Lesson 10

Glencoe Geometry Chapter 4.6

Analyzing Isosceles Triangles

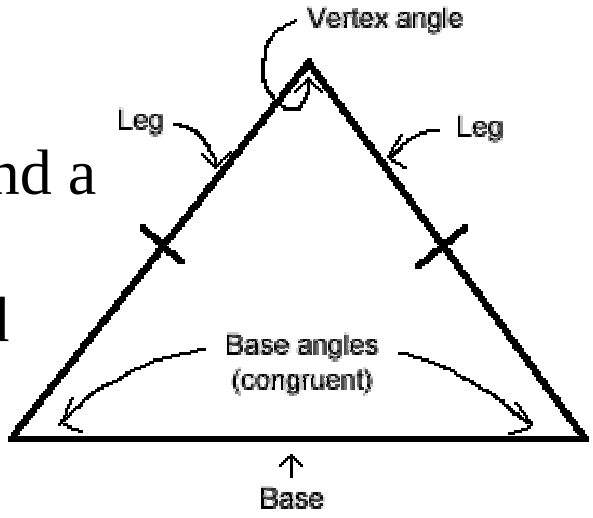
By the end of this lesson, you should be able to

1. Use properties of isosceles and equilateral triangles.
2. Look forward to next week's show.

This week we are AGAIN sticking with our topic from the last two weeks: **TRIANGLES**

Today, we are going to focus primarily on the properties of isosceles triangles, which will naturally lead us into the realm of equilateral triangles as well.

To review:
An ***isosceles triangle*** has at least two congruent sides called ***legs*** and a third side called the ***base***. The ***vertex angle*** is the angle included by the legs. The other two angles are called ***base angles***. The base angles are congruent.



Isosceles Triangle

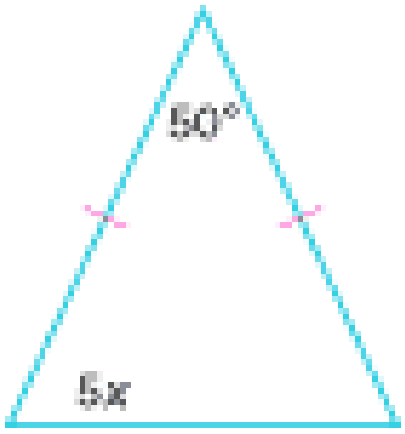
There are a few special rules to learn and remember when dealing with isosceles triangles. The following is called the **ISOSCELES TRIANGLE THEOREM.**

THEOREM: If two sides of a triangle are congruent *(like in any isosceles triangle)*, then the angles opposite those sides are congruent.

Example:

Find the value of *x*.

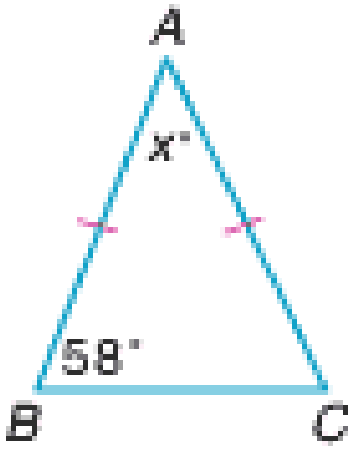
A. 20
B. 10
C. 26
D. 13



Example:

What is the value of *x*?

A. 122°
B. 58°
C. 65°
D. 64°



Example:

In isosceles $\triangle PQR$, with base $\overline{QR}$, $PQ = 2x + 3$, and $PR = 9x - 11$. What is the value of x?

