

Name: Kelly

Date: _____

UNIT 1B

LESSON 13

AIM: WHAT IS THE EXTERIOR ANGLE OF A TRIANGLE THEOREM?

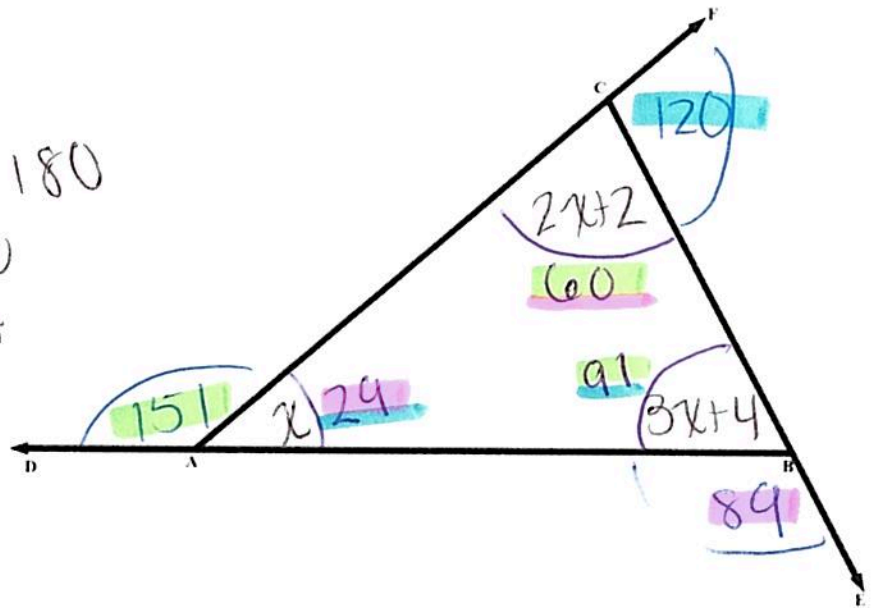
Do Now: The angles of a triangle can be represented by x , $2x + 2$ and $3x + 4$.

1. Find the value of x .

$$\begin{aligned} x + 2x + 2 + 3x + 4 &= 180 \\ 6x + 6 &= 180 \\ 6x &= 174 \\ x &= 29 \end{aligned}$$

2. Find the measure of all INTERIOR angles of the triangle

$$\begin{aligned} x &= 29 \\ 2(29) + 2 &= 60 \\ 3(29) + 4 &= 91 \end{aligned}$$



3. Find the measure of all EXTERIOR angles of the triangle.

$$\begin{aligned} 180 - 29 &= 151 \\ 180 - 60 &= 120 \\ 180 - 91 &= 89 \end{aligned} \quad \left. \begin{array}{l} \\ \\ \end{array} \right\} \text{Linear Pairs}$$

4. Look at the relationship between angles:

- $\angle CAD$ and $\angle ACB, \angle ABC$ $151 = 60 + 91$
- $\angle ABE$ and $\angle CAB, \angle BCA$ $89 = 29 + 60$
- $\angle BCF$ and $\angle CBA, \angle CAB$ $120 = 29 + 91$

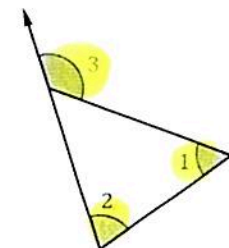
What do you notice?

The exterior \angle = the sum of 2 interior \angle 's

EXTERIOR ANGLE THEOREM OF A TRIANGLE

The exterior \angle = 's the sum of the two non-adjacent interior \angle 's

↳ not next to

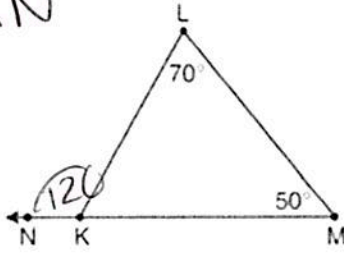


$$m\angle 1 + m\angle 2 = m\angle 3$$

EXAMPLES:

**FIX*

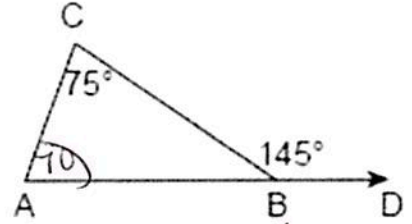
1. In the diagram of $\triangle KLM$ below, $m\angle L = 70^\circ$, $m\angle M = 50^\circ$, and \overline{MK} is extended through N. What is the measure of $\angle LKN$?



**LKN*

$$70 + 50 = \boxed{120^\circ}$$

2. In the accompanying diagram of $\triangle ABC$, \overline{AB} is extended to D, exterior angle CBD measures 145° , and $m\angle C = 75^\circ$. What is the measure of $\angle CAB$?

