

# Ch 4: Congruent Triangles

## 4.1: Triangles + Angles

Chapter Goal: - to prove triangles are congruent given information about their sides and angles  
 - how to use congruent triangles to solve real life problems

Objective - Classify triangles by their sides and angles  
 Find angle measures in triangles

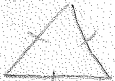
Warm-up State the # of sides each figure has

- 1) trapezoid
- 2) equilateral triangle
- 3) rhombus
- 4) parallelogram
- 5) scalene triangle


### Names of triangles

Classifying by sides

Equilateral Triangle  
 $3 \cong$  sides



Isosceles  $\Delta$   
 At least  $2 \cong$  sides




Scalene  $\Delta$   
 No  $\cong$  sides




Classifying by angles


Acute  $\Delta$   
 $3$  acute angles




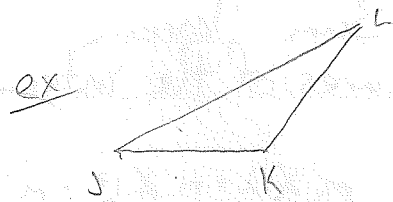
Equiangular  $\Delta$   
 $3$  congruent angles



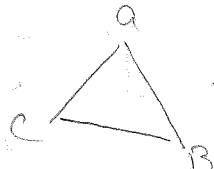
Right  $\Delta$   
 $1$  right  $\angle$



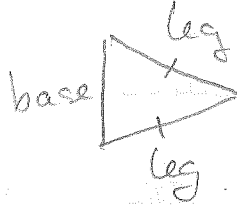
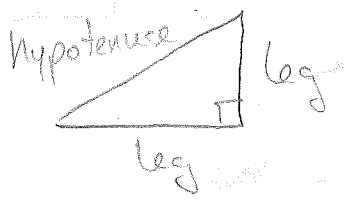
Obtuse  $\Delta$   
 $1$  obtuse  $\angle$

Name the vertices: J, K, L  
 Name the adjacent sides to  $\angle J$ :  $\overline{JK}, \overline{JL}$   
 Name the opposite side to  $\angle J$ :  $\overline{LK}$

Now try:  Name the vertices, adjacent to  $\angle a$ , opposite  $\angle a$

Right + Isosceles  $\Delta$ 's

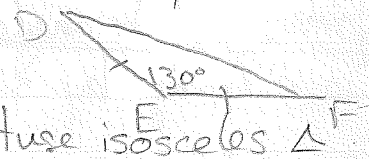


Classifying Triangles

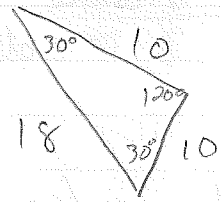
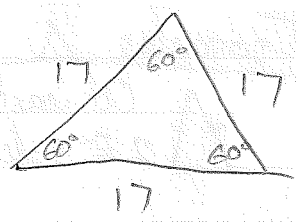
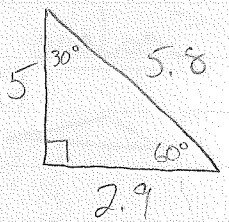


Acute Scalene Triangle

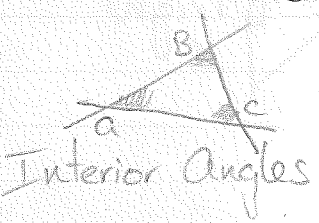
Now try



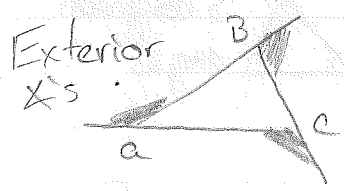
Obtuse isosceles  $\Delta$



Using Angle Measures of Triangles



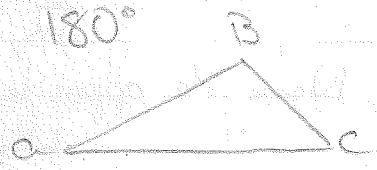
Interior Angles



Exterior  $\angle$ 's

Theorem 4.1 Triangle Sum Theorem

The sum of the measures of the interior angles of a triangle is  $180^\circ$



$$m\angle A + m\angle B + m\angle C = 180^\circ$$

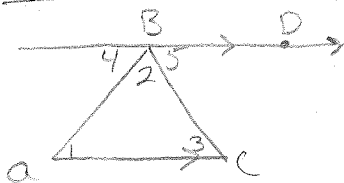
## Theorem 4.2 Exterior Angle Theorem

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



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

### Proof of Theorem 4.1

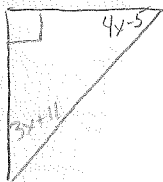


Given:  $\triangle ABC$   
 $\overleftrightarrow{BD} \parallel \overleftrightarrow{AC}$

Prove:  $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$

Statement	Reason
1) $\overleftrightarrow{BD} \parallel \overleftrightarrow{AC}$	1) Given
2) $\angle 4 \cong \angle 1$ , $\angle 5 \cong \angle 3$	2) Alternate Interior Angle Theorem
3) $m\angle 4 = m\angle 1$ , $m\angle 5 = m\angle 3$	3) D.O.C.
4) $m\angle 4 + m\angle 2 + m\angle 5 = 180^\circ$	4) Def of straight $\angle$
5) $m\angle 1 + m\angle 2 + m\angle 3 = 180^\circ$	5) Substitution

### Finding an angle measure

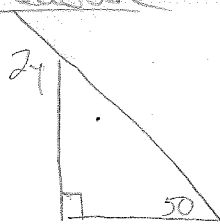


$$90 + 3x + 11 + 4x - 5 = 180$$

$$7x + 6 = 90$$

$$7x = 84$$

$$x = 12$$

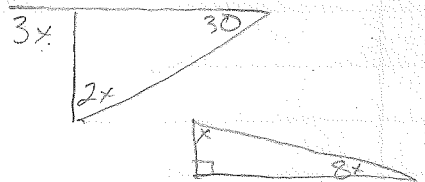


$$90 + 50 = 2y$$

$$140 = 2y$$

$$y = 70$$

Now try



Closure: Name the types of triangles. What do the interior  $\angle$ 's of a  $\triangle = ?$

How do we find exterior  $\angle$ 's

Homework: 4.1B