

Name _____ Score _____/10

Please Print Clearly**Show your work neatly and well organized.**

1. Solve the triangle shown in Figure 1. Write your findings in the blanks provided.

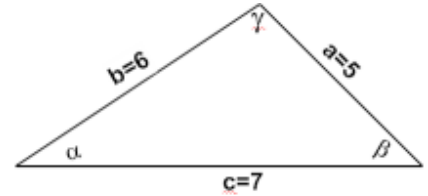


Figure 1

$$\alpha = \cos^{-1} \left(\frac{b^2 + c^2 - a^2}{2bc} \right) = \cos^{-1} \left(\frac{6^2 + 7^2 - 5^2}{(2)(6)(7)} \right) = 44.4^\circ$$

$$\beta = \cos^{-1} \left(\frac{a^2 + c^2 - b^2}{2ac} \right) = \cos^{-1} \left(\frac{5^2 + 7^2 - 6^2}{(2)(5)(7)} \right) = 57.1^\circ$$

$$\gamma = \cos^{-1} \left(\frac{a^2 + b^2 - c^2}{2ab} \right) = \cos^{-1} \left(\frac{5^2 + 6^2 - 7^2}{(2)(5)(6)} \right) = 78.5^\circ$$

$$\alpha = 44.4^\circ$$

$$\beta = 57.1^\circ \quad \text{Notice their sum is } 180^\circ$$

$$\gamma = 78.5^\circ$$

2. Solve the triangle shown in Figure 2. Write your findings in the blanks provided.

Use the Law of Sines to find α

$$\frac{\sin(\alpha)}{42.7} = \frac{\sin(\beta)}{30} \Rightarrow \sin(\alpha) = \frac{42.7 \sin(38.9)}{30}$$

$$\alpha_1 = \sin^{-1}\left(\frac{42.7 \sin(38.9)}{30}\right) = 63.4$$

$$\alpha_1 + \beta = 63.4 + 38.9 = 102.3 < 180$$

Therefore there is a triangle with $\alpha_1 = 63.4$

Because $\sin(\theta) = \sin(180 - \theta)$ whenever θ is in the first quadrant, we must consider the possibility of a second triangle.

$$\alpha_2 = 180 - \alpha_1 = 180 - 63.4 = 116.6$$

$$\alpha_2 + \beta = 116.6 + 38.9 = 155.5 < 180$$

Therefore there is a triangle with $\alpha_2 = 116.6$

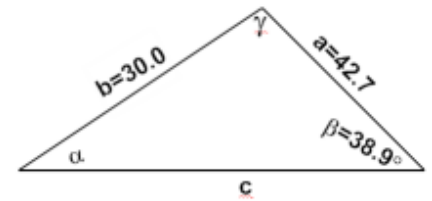


Figure 2

TRIANGLE I:

$$\alpha_1 = 63.4 \Rightarrow \gamma_1 = 180 - 63.4 - 38.9 = 77.7$$

$$\text{Then } \frac{c}{\sin(\gamma_1)} = \frac{a}{\sin(\alpha_1)} \Rightarrow c = \frac{a \sin(\gamma_1)}{\sin(\alpha_1)} = \frac{42.7 \sin(77.7)}{\sin(63.4)} = 46.7$$

TRIANGLE II:

$$\alpha_2 = 116.6 \Rightarrow \gamma_2 = 180 - 116.6 - 38.9 = 24.5$$

$$\text{Then } \frac{c}{\sin(\gamma_2)} = \frac{a}{\sin(\alpha_2)} \Rightarrow c = \frac{a \sin(\gamma_2)}{\sin(\alpha_2)} = \frac{42.7 \sin(24.5)}{\sin(116.6)} = 19.8$$

$\alpha_1 = 63.4$	$\alpha_2 = 116.6$
$\gamma_1 = 77.7$	$\gamma_2 = 24.5$
$c_1 = 46.7$	$c_2 = 19.8$