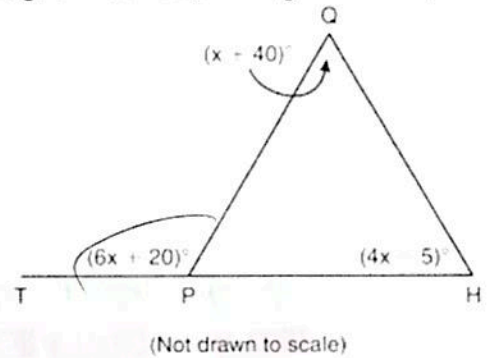


$$185 - 75 = \boxed{110^\circ}$$

3. In the diagram below of $\triangle HQP$, side \overline{HP} is extended through P to T, $m\angle QPT = 6x + 20$, $m\angle HQP = x + 40$, and $m\angle PHQ = 4x - 5$. Find $m\angle QPT$.

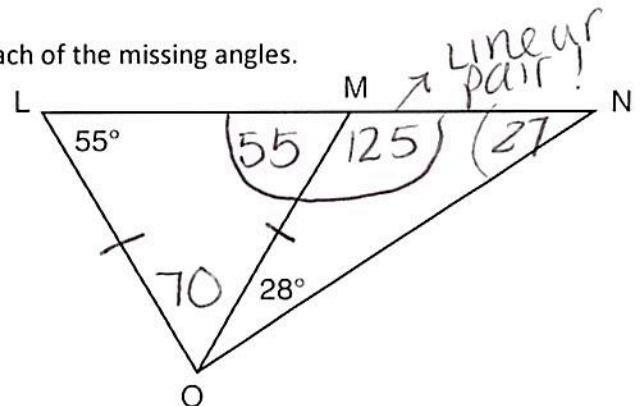
$$\begin{aligned} 6x + 20 &= x + 40 + 4x - 5 \\ 6x + 20 &= 5x + 35 \\ -5x - 20 & \quad -5x - 20 \\ \hline x &= 15 \end{aligned}$$

$$*QPT = 6(15) + 20 = \boxed{110^\circ}$$



4. In the diagram below, $\triangle LMO$ is isosceles with $\overline{LO} \cong \overline{OM}$. Find each of the missing angles.

base angles!



Name: Kely

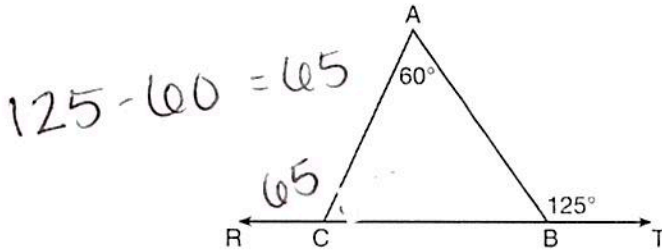
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UNIT 1B

LESSON 13

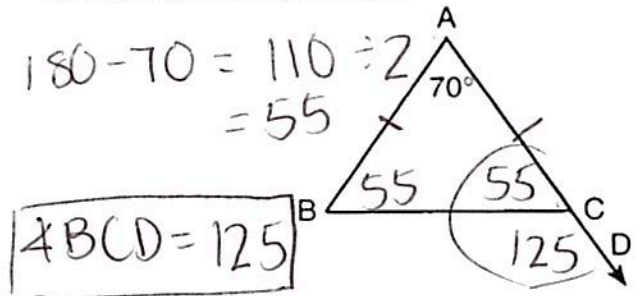
HOMEWORK

1. In the diagram below, \overline{RCBT} and $\triangle ABC$ are shown with $m\angle A = 60$ and $m\angle ABT = 125$. What is $m\angle ACR$?



$125 - 60 = 65$

2. In the accompanying diagram of isosceles triangle BAC , vertex angle A measures 70° and \overline{AC} is extended to D . Find $m\angle BCD$.

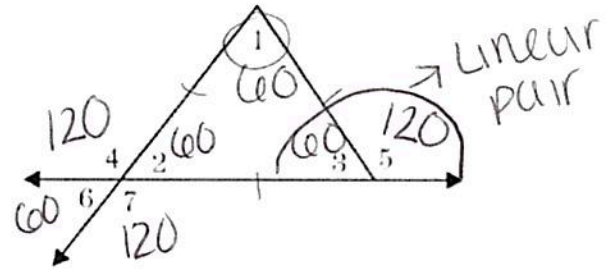


$180 - 70 = 110 \div 2 = 55$

$\angle BCD = 125$

3. In the diagram shown above, $m\angle 5 = 120$ and $m\angle 4 = 120$. Find $m\angle 1$.

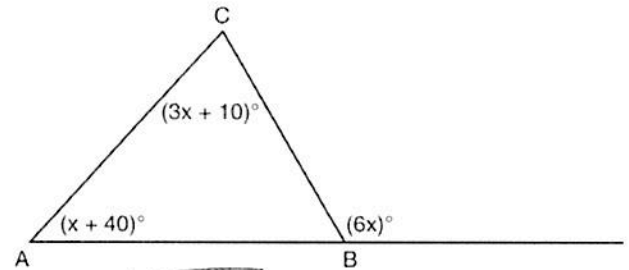
$m\angle 1 = 60^\circ$



vertical #'s

4. In the diagram of $\triangle ABC$ below, \overline{AB} is extended to point D . If $m\angle CAB = x + 40$, $m\angle ACB = 3x + 10$, $m\angle CBD = 6x$, what is $m\angle CAB$?

