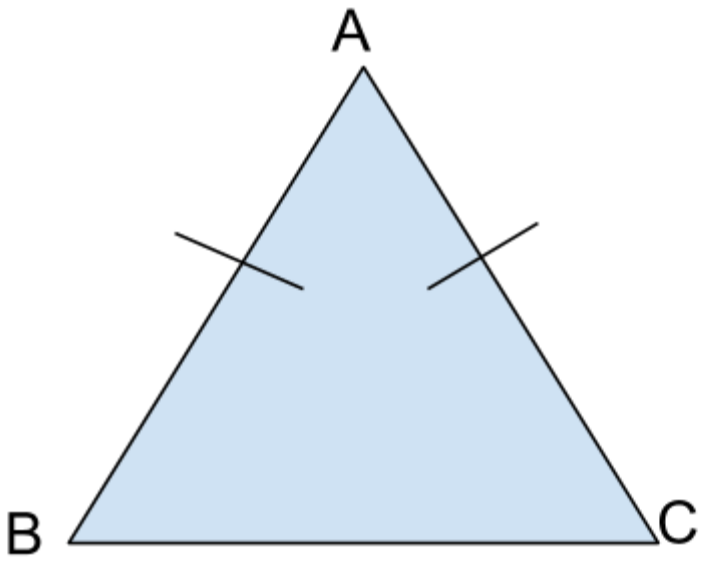
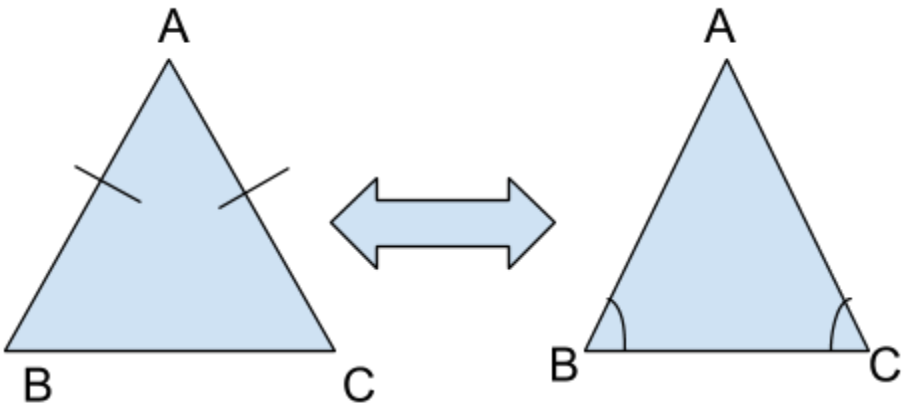
Isosceles and Equilateral Triangle Theorem Notes



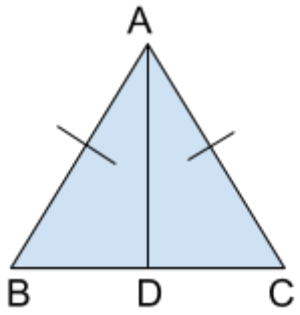
Vocabulary: < A: called the vertex angle, the congruent sides AB and AC are called the legs of the isosceles triangle and Side BC is called the base of the isosceles triangle. Angles B and C are the base angles.

There are two theorems about Isosceles Triangles and both are related but each has a separate proof. For simplicity to remember the theorems the following biconditional statement can be used to remember both.



A triangle is isosceles if and only if the base angles are congruent.

Proof that the base angles of an isosceles triangle are congruent. (Isosceles Triangle Theorem)

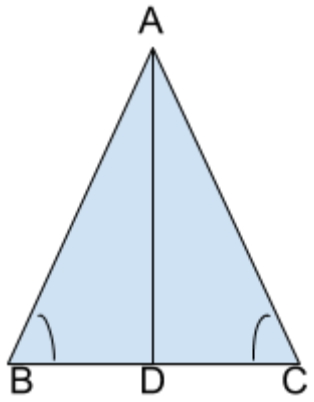


Given: $\overline{AB} \cong \overline{AC}$

Prove: $\angle B \cong \angle C$

1. $\overline{AB} \cong \overline{AC}$	1. Given
2. Draw $\overline{AD}$ such that $\overline{AD}$ *bisects* $\angle BAC$	2. Construction
3. $\angle DAB \cong \angle DAC$	3. Def of bisect
4. $\overline{AD} \cong \overline{AD}$	4. Reflexive Prop
5. $\Delta DAB \cong \Delta DAC$	5. SAS
6. $\angle B \cong \angle C$	6. CPCTC

Proof of the Converse of the Isosceles Triangle Theorem
(If the base angles are congruent the sides are congruent)



