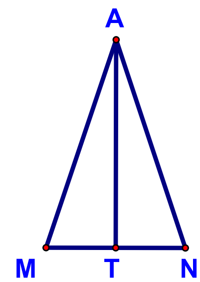
Angle-Side Theorems - Lesson 3-7

Here's today's warmup!

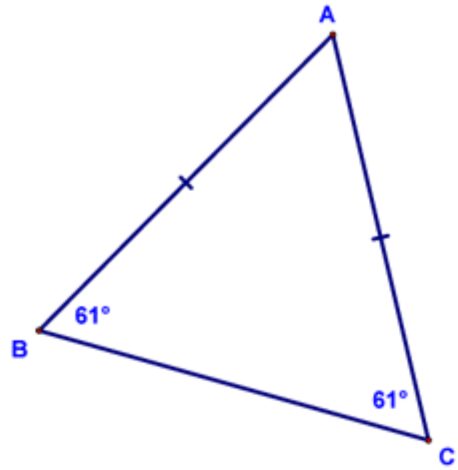
Given: $\overline{AM} \cong \overline{AN}$
$\overline{AT}$ is the median of $\triangle AMN$

Prove: $\angle M \cong \angle N$



Statements	Reasons

Today, we're going to cover two new properties regarding isosceles triangles:

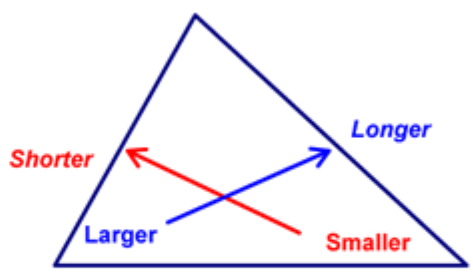


Theorem 20 - **If two sides of a triangle are congruent, then the angles opposite the sides are congruent (ITT).**

Theorem 21 - **If two angles of a triangle are congruent, then the side opposite the angles are congruent (Converse of ITT).**

Sometimes, students get these two theorems mixed up, but you should be able to keep the straight if you think about the fact that ITT stands for *Isosceles Triangle* Theorem…you can only use it if you know that it's an *isosceles* triangle, right? Well, isosceles triangles have at least 2 congruent sides…so ITT is sides implies angles…converse of ITT is angles implies sides!

There are two new postulates you need to know as well, which will be used in restrictions type problems. Neither of these will be used in proofs, but they are useful for some of the kinds of homework (and quiz/test!) problems that we'll be doing.



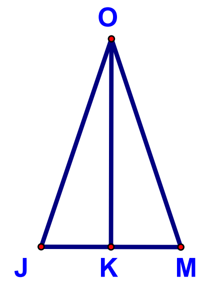
If two sides of a triangle are not congruent, then the angles opposite them are not congruent, and the larger angle is opposite the longer side.

If two angles of a triangle are not congruent, then the sides opposite them are not congruent, and the longer side is opposite the larger angle.

OK…time for a couple of examples…let's start with the following:

Given: $\triangle JOM$ is isosceles with $\angle JOM$ the vertex $\angle$
$\overrightarrow{OK}$ bisects $\angle JOM$

Prove: $\overline{OK}$ is the median to the base

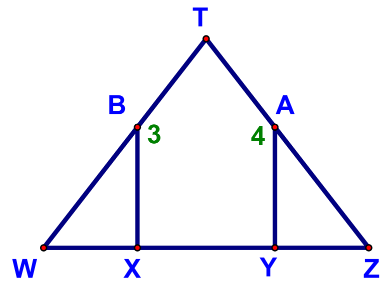


Statements	Reasons

And wrap up the section with this proof, which requires one of our new theorems!

Given: $\overline{BX} \cong \overline{AY}$
$\overline{BW} \cong \overline{AZ}$
$\angle 3 \cong \angle 4$

Prove: $\triangle WTZ$ is isosceles



Statements	Reasons