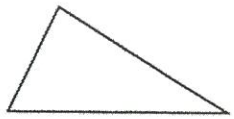
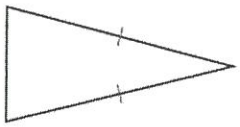
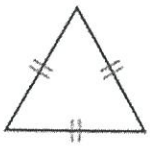
Name: Date: Period: 5

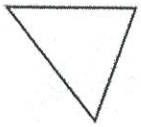
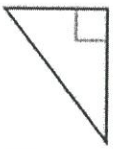
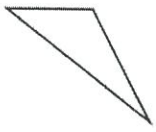
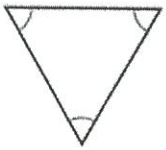
Classifying Triangles

Lesson Objective IWBAT classify Δs by their sides and Ls; prove/apply thms about L relationships in Δs

Classifying Triangles by their SIDES

Scalene Triangle	Isosceles Triangle	Equilateral Triangle
		
No congruent sides	At least 2 congruent sides	3 congruent sides

Classifying Triangles by their ANGLES

Acute Triangle	Right Triangle	Obtuse Triangle	Equiangular Triangle
			
3 acute angles	1 right angle	1 obtuse angle	3 congruent angles

In the Coordinate Plane

1. Classify ΔOPQ by its sides. Then determine whether it is a right triangle.

$PO^2 = 1^2 + 2^2$ → $PO = \sqrt{5}$

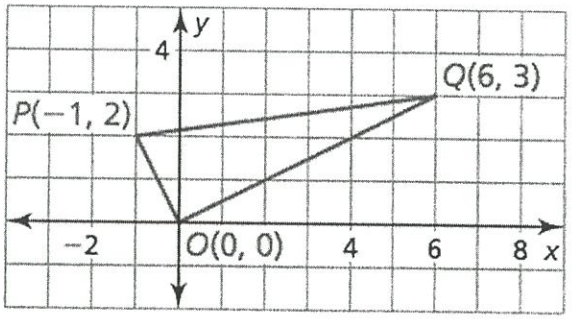
$PQ^2 = 1^2 + 7^2$ → $PQ = 5\sqrt{2}$

$OQ^2 = 3^2 + 6^2$ → $QO = 3\sqrt{5}$

scalene Δ

$m_{\overline{OP}} = -2$ $m_{\overline{QO}} = \frac{1}{2}$

right Δ

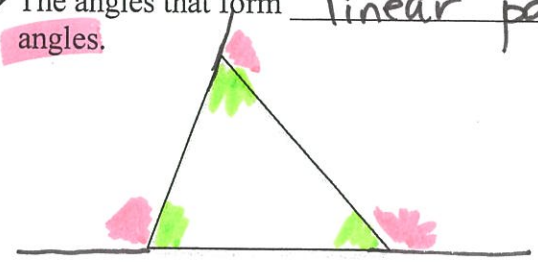


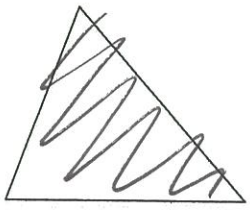
Finding Angle Measures of Triangles

When the sides of a polygon are extended, other angles are formed.

→ The ORIGINAL angles are the interior angles

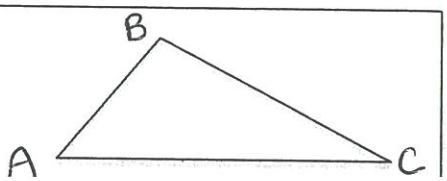
→ The angles that form linear pairs with the interior angles are the exterior angles.



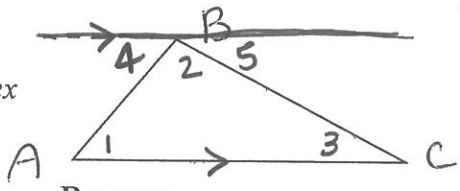


Triangle Sum Theorem

The sum of the measures of the interior angles of a triangle is 180°.