Given: $< B \cong < C$

Prove: $\overline{AB} \cong \overline{AC}$

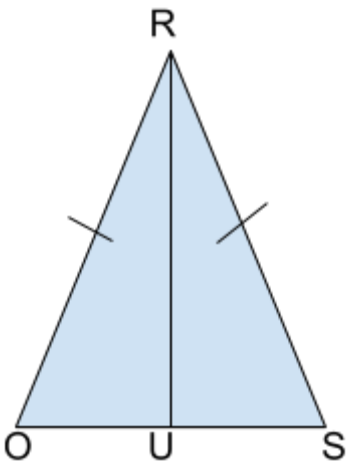
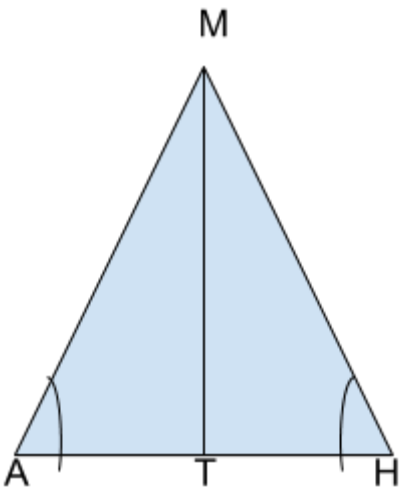
1. $< B \cong < C$	1. Given
2. Draw $\overline{AD}$ such that $\overline{AD}$ bisects <BAC	2. Construction
3. $< DAB \cong < DAC$	3. Def of bisect
4. $\overline{AD} \cong \overline{AD}$	4. Reflexive prop
5. $\Delta BAD \cong \Delta CAD$	5. AAS
6. $\overline{AB} \cong \overline{AC}$	6. CPCTC

From these two theorems, what is also true?

a) Point D is a Midpoint.

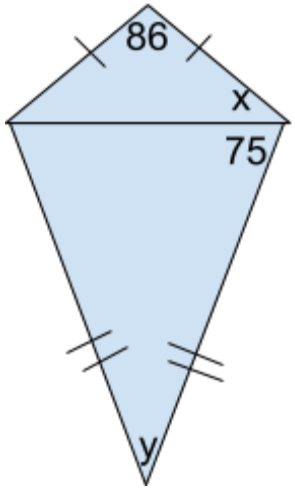
b) <ADB and <ADC are Right angles.

So practical questions:

1.  If RO = 9x - 14 and RS = -3x + 34, solve for x and what is RO and RS? 9x - 14 = -3x +34	2.  If m<TMH = 24 degrees then what is the measure of <'s A and H? 90-24 = 66

12x = 48
X = 4

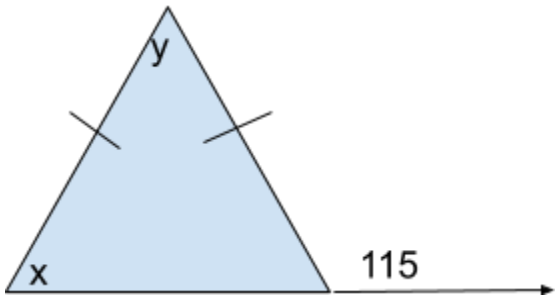
9*4 - 14 = 22 = RO
-3 *4 + 34 = RS



3. Solve for x and y

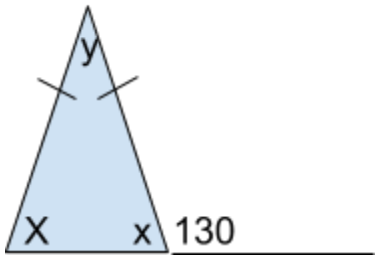
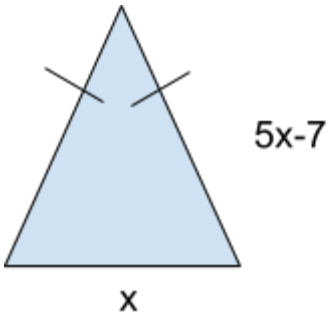
X + x + 86 = 180
2x + 86 = 180
2x = 94
X = 47

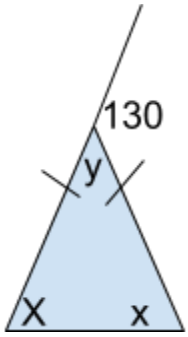
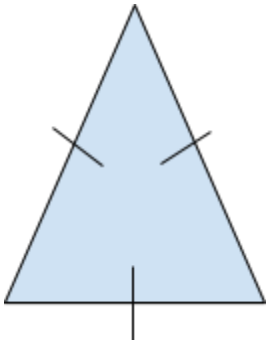
75 + 75 + y = 180
150 + y = 180
Y = 30



4. Solve for x and y

180 - 115 = 65 = x
65 + y =115
Y = 50

5. Suppose you have an exterior angle of an isosceles triangle that measures 130 degrees. What could be the interior angles?  180-130= 50 = x 50 + 50 + y = 180 100 + y = 180 Y = 80	6. Suppose the perimeter of an isosceles triangle is 63 with the base length is x and one of the legs is 5x -7. Solve for x and what is the length of each side?  X + 5x - 7 + 5x - 7 = 63 11x - 14 = 63 11x = 77 X = 7 Base = 7 5(7) - 7 = 28 = legs

50,50,80 or	
 180-130 = y Y = 50 X + x = 130 2x = 130 X = 65 50, 65,65	 7. What is the measure of each angle? 180/3 = 60