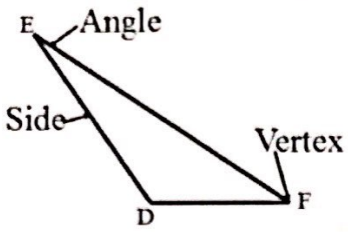
Day 1 – Angle Relationships in Triangles Notes

A **triangle** is a figure formed when three noncollinear (not on the same line) points are connected by segments.



The sides are: $\overline{ED}$, $\overline{DF}$, $\overline{EF}$

The vertices are: E, D, F

The angles are: $\angle E$, $\angle F$, $\angle D$

Opposite Side of $\angle F$: $\overline{ED}$

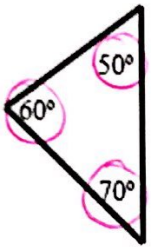
Opposite Side of $\angle E$: $\overline{FD}$

Opposite Side of $\angle D$: $\overline{EF}$

Triangles can be classified by two categories: **by Angles and by Sides.**

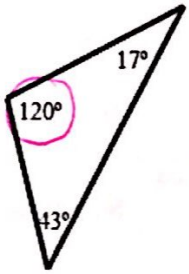
ANGLES

Acute



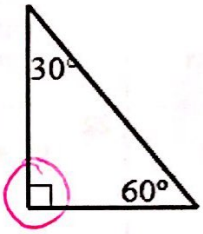
All Acute Angles

Obtuse



One Obtuse Angle

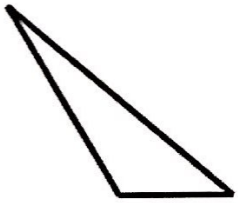
Right



One Right Angle

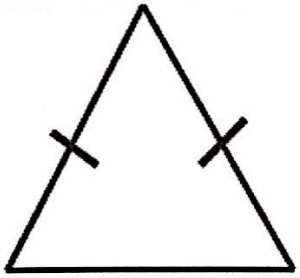
SIDES

Scalene



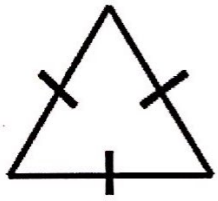
No Sides Congruent

Isosceles



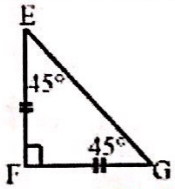
At Least 2 Sides Congruent

Equilateral

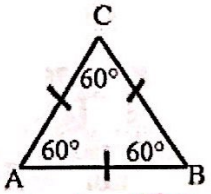


All Sides Congruent

Practice: Classify the triangles by sides and angles.



Right Isosceles



Acute Equilateral

Think About It: Check which triangles are possible.

	Acute	Obtuse	Right
Scalene	✓	✓	✓
Isosceles	✓	✓	✓
Equilateral	✓		

Triangle Sum Theorem

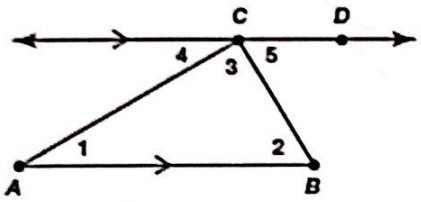
Triangle Sum Theorem: The measures of the three interior angles in a triangle add up to be 180°

This means: $\angle 1 + \angle 2 + \angle 3 = 180°$

Corollary to Triangle Sum Theorem: The acute angles of a right triangle are complementary.

This means: $\angle 1 + \angle 2 = 90°$

Proof of the Triangle Sum Theorem:

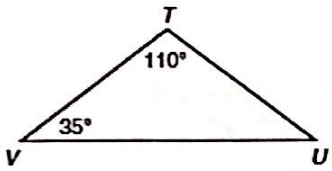


Given: Triangle ABC with $\overline{AB} \parallel \overline{CD}$

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

Statements	Reasons
1. AB ∥ CD	1. Given
2. $\angle 4 \cong \angle 1$	2. Alt. Int ∠'s are ≅
3. $\angle 5 \cong \angle 2$	3. Alt. Interior Angles are ≅
4. $m\angle 4 \cong m\angle 1$	4. Def of ≅ ∠'s
5. $m\angle 5 = m\angle 2$	5. Def. of ≅ Angles
6. $m\angle ACD = m\angle 5 + m\angle 3$	6. Angle Addition
7. $m\angle 4 + m\angle ACD = 180°$	7. Linear Pair Postulate
8. $m\angle 4 + m\angle 5 + m\angle 3 = 180°$	8. Substitution Property (6,7)
9. $m\angle 1 + m\angle 2 + m\angle 3 = 180°$	9. Substitution Property (4,5,8)

Examples: Find $m\angle U$.

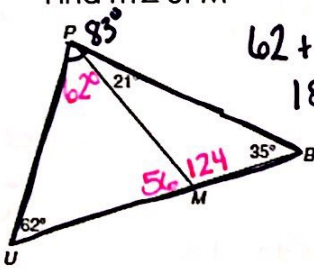


$35 + 110 = 145$

$180 - 145 = 35°$

$\angle U = 35°$

Find $m\angle UPM$



$62 + 35 = 97$

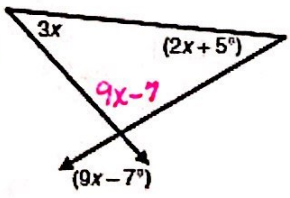
$180 - 97 = 83$

$83 - 21 = \boxed{62°}$

1. $21 + 35 = 56$
2. $180 - 56 = 124$ (triangle sum)
3. $180 - 124 = 56$ (linear pair)
4. $62 + 56 = 118$
5. $180 - 118 = 62°$

$\angle UPM = 62°$

Find the measure of x.



$3x + 2x + 5 + 9x - 7 = 180$

$14x - 2 = 180$

$14x = 182$

$\boxed{x = 13}$