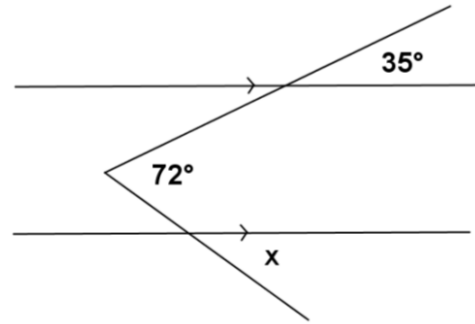


Lesson 8: Solve for Unknown Angles—Angles in a Triangle

Classwork

Opening Exercise

Find the measure of angle x in the figure to the right. Explain your calculations. (Hint: Draw an auxiliary line segment.)



Discussion

The sum of the 3 angle measures of any triangle is _____.

Interior of a Triangle: A point lies in the *interior of a triangle* if it lies in the interior of each of the angles of the triangle.

In any triangle, the measure of the exterior angle is equal to the sum of the measures of the _____ angles.

These are sometimes also known as _____ angles.

Base angles of an _____ triangle are equal in measure.

Each angle of an _____ triangle has a measure equal to 60° .

Relevant Vocabulary

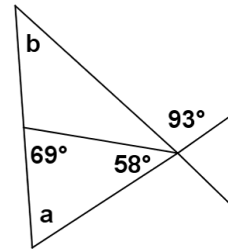
Isosceles Triangle: An *isosceles triangle* is a triangle with at least two sides of equal length.

Angles of a Triangle: Every triangle $\triangle ABC$ determines three angles, namely, $\angle BAC$, $\angle ABC$, and $\angle ACB$. These are called the *angles of $\triangle ABC$* .

Exterior Angle of a Triangle: Let $\angle ABC$ be an interior angle of a triangle $\triangle ABC$, and let D be a point on \overrightarrow{AB} such that B is between A and D . Then $\angle CBD$ is an *exterior angle of the triangle $\triangle ABC$* .

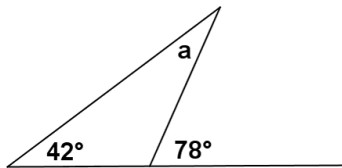
Exercises

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



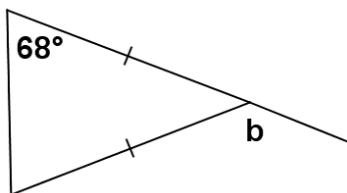
In each figure, determine the measures of the unknown (labeled) angles. Give reasons for your calculations.

2.



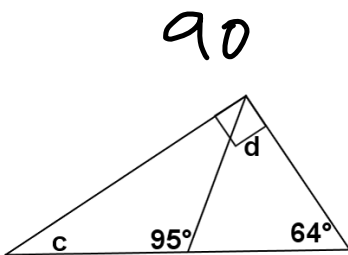
$m\angle a =$ _____

3.



$m\angle b =$ _____

4.



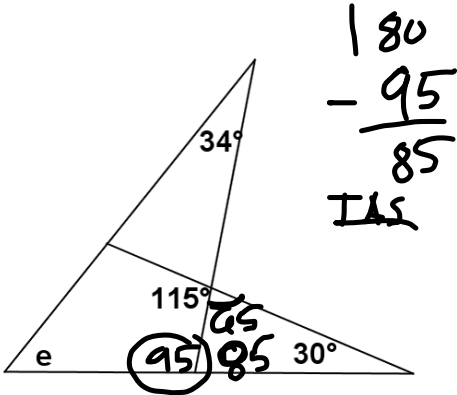
$m\angle c =$ _____ Triangle
 $m\angle d =$ _____ Angle Sum

$$\begin{array}{r} 90 + 64 + c = 180 \\ -90 - 64 \\ \hline c = 26 \end{array}$$

$$\begin{array}{r} 95 = 64 + d \\ -64 \quad -64 \\ \hline 31 = d \end{array}$$

Exterior Angle Theorem

5.



$$\begin{array}{r} 180 \\ - 95 \\ \hline 85 \end{array}$$

IAS

$$\begin{array}{r} 180 \\ - 115 \\ \hline 65 \end{array}$$

Linear Pair

Supp. Angles
Triangle
Angle Theorem

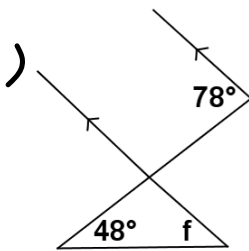
$m\angle e =$ _____

$$\begin{array}{r} 180 \\ - 85 \\ \hline 95 \end{array}$$

$180 = 95 + 34 + e$

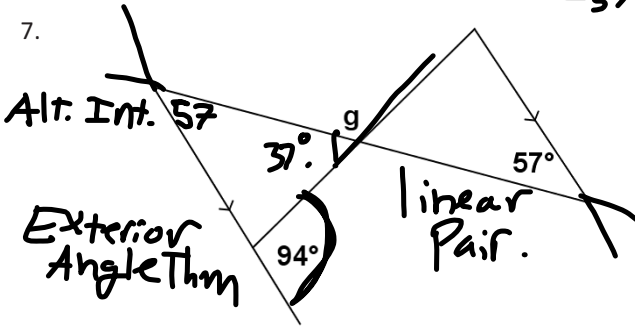
$e = 51^\circ$

6.



