3.5 Parallel Lines and Triangles

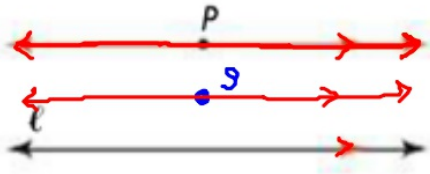
Learning Targets for today

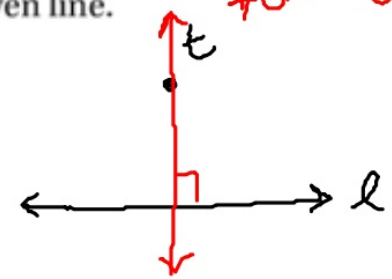
- To be able to use parallel lines to prove a theorem about triangles.
- To be able to find measures of angles of triangles.
- To know and understand that the sum of the angle measures of a triangle is always the same.

KEY CONCEPTS!

Parallel Postulate

Through a point not on a line, there is one and only one line parallel to the given line.



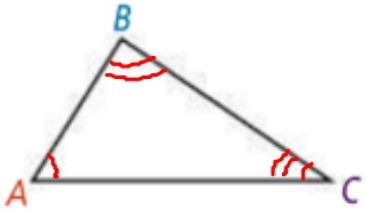


#one and only one!

There is exactly one line through P parallel to ℓ.

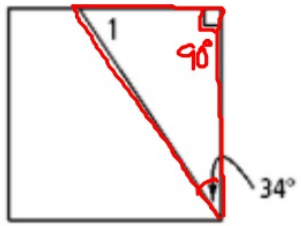
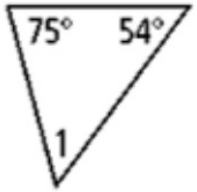
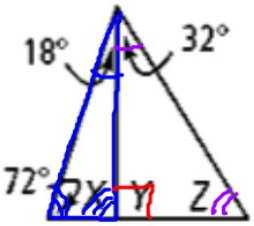
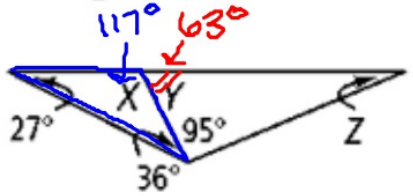
Triangle Angle-Sum Theorem

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



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

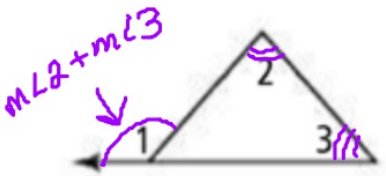
Using the Triangle Angle-Sum Theorem

Example for you…	**Your turn to try…**
Use the diagram to find measure of ∠ 1.	Use the diagram to find measure of ∠ 1.
1.  $34+90+m\angle 1=180$ $90-34=m\angle 1$ $56^\circ=m\angle 1$	1.  $75+54+m\angle 1=180$ $129+m\angle 1=180$ $-129 \quad -129$ $m\angle 1=51^\circ$
Use the diagram to find the value of each variable.	Use the diagram to find the value of each variable.
2.  $90-32=m\angle Z$ $58=m\angle Z$ $72+18+X=180$ $X+90=180$ $-90 \quad -90$ $X=90^\circ$ $y=90^\circ$	2.  $Y+117=180$ $-117 \quad -117$ $Y=63^\circ$ $27+36+X=180$ $63+X=180$ $-63 \quad -63$ $X=117^\circ$ $63+95+Z=180$ $158+Z=180$ $-158 \quad -158$ $Z=22^\circ$

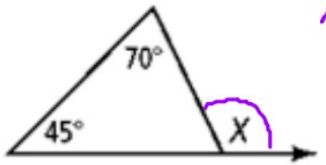
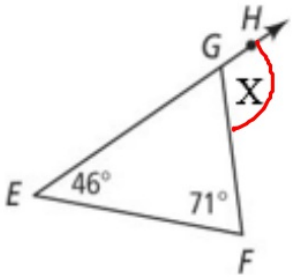
Triangle Exterior Angle Theorem

The measure of each exterior angle of a triangle equals the sum of the measures of its two remote interior angles.

$$m\angle 1 = m\angle 2 + m\angle 3$$



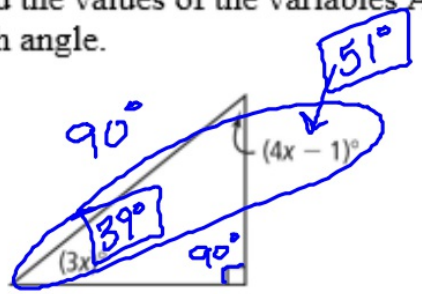
Using the Triangle Exterior Angle Theorem

Example for you…	**Your turn to try…**
Use the diagram to find value of X.	Use the diagram to find the value of X.
1.  $X = 45 + 70$ $X = 115°$	1.  $X = 46 + 71$ $X = 117°$

Applying Algebra to Geometry

Example for you…	**Your turn to try…**
Find the values of the variables AND the measures of each angle.	Find the values of the variables AND the measures of each angle.

1.



$3x + 4x - 1 = 90$

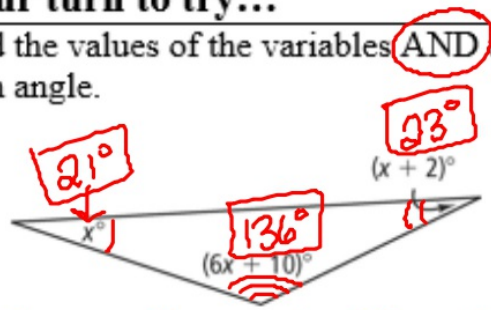
$7x - 1 = 90$

$+1 \quad +1$

$\frac{7x}{7} = \frac{91}{7}$

$x = 13$

1.



$x + x + 2 + 6x + 10 = 180$

$8x + 12 = 180$

$-12 \quad -12$

$\frac{8x}{8} = \frac{168}{8}$

$x = 21$