PROOF OF Δ SUM THM:
**hint: draw a line parallel to any side of the triangle through its opposite vertex*



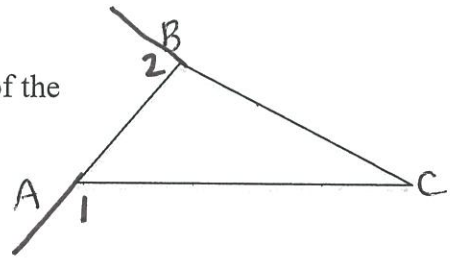
Statements	Reasons
① $m\angle 4 + m\angle 2 + m\angle 5 = 180°$	① def. of supp. ∠s
② $\angle 1 \cong \angle 4$, $\angle 3 \cong \angle 5$	② $\parallel \rightarrow$ alt. int. ∠s $\cong$
③ $m\angle 1 = m\angle 4$, $m\angle 3 = m\angle 5$	③ $\cong \rightarrow =$
④ $m\angle 1 + m\angle 3 + m\angle 2 = 180°$	④ substitution prop. $=$

Exterior Angle Theorem

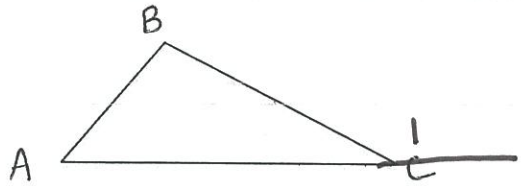
The measure of an exterior angle is a triangle is equal to the sum of the measures of the two remote interior angles.

$m\angle 1 = m\angle B + m\angle C$

$m\angle 2 = m\angle A + m\angle C$



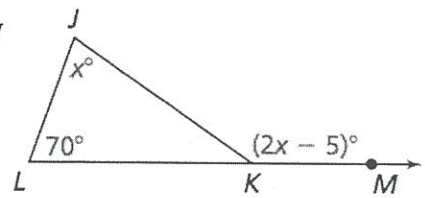
PROOF: **Given**: ΔABC with exterior angle at $\angle C$ (called $\angle 1$)
Prove: $m\angle A + m\angle B = m\angle 1$



Statements	Reasons
① $m\angle A + m\angle B + m\angle C = 180$	① Δ sum thm
② $m\angle C + m\angle 1 = 180°$	② lin. pair post.
③ $m\angle A + m\angle B + m\angle C = m\angle C + m\angle 1$	③ subst. prop. $=$
④ $m\angle A + m\angle B = m\angle 1$	④ subtract. prop. $=$

Example:

2. Find $m\angle JKM$



$2x - 5 = 70 + x$

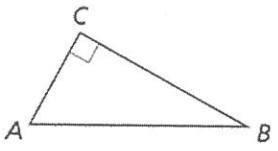
$x = 75$

$m\angle JKM = 145°$

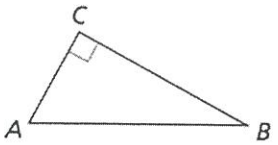
Corollary: A corollary to a theorem is a statement that can be proved easily using the theorem.

Corollary to the Triangle Sum Theorem

The acute angles of a right triangle are complementary.



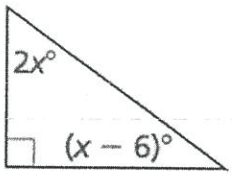
PROOF: **Given**: right ΔABC with a right angle at $\angle C$
Prove: $\angle A$ comp $\angle B$



Statements	Reasons
① $m\angle A + m\angle B + m\angle C = 180°$	① Δ sum thm
② $\angle C$ is a right $\angle$	② given
③ $m\angle C = 90°$	③ def. of right $\angle$
④ $m\angle A + m\angle B + 90 = 180°$	④ subst. prop. =
⑤ $m\angle A + m\angle B = 90$	⑤ subtract. prop. =
⑥ $\angle A$ comp $\angle B$	⑥ def. of comp. $\angle$s

mples:

3. Find the measure of each acute angle.



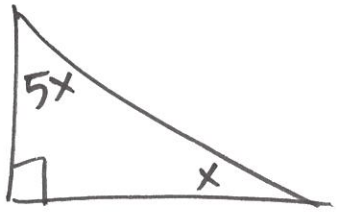
$2x + x - 6 = 90$

$3x = 96$

$x = 32$

64° and 26°

4. The measure of one acute angle in a right triangle is 5 times the measure of the other acute angle. Find the measure of each acute angle in this right triangle.



$x + 5x = 90$

$6x = 90$

$x = 15$

15° and 75°