

Name

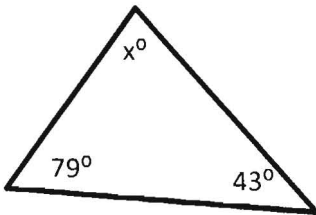
KEY

Date _____

Geometry: Triangle Properties and Proofs

Use the Angle Sum Theorem, Exterior Angles Theorem, and the Third Angle Theorem to find missing values of the following.

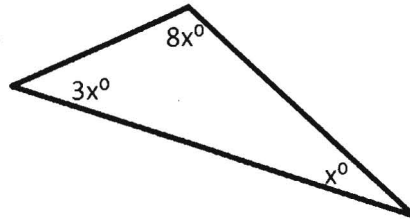
1)



$$x = \underline{58}$$

$$\begin{aligned} 79^\circ + 43^\circ + x^\circ &= 180^\circ \\ (79^\circ + 43^\circ) + x^\circ &= 180^\circ \\ 122^\circ + x^\circ &= 180^\circ \\ -122^\circ & \quad -122^\circ \\ x^\circ &= 58^\circ \\ x &= 58 \end{aligned}$$

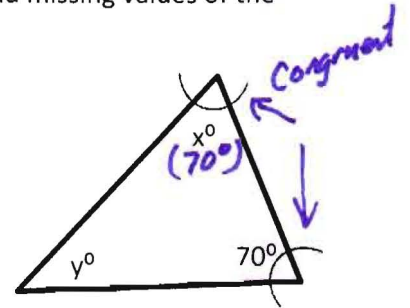
2)



$$x = \underline{15}$$

$$\begin{aligned} x^\circ + 3x^\circ + 8x^\circ &= 180^\circ \\ \underline{12x^\circ} &= \underline{180^\circ} \\ \frac{12x^\circ}{12} &= \frac{180^\circ}{12} \\ x &= 15 \end{aligned}$$

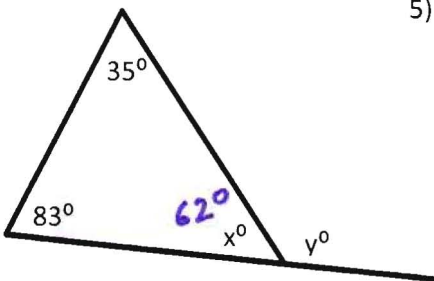
3)



$$x = \underline{70} \quad y = \underline{40}$$

$$\begin{aligned} 70^\circ + 70^\circ + y^\circ &= 180^\circ \\ 140^\circ + y^\circ &= 180^\circ \\ -140^\circ & \quad -140^\circ \\ y^\circ &= 40^\circ \\ y &= 40 \end{aligned}$$

4)



$$x = \underline{62} \quad y = \underline{118}$$

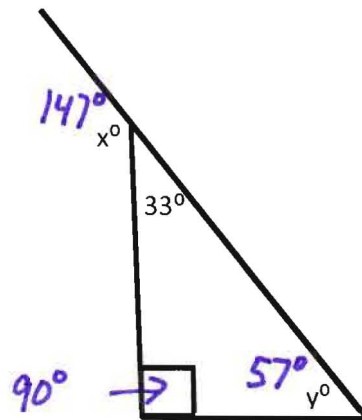
$$\begin{aligned} (35^\circ + 83^\circ) + x^\circ &= 180^\circ \\ 118^\circ + x^\circ &= 180^\circ \\ -118^\circ & \quad -118^\circ \\ x^\circ &= 62^\circ \\ x &= 62 \end{aligned}$$

Ext. Ang.
 $y^\circ = 83^\circ + 35^\circ$
 $y^\circ = 118^\circ$
 $y = 118$

Lin Pair
 $62^\circ + y^\circ = 180^\circ$
 $-62^\circ \quad -62^\circ$
 $y^\circ = 118^\circ$
 $y = 118$

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5)



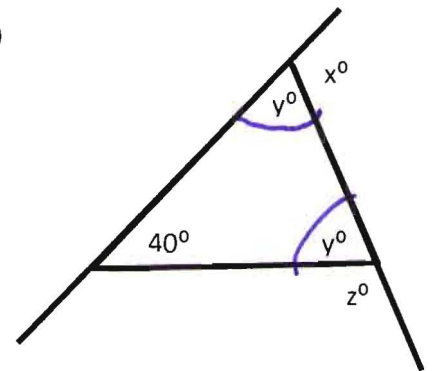
$$x = \underline{147} \quad y = \underline{57}$$

$$\begin{aligned} 90^\circ + 33^\circ + y^\circ &= 180^\circ \\ 123^\circ + y^\circ &= 180^\circ \\ -123^\circ & \quad -123^\circ \\ y^\circ &= 57^\circ \\ y &= 57 \end{aligned}$$

lin pair

$$\begin{aligned} 33^\circ + x^\circ &= 180^\circ \\ -33^\circ & \quad -33^\circ \\ x^\circ &= 147^\circ \\ x &= 147 \end{aligned}$$

6)



$$x = \underline{110} \quad y = \underline{70} \quad z = \underline{110}$$

$$\begin{aligned} 2y^\circ + 40^\circ &= 180^\circ \\ -40^\circ & \quad -40^\circ \\ 2y^\circ &= 140^\circ \\ \frac{2y^\circ}{2} &= \frac{140^\circ}{2} \\ y^\circ &= 70^\circ \\ y &= 70 \end{aligned}$$

Lin. Pair

$$\begin{aligned} y^\circ + x^\circ &= 180^\circ \\ 70^\circ + x^\circ &= 180^\circ \\ -70^\circ & \quad -70^\circ \\ x^\circ &= 110^\circ \\ x &= 110 \end{aligned}$$

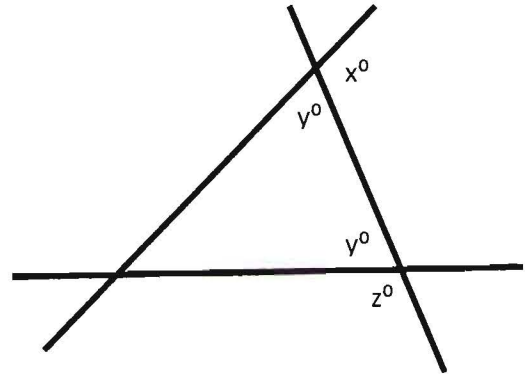
$$\begin{aligned} y^\circ + z^\circ &= 180^\circ \\ 70^\circ + z^\circ &= 180^\circ \\ -70^\circ & \quad -70^\circ \\ z^\circ &= 110^\circ \\ z &= 110 \end{aligned}$$

Challenge Problem:

Use the following diagram to prove the results for x and z on problem number 6.

(Use vertical angles, linear pairs, etc.)

Prove: $x^\circ = z^\circ$



Statement	Reason
1) $x^\circ + y^\circ = 180^\circ$	Def Lin Pair
2) $y^\circ + z^\circ = 180^\circ$	Def Lin Pair
3) $x^\circ + y^\circ = y^\circ + z^\circ$	(1)(2) Substitution
4) $x^\circ = z^\circ$	(3) Subtraction Prop.