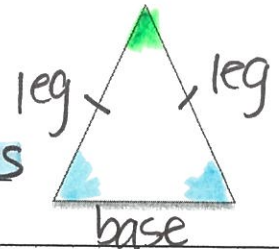


Equilateral and Isosceles Triangles

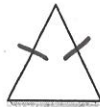
Lesson Objective

INBAT prove and apply thms about isosceles + equilateral Δ s.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



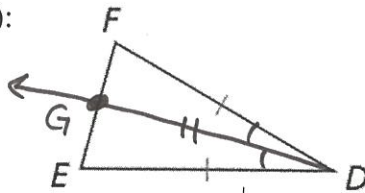
Base Angles Theorem

If two legs of a triangle are congruent, then the base $\angle$ s opposite them are congruent.

Converse of the Base Angles Theorem

If two base $\angle$ s of a triangle are congruent, then the legs opposite them are congruent.

PROOF (of the Base Angles Theorem):

Given: $\overline{DF} \cong \overline{DE}$ Prove: $\angle F \cong \angle E$ 

Statements

Reasons

① $\overline{DF} \cong \overline{DE}$

① given

② Draw $\overrightarrow{DG}$, the $\angle$ bisector of $\angle D$.
(Let G be on $\overline{EF}$).② existence of $\angle$ bisectors

③ $\angle FDG \cong \angle EDG$

③ def of $\angle$ bisector

④ $\overline{DG} \cong \overline{DG}$

④ reflex. prop. $\cong$

⑤ $\triangle FDG \cong \triangle EDG$

⑤ SAS $\cong$

⑥ $\angle E \cong \angle F$

⑥ corresp. parts of $\cong \Delta$ s
~ ~ ~ ~ ~

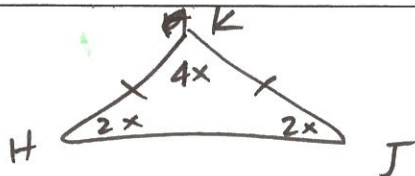
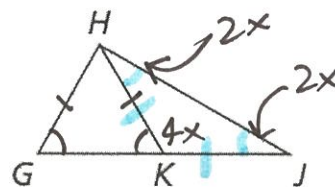
Example:

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

a. If $\overline{HG} \cong \overline{HK}$, then $\angle G \cong \angle H K G$

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

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



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

$$x = 22.5$$

$$m\angle HKJ = 90^\circ$$

REMEMBER: An equilateral triangle has three congruent sides.

Corollary to the Base Angles Theorem

If a triangle is equilateral,
then it is equiangular.



Corollary to the Converse of the Base Angles Thm

If a triangle is equiangular,
then it is equilateral.



What are the measures of each of the angles of equilateral triangle PQR?

$$3x = 180$$

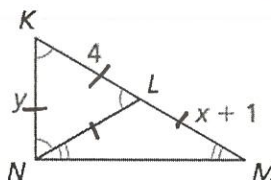
$$x = 60^\circ$$

Example:

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

$$y = 4$$

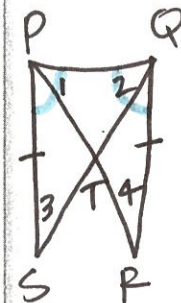
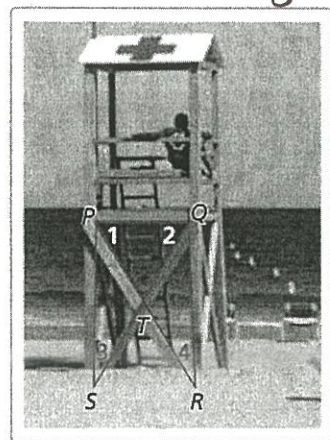
$$x = 3$$



3. In the lifeguard tower, $\overline{PS} \cong \overline{QR}$ and $\angle QPS \cong \angle PQR$.

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

Statements	Reasons



b. Explain why $\triangle PQT$ is an isosceles triangle.