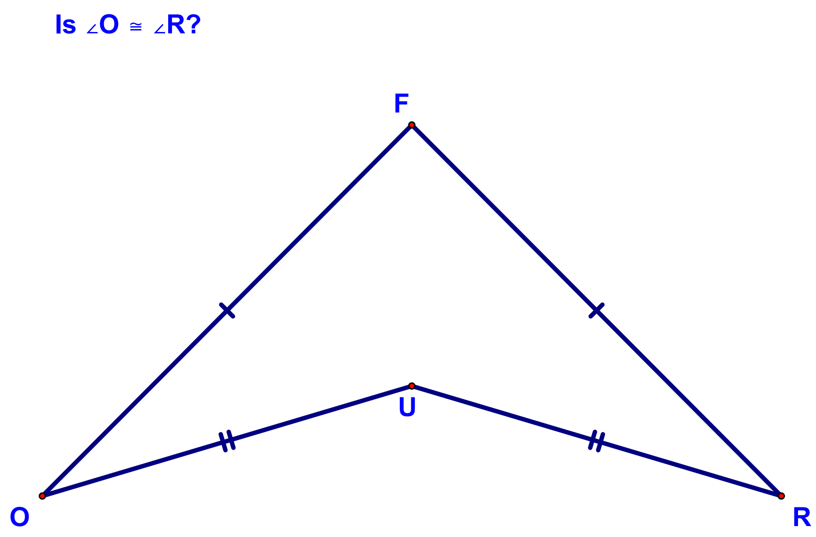
Next, let's construct an *altitude of an acute triangle*. You should know how to do this using the construction of a perpendicular to a line from a point not on the line. Construct altitude $\overline{RT}$ for $\triangle$ RED shown below.



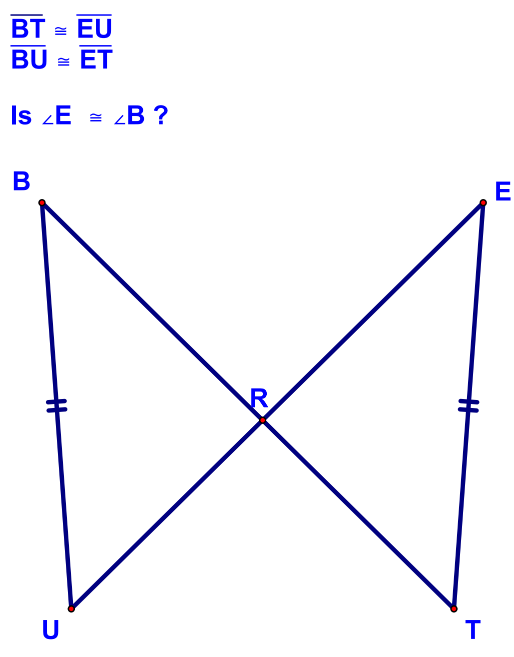
Finally, I'd like you to use the same construction to construct an altitude for an obtuse triangle. The only trick here is that you need to extend the side opposite from the vertex in order to make the perpendicular. Construct altitude $\overline{RG}$ for the triangle shown!



Now, let's go through a couple of examples of using auxiliary lines



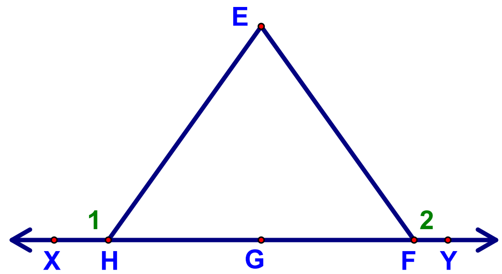
How about this example…can you show that ∠E ≅ ∠B?



We'll wrap up today with an example proof...

Given: G is the midpoint of $\overline{HF}$
$\overline{EF} \cong \overline{EH}$

Prove: $\angle 1 \cong \angle 2$



Statements	Reasons