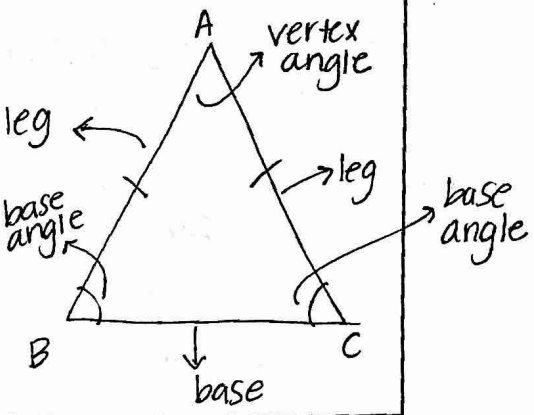
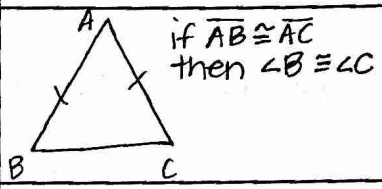
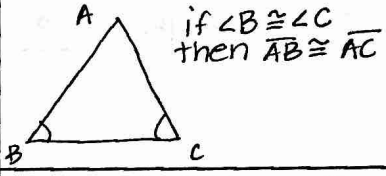
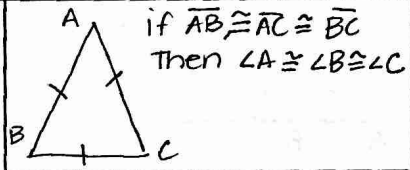
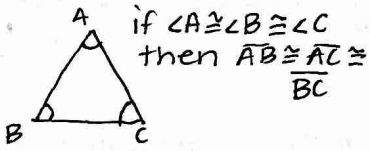
4.7 Use Isosceles and Equilateral Triangles

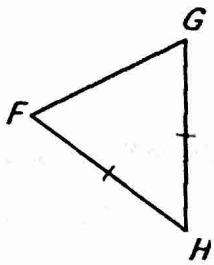
Key

Term	Definition	Example
parts of an isosceles triangle	• **Vertex Angle**— angle formed by the two equal sides • **Legs**— the two equal sides of the Δ. • **Base**— the other two ∠'s of the triangle • **Base Angles**— third side of the Δ.	
Theorem 4.7 Base Angles Theorem	If two sides of a triangle are congruent, then the angles opposite them are congruent.	
Theorem 4.8 Converse of Base Angles Theorem	If two angles of a triangle are congruent, then the sides opposite them are congruent.	
Corollary to the Base Angles Theorem	If a triangle is equilateral, then it is equiangular.	
Corollary to the Converse of Base Angles Theorem	If a triangle is equiangular, then it is equilateral.	

Examples:

1. In ΔFGH, $\overline{FH} \cong \overline{GH}$. Name two congruent angles.

$\angle F \cong \angle G$

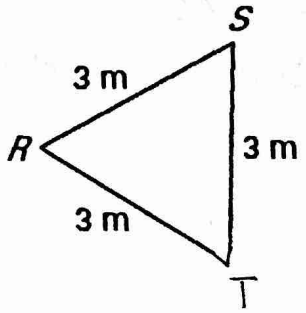


2. Find the measures of $\angle R$, $\angle S$, and $\angle T$.

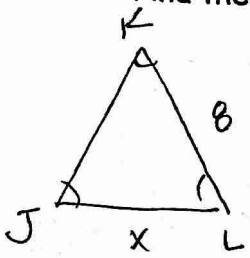
ΔRST is equilateral so $\angle R \cong \angle S \cong \angle T$

Therefore

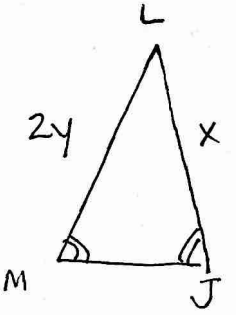
$\angle R, \angle S, \angle T = 60°$



3. Find the values of x and y in the diagram.



ΔJKL is equilateral so $\boxed{x=8}$

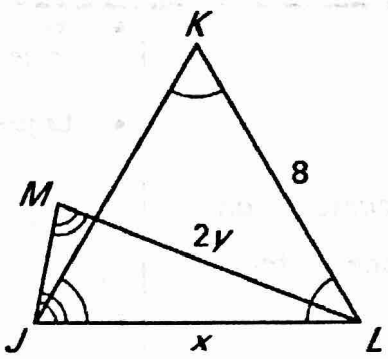


ΔMLJ is isosceles so

$2y = x$

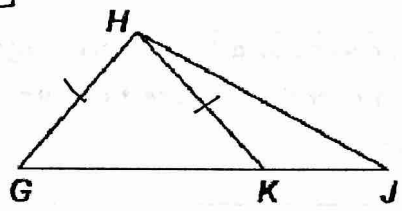
$2y = 8$

$\boxed{y=4}$



3.

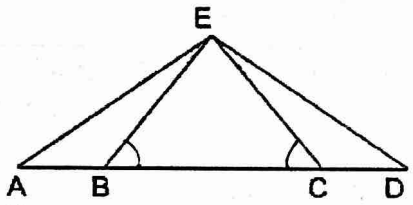
Copy and complete the statement.



If $\overline{HG} \cong \overline{HK}$, then $\angle$? $\cong \angle$?.

G K

4.



Use the diagram to complete the statement.

If $\angle EBC \cong \angle ECB$, then ? $\cong$?.

$\overline{EB}$ $\overline{EC}$

5. (a) Write the converse of the theorem: If a triangle is isosceles, then the base angles are equal.

if the base angles of a Δ are equal, then the Δ is isosceles

(b) Write a proof of the converse written in (part a)

statements	reasons
① $\angle B \cong \angle C$	① given
② $\overline{AB} \cong \overline{AC}$	② Thm 4.8
③ ΔABC is isosceles	③ Def of isosceles Δ.