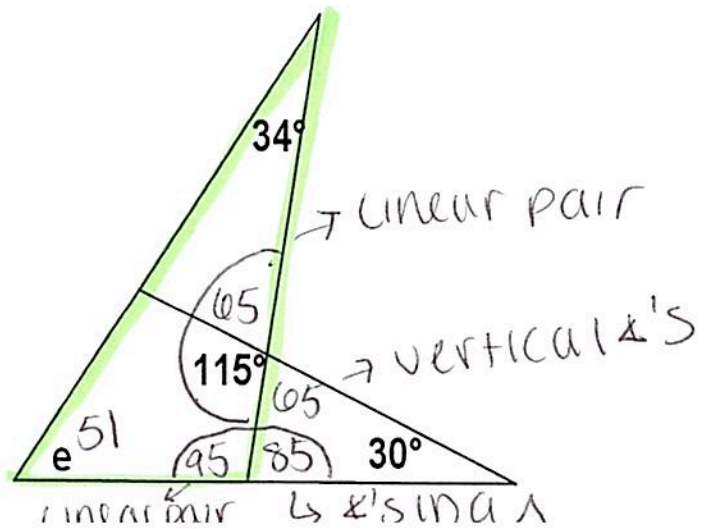
$6x = 3x + 10 + x + 40$
 $6x = 4x + 50$
 $-4x \quad -4x$
 $2x = 50$
 $x = 25$



$\angle CAB = 25 + 40 = 65^\circ$

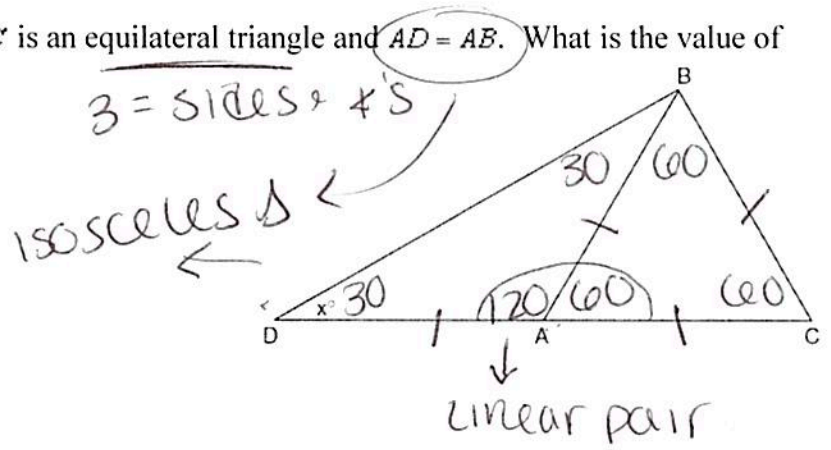
5. Solve for $m\angle e =$ $x = 25$

$180 - 95 - 34 = 51$
 $\angle e = 51^\circ$



5. In the accompanying diagram of $\triangle BCD$, $\triangle ABC$ is an equilateral triangle and $AD = AB$. What is the value of x , in degrees?

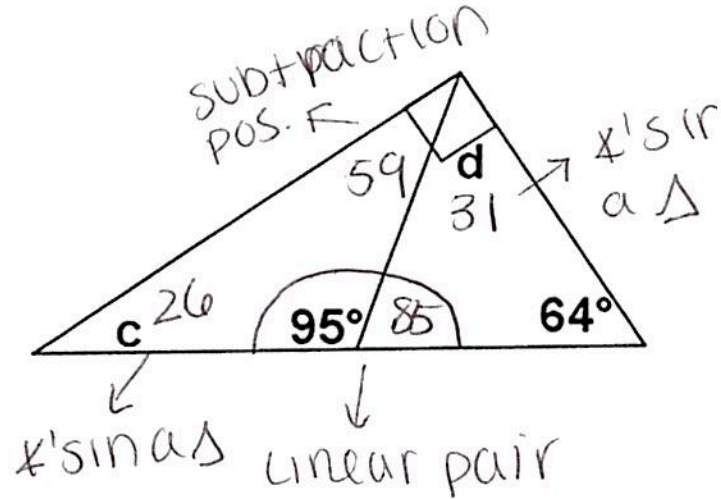
$$x = 30^\circ$$



6. In exercise below, find the unknown angles.

$$\angle C = 26$$

$$\angle d = 31$$



7. Find the measures of angles a and b in the figure to the right. Justify your results.

$$\angle a = 53^\circ$$

$$\angle b = 40^\circ$$

