Geometry 5.4 Notes: Equilateral and Isosceles Triangles

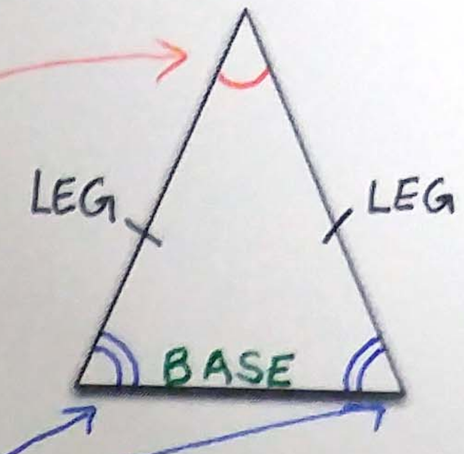
Isosceles Triangles: A triangle is isosceles when it has at least two congruent sides.

→ The two congruent sides are called the LEGS

→ The angle formed by the LEGS is called the VERTEX ANGLE

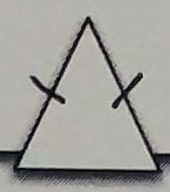
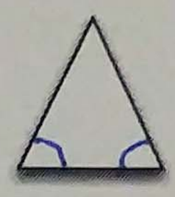
→ The third side is called the BASE

→ The two angles adjacent to the BASE are called the BASE ANGLES



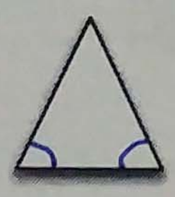
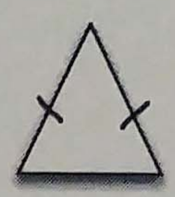
Base Angles Theorem

If two SIDES of a triangle are congruent, then the ANGLES opposite them are congruent.

IF  → 

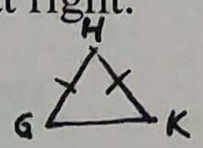
Converse of the Base Angles Theorem

If two ANGLES of a triangle are congruent, then the LEGS opposite them are congruent.

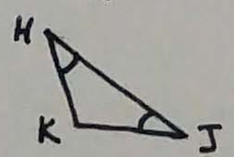
IF  → 

Example:

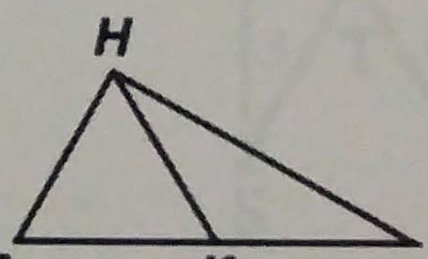
1. Copy and complete the statement. Use the diagram at right.



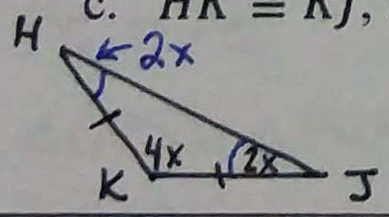
a. If $\overline{HG} \cong \overline{HK}$, then $\angle$ HGK $\cong \angle$ HKG



b. If $\angle KHJ \cong \angle KJH$, then $\overline{HK} \cong \overline{KJ}$



c. $\overline{HK} \cong \overline{KJ}$, $m\angle HKJ = 4x°$ and $m\angle J = 2x°$. Find $m\angle HKJ$.



$2x + 2x + 4x = 180$

$8x = 180$

$x = 22.5$

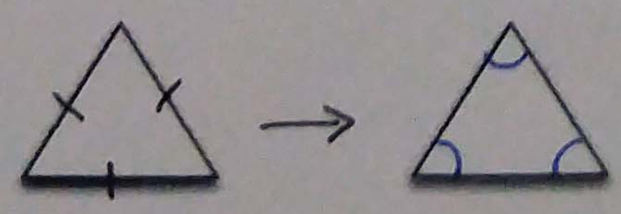
$4(22.5) = \boxed{90°}$

REMEMBER: An equilateral triangle has three congruent sides.

