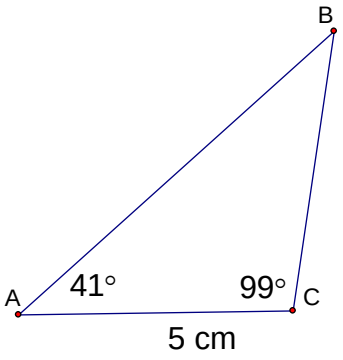
Pre-Calculus Name: Date: Period:

7D.1: The Law of Sines- Solutions

Use the Law of sines to find (a) the length of each side, and (b)The measure of each missing angle. *Careful, one of the triangles is an impossible triangle. You'll find it when you get an undefined value of* $\sin^{-1}\theta$.

1.



$m\angle B = 40°$

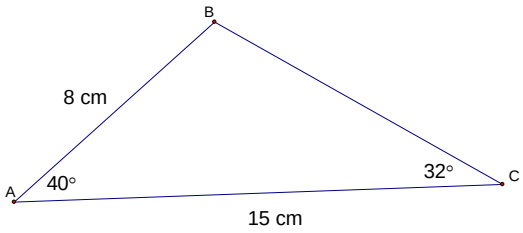
$$\frac{\sin 40}{5} = \frac{\sin 99}{c}$$

$$c = \frac{5\sin 99}{\sin 40} \approx 7.68cm$$

$$\frac{\sin 40}{5} = \frac{\sin 41}{a}$$

$$a = \frac{5\sin 41}{\sin 40} \approx 5.10\ cm$$

2.

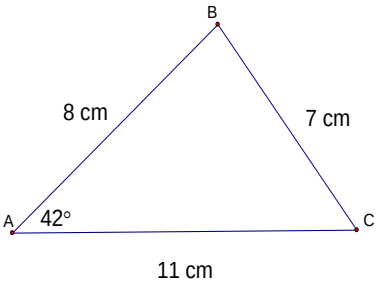


$$\frac{sin\,40}{a} = \frac{sin\,32}{8}$$

$$a = 9.7$$

$$B = 108°$$

3.



$$\frac{sin\,42}{7} = \frac{sin\,C}{8}$$

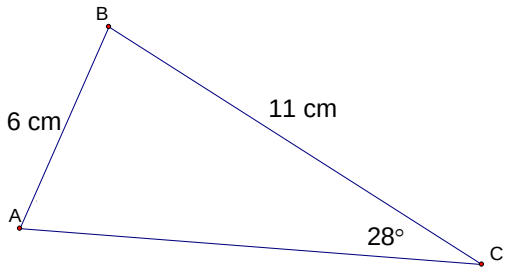
$$C \approx 49.9°$$

$$\frac{sin\,42}{7} = \frac{sin\,B}{11}$$

$$\sin B = \frac{11\sin 42}{7} \approx 1.051 \rightarrow no\ solution$$

$i.e.\ this\ triangle\ is\ impossible!$

4. Find all possible solutions.



$$\frac{\sin A}{11} = \frac{\sin 28}{6}$$

Case 1: $m\angle A = 59.4°$

$$m\angle B = 180 - (59.4 + 28) = 92.6°$$

$$\frac{\sin 92.6}{b} = \frac{\sin 28}{6}$$

$$b = 12.8$$

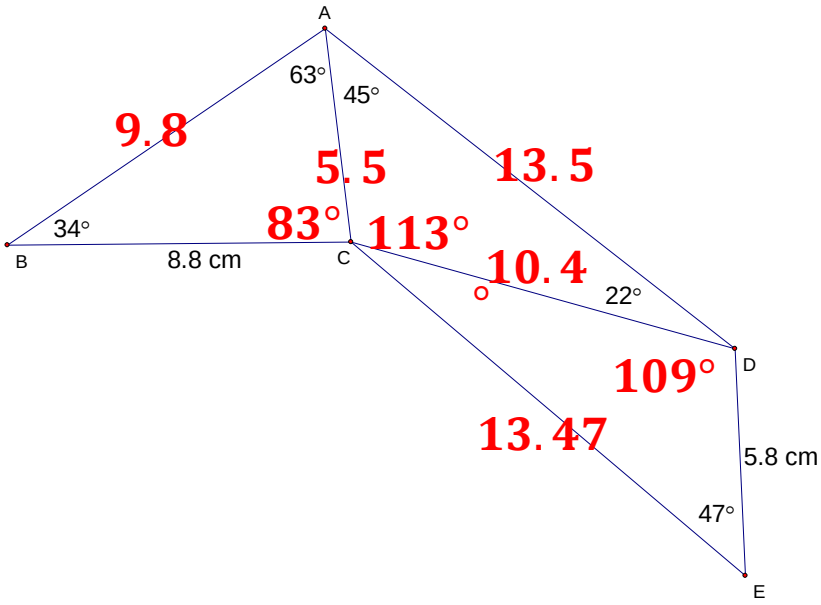
Case2: $m\angle A = 180 - 59.4 = 120.6°$

$$m\angle B = 180 - (120.6 + 28) = 31.4°$$

Textbook Reference: 9.5

$$\frac{\sin 31.4}{b} = \frac{\sin 28}{6}$$
$$b = 6.7$$

1. You are working for an aeronautics manufacture and you are in charge of building a panel for an airplane with the dimensions shown below. Find all missing angles (to the nearest degree) and segment lengths (to the nearest tenth of a cm.)



2. Two observers are standing 1250 feet apart and looking up at an airplane that is directly between them as shown in the drawing below. One looks up at 75° and the other looks up at 65°.

   Find out how far the plane is from each observer.

$$A = 40°$$
$$\frac{\sin 40}{1250} = \frac{\sin 65}{x}$$
$$x = 1762.5ft.$$
$$\frac{\sin 40}{1250} = \frac{\sin 75}{y}$$
$$y = 1878.4ft.$$

   a. Find the height of the airplane.

$$\sin 75 = \frac{h}{1762.5}$$
$$h = 1702.4$$