$m\angle f =$ _____

7.

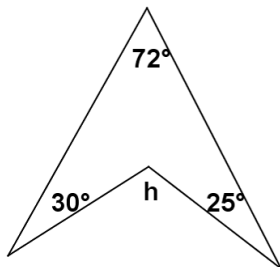


$$\begin{array}{r} 57 + ? = 94 \\ - 57 \\ \hline ? = 37 \end{array}$$

$m\angle g =$ 143°

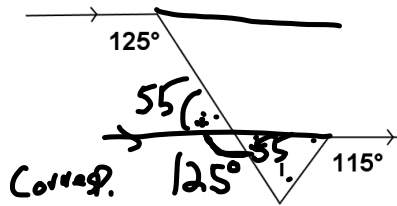
$$\begin{array}{r} 180 \\ - 37 \\ \hline 143 \end{array}$$

8.

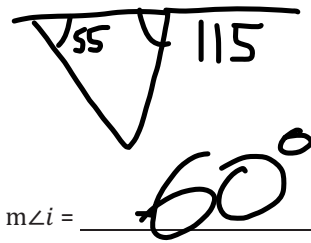


$m\angle h =$ _____

9.

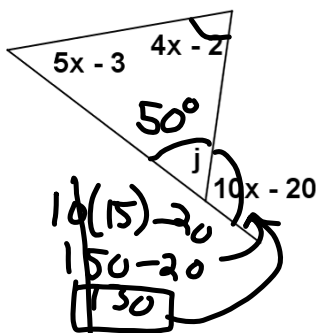


$$\begin{array}{r} 180 \\ -125 \\ \hline 55 \end{array}$$



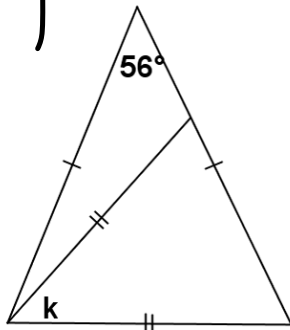
$$\begin{array}{r} 180 \\ -115 \\ \hline 65 \\ +55 \\ \hline 120 \\ -120 \\ \hline 60 \end{array}$$

10.



$$\begin{array}{l} 5x-3 + 4x-2 = 10x-20 \\ 9x-5 = 10x-20 \\ -9x \quad -9x \\ \hline -5 = -20 + x \\ +20 \quad +20 \\ \hline 15 = x \end{array}$$

11.

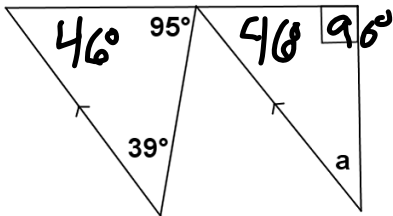


$m\angle k =$ _____

Problem Set

Find the unknown (labeled) angle in each figure. Justify your calculations.

1.

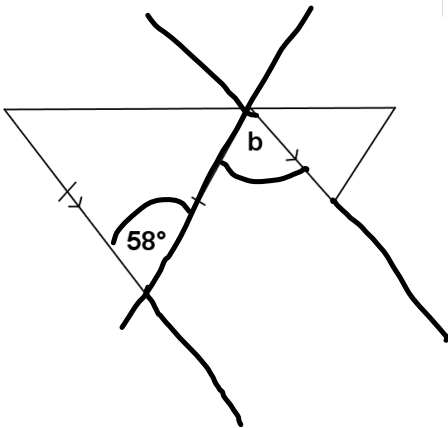


$$m\angle a = 180$$

$$\begin{array}{r} -136 \\ \hline 44^\circ \end{array}$$

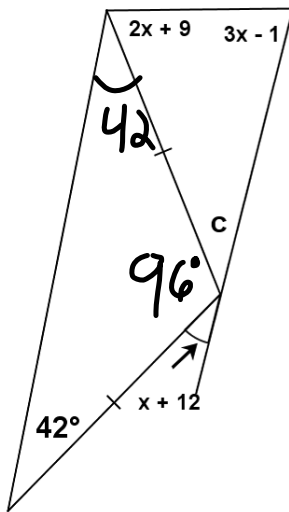
- Triangle \angle Sum
- Correspond.

2.



$$m\angle b = 58^\circ$$

3.



$$m\angle c = 47^\circ$$

$$\begin{array}{r} 25 + 12 + 96 + C = 180 \\ 133 + C = 180 \\ -133 \quad -133 \\ \hline C = 47^\circ \end{array}$$