Corollary to the Base Angles Theorem

If a triangle is EQUILATERAL,

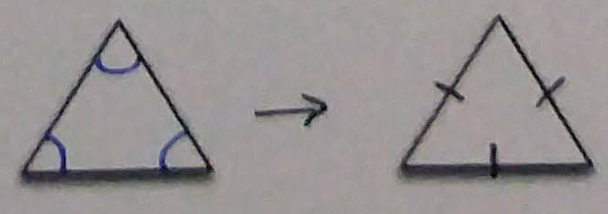
then it is EQUIANGULAR.

IF 

Corollary to the Converse of the Base Angles Thm

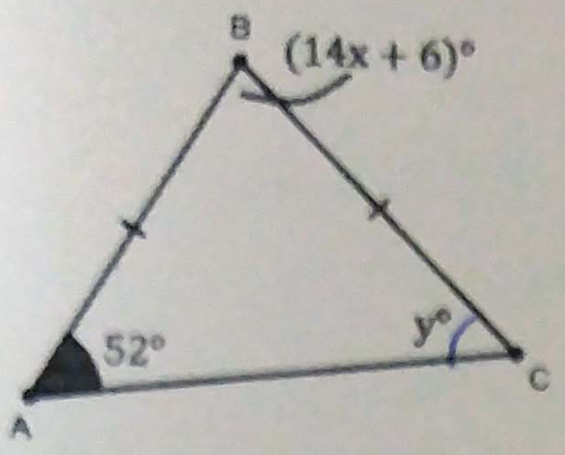
If a triangle is EQUIANGULAR,

then it is EQUILATERAL.

IF 

Example:

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



$y = 52°$

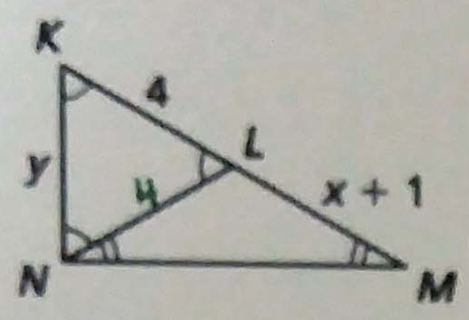
$52 + 52 + 14x + 6 = 180$

$14x + 110 = 180$

$14x = 70$

$x = 5$

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

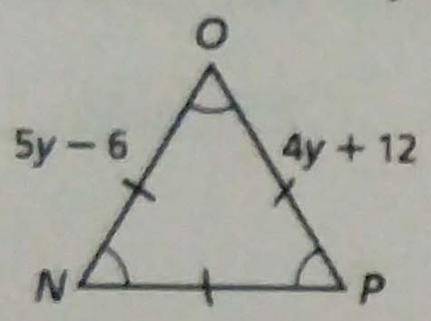


$y = 4$

$x + 1 = 4$

$x = 3$

4. Find the value of y in the diagram.

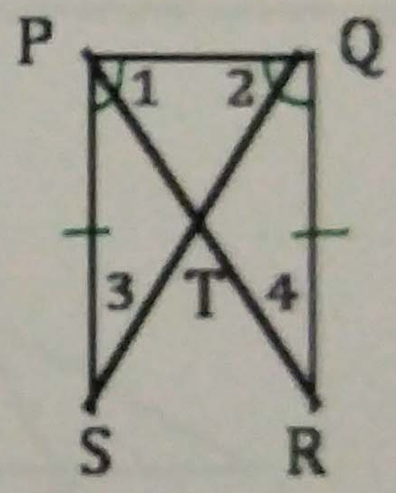


$5y - 6 = 4y + 12$

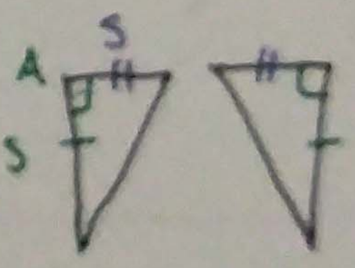
$y = 18$

5. $\overline{PS} \cong \overline{QR}$ and $\angle QPS \cong \angle PQR$.

a. Prove that $\Delta QPS \cong \Delta PQR$



Statements	Reasons
1. $\overline{PS} \cong \overline{QR}$ $\angle QPS \cong \angle PQR$	1. GIVEN
2. $\overline{PQ} \cong \overline{PQ}$	2. REFL. PROP. $\cong$
3. $\Delta QPS \cong \Delta PQR$	3. SAS $\cong$



~~b. Explain why ΔPQT is an isosceles triangle.~~