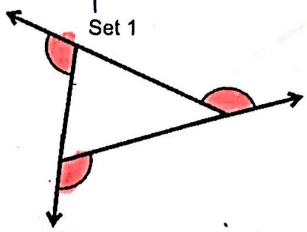
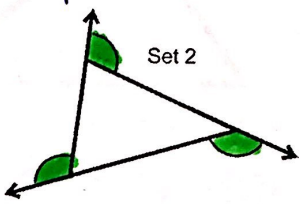
Unit 2 Lesson 9 - Triangle Theorems (Triangle Angle Sum Theorem and Exterior Angle Theorem)

An Exterior Angle is The angle between any side of a shape and a line extended from the next side.

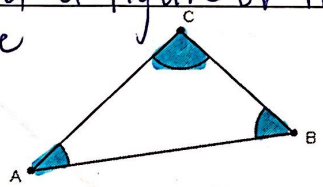
↓ Outside





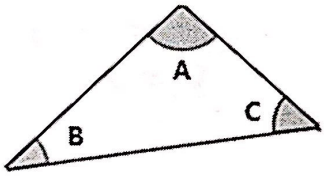
An Interior Angle is the angle between adjacent sides of a figure or the angle at each vertex on the inside of the figure.

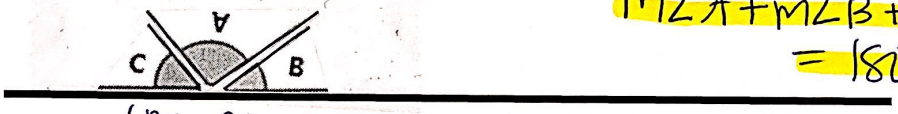
↓ inside



*The **Triangle Angle Sum Theorem** states The three INTERIOR angles of any triangle add to 180°.

* There are 180° in a line.

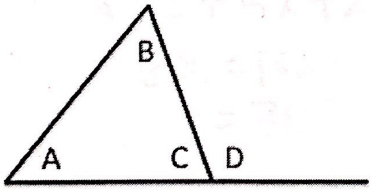


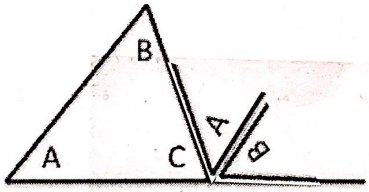


(Proof)

$m\angle A + m\angle B + m\angle C = 180°$

The **Exterior Angle Theorem** states The measure of an exterior angle is equal to the sum of the measures of the two non-adjacent interior angles of the Δ.



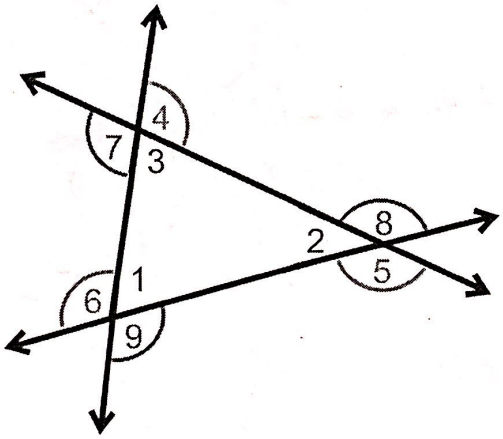


(Proof)

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

Examples:

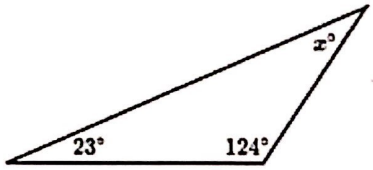
Use the diagram to fill in each blank.



1. $m\angle 1 + m\angle 2 + m\angle 3 =$ 180°
2. $m\angle 1 + m\angle 2 =$ m∠7 or m∠4
3. $m\angle 2 + m\angle 3 =$ m∠6 or m∠9
4. $m\angle 1 + m\angle 3 =$ m∠5 or m∠8

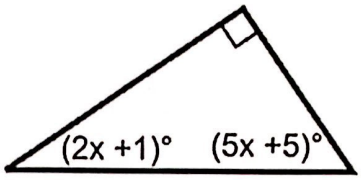
Practice

1.



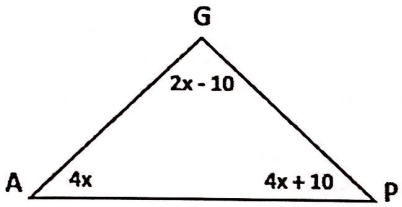
$23+124+x=180°$
$147+x=180$
$x=33°$

2.



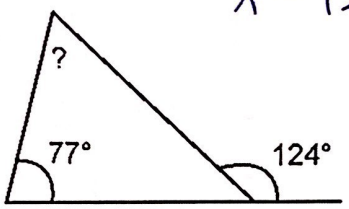
$90+2x+1+5x+5=180$
$7x+96=180$
$7x=84$
$x=12$

3.



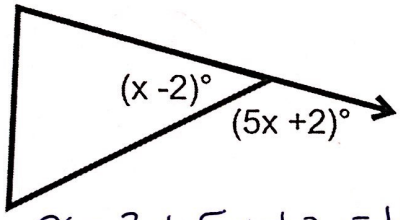
$4x+2x-10+4x+10=180$
$10x=180$
$x=18$

4.



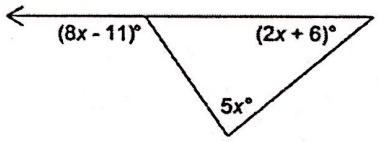
$?+77=124$
$?=47°$

5? Skip



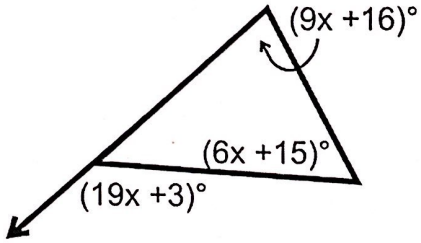
$x-2+5x+2=180$
$6x=180$
$x=30$

6.



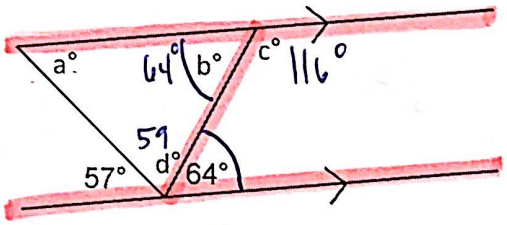
$2x+6+5x=8x-11$
$7x+6=8x-11$
$-x=-17$
$x=17$

7.



$9x+16+6x+15=19x+3$
$15x+31=19x+3$
$-4x=-28$
$x=7$

8.



$57+64+d=180$
$121+d=180$
$d=59°$

Alt Int ∠s.
$b=64°$

$64+c=180$
$c=116°$

$a+64+59=180$
$a+123=180$
$a=57°$

OR $a+d=116$