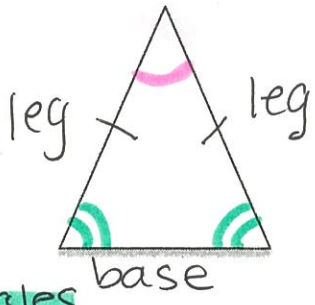
Name: Date: Period: 2

Equilateral and Isosceles Triangles

sson Objective IWBAT use properties of isosceles and equilateral Δs to solve for unknown info



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  →

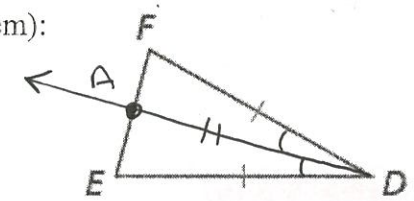
Converse of the Base Angles Theorem

If two angles of a triangle are congruent, then the sides opposite them are congruent.

if  →

PROOF (of the Base Angles Theorem):

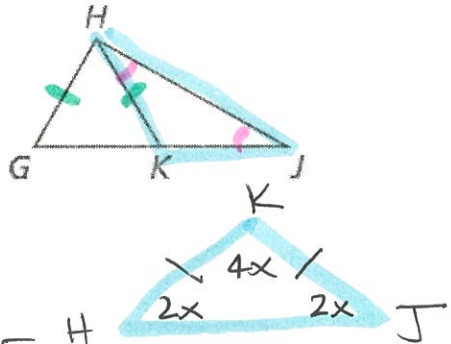
Given: $\overline{DF} \cong \overline{DE}$
Prove: $\angle F \cong \angle E$



Statements	Reasons
① $\overline{DF} \cong \overline{DE}$	① given
② construct $\overrightarrow{DA}$, the ∠ bisector of ∠FDE	② existence of ∠ bisectors
③ ∠FDA ≅ ∠EDA	③ def. of an ∠ bisector
④ $\overline{DA} \cong \overline{DA}$	④ reflex. prop. ≅
⑤ ΔFDA ≅ ΔEDA	⑤ SAS ≅ (1, 3, 4)
⑥ ∠F ≅ ∠E	⑥ corresp. parts of ≅

Example:

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



a. If $\overline{HG} \cong \overline{HK}$, then $\angle$ G $\cong \angle$ 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 $m\angle HKJ$.

$4x+2x+2x = 180°$ → $x = 22.5$

$8x = 180$

$m\angle HKJ = 90°$

REMEMBER: An equilateral triangle has three congruent sides.

Corollary to the Base Angles Theorem

If a triangle is equilateral,

then it is equiangular.

if →

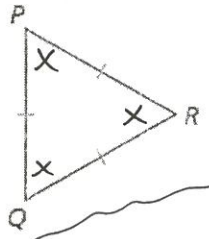
Corollary to the Converse of the Base Angles Thm

If a triangle is equiangular

then it is equilateral.

if →

Think About It…What are the measures of each of the angles of equilateral triangle PQR?



$x+x+x = 180$

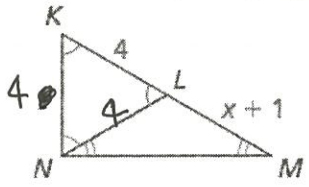
$3x = 180$

$x = 60$

60°

Example:

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



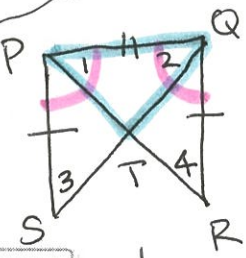
y = 4

if △ → △

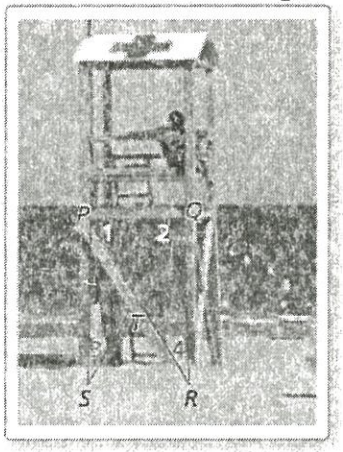
$4 = x+1$

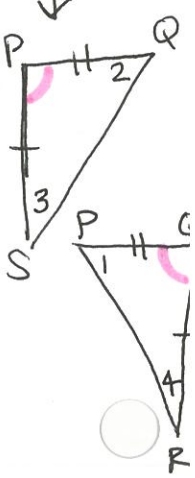
$3 = x$

if △ → △



3. In the lifeguard tower, $\overline{PS} \cong \overline{QR}$ 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 $\overline{PQ} \cong \overline{QP}$	② reflex. prop $\cong$
③ $\Delta QPS \cong \Delta PQR$	③ SAS $\cong$ (1, 1, 2)

b. Explain why ΔPQT is an isosceles triangle.

$\angle 1 \cong \angle 2$ since corresp. parts of $\cong$ △s are $\cong$.

So, $\overline{PT} \cong \overline{QT}$ since if △ → △. Thus, ΔPQT is isosceles.