A. –7 B. 7 C. $\frac{8}{11}$ D. 2

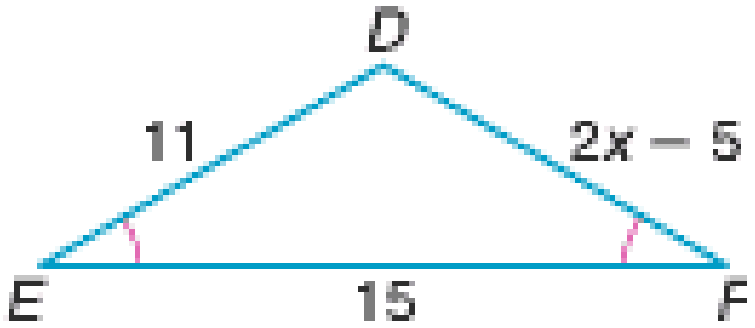
The converse of the **ISOSCELES TRIANGLE THEOREM** is also true.

THEOREM: If two angles of a triangle are congruent *(like the base angles in any isosceles triangle)*, then the sides opposite those angles are congruent.

Example:

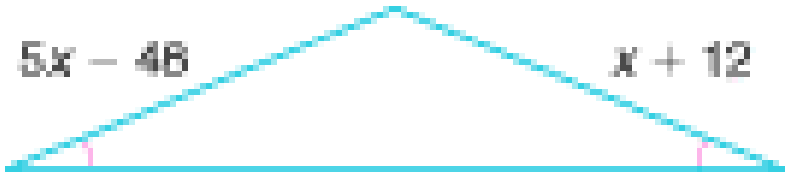
Find the value of x.

A. 9
B. 10
C. 8
D. 3



Example:

What is the value of each of the two sides opposite the congruent angles?



A. 39
B. 15
C. 75
D. 27

Example:

In isosceles $\triangle ABC$ with base $\overline{AC}$, $m\angle A = 3x + 9$, and $m\angle C = 5x - 13$, Find the measure of $\angle B$.

A. 34
B. 96
C. 42
D. 52

Example:

If two angles of an isosceles triangle are each twice the measure of the other angle, what is the measure of this other angle?

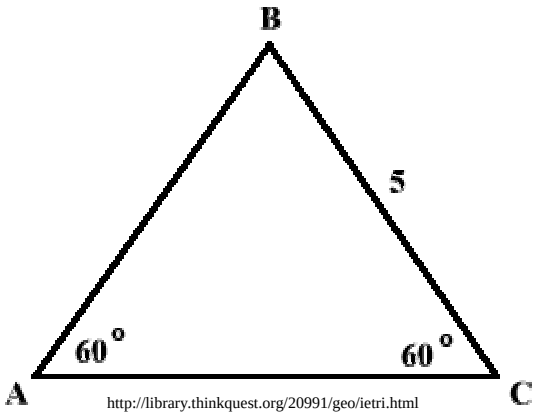
A. 36°
B. 72°
C. 64°
D. 18°

The **ISOSCELES TRIANGLE THEOREM** leads to two important **corollaries**. (A ***corollary*** is just a natural or immediate consequence of a proven theorem that requires little or no proof).

COROLLARY: A triangle is equilateral IFF it is equiangular
COROLLARY: A triangle is equilateral IFF each angle measures 60°

Example:

Find *AB* and *AC* in the given triangle.



http://library.thinkquest.org/20991/geo/ietri.html

RANDOM JOKE INSERTION:

Q: What did the complementary angle say to the isosceles triangle?

A:

Say What??!!

1. How many sides are congruent on an isosceles triangle?
2. What side of an isosceles triangle is not equal to the rest?
3. Besides the two legs, what else is congruent in an isosceles triangle?
4. How many sides are equal on an equilateral triangle?
5. Are the angle measures different in an isosceles triangle?
6. What is the measure of an angle in an equilateral triangle?
7. You are given a triangle you know to be isosceles. You find a base angle to measure 60 degrees, what conclusion can you make?
8. A given triangle has 2 congruent sides and one angle measure of 70 degrees. What type of triangle is this?
9. Given that a triangle is equilateral and that one side is 20, what are the measures of the other sides?
10. One of the base angles of an isosceles triangle measures 45 degrees, what is the vertex angle's measure?

*all graphics and many examples are from www.glencoe.com