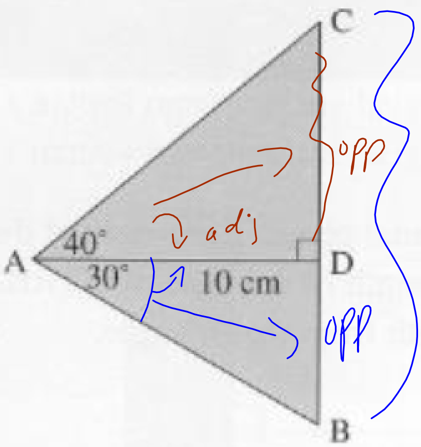
MCT 4CI Homework for 5.3.1

1. Calculate the length of BC.

a)



$BC = BD + DC$

$\doteq 5.774 + 8.391$

$\doteq 14.165$ cm

TOA

$\tan 30° = \frac{BD}{10}$

$BD = 10 \tan 30°$

$\doteq 5.7735$

$\doteq 5.774$

TOA

$\tan 40° = \frac{DC}{10}$

$DC = 10 \tan 40°$

$\doteq 8.3909$

$\doteq 8.391$

Before we begin, are there any questions from last day's work? 5.3.1

pp.36-40 (1,2)ac,4,5,10,12,13 p.71 14,17

(Tuesday's quiz will be based on the first three lessons...not today's)

Today's Learning Goal(s):

By the end of the class, I will:

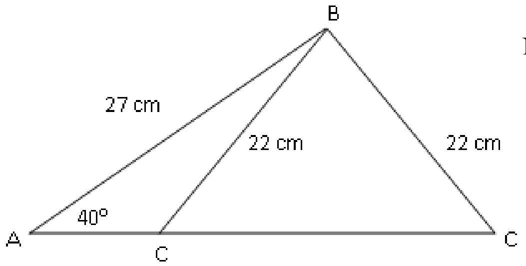
a) understand, that when the diagram is not included, the information may lead to *two different drawings* of the triangle, and is therefore ambiguous.

b) be able to create the diagram and solve for both possible triangles.

5.4.1: The **Ambiguous** Case of the Sine Law

Date: Nov. 19/18

Ex. 1 Consider ΔABC, $\angle A = 40°$, AB=27 cm, and BC = 22 cm.



Note: There are 2 different ways to sketch ΔABC using this information. This means there are two possible ways to solve this triangle. This is the ambiguous case of the Sine Law.

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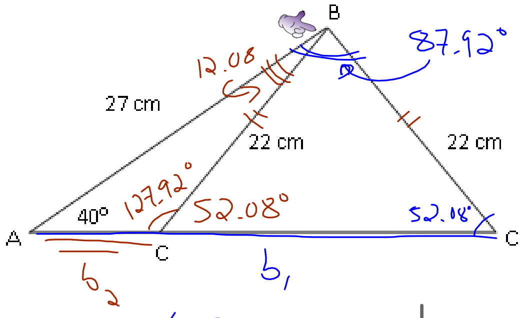
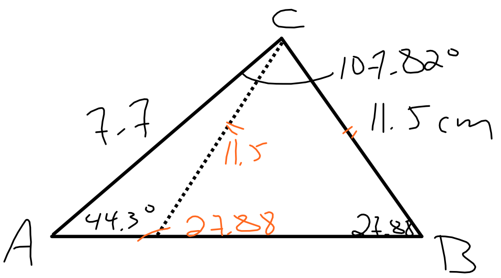


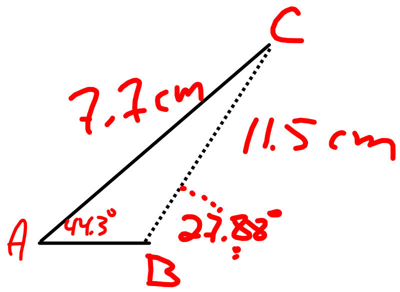
Note: There are 2 different ways to sketch ΔABC using this information.
This means there are two possible ways to solve this triangle.
This is the ambiguous case of the Sine Law.

$\angle C$	$\angle B$	b
$\frac{\sin C}{27} = \frac{\sin 40°}{22}$ $\sin C = 27 \times \frac{\sin 40°}{22}$ $C = \sin^{-1}\left(27 \times \frac{\sin 40°}{22}\right)$ $\doteq 52.080$ $\doteq 52.08°$	$B \doteq 180° - 40° - 52.08°$ $\doteq 87.92°$	$\frac{b}{\sin 87.92°} \doteq \frac{22}{\sin 40°}$ $b \doteq \sin 87.92° \times \frac{22}{\sin 40°}$ $\doteq 34.2033$ $\doteq 34.203$ cm

$\angle C$	$\angle B$	b
$C \doteq 180° - 52.08°$ $\doteq 127.92°$	$B \doteq 180° - 40° - 127.92°$ $\doteq 12.08°$	$\frac{b}{\sin 12.08°} \doteq \frac{22}{\sin 40°}$ $b \doteq \sin 12.08° \times \frac{22}{\sin 40°}$ $\doteq 7.1627$ $\doteq 7.163$ cm

Ex. 2 Solve $\triangle ABC$, $\angle A = 44.3°$, a = 11.5 cm, and b = 7.7 cm.

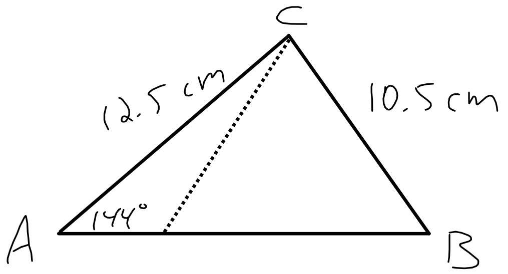


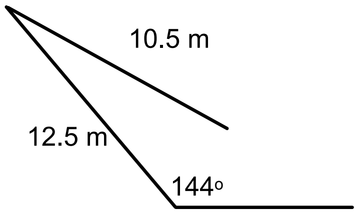


$\angle B$	$\angle C$	c
$\frac{\sin B}{7.7} = \frac{\sin 44.3°}{11.5}$ $B = \sin^{-1}\left(7.7 \times \frac{\sin 44.3°}{11.5}\right)$ $\doteq 27.880$ $\doteq 27.88°$	$C \doteq 180° - 44.3° - 27.88$ $\doteq 107.82°$	$\frac{c}{\sin 107.82} \doteq \frac{11.5}{\sin 44.3°}$ $c \doteq \sin 107.82° \times \frac{11.5}{\sin 44.3°}$ $\doteq 15.6758$ $\doteq 15.676$ cm

$\angle B$	$\angle C$	
$B \doteq 180° - 27.88°$ $\doteq 152.12°$	$C \doteq 180° - 44.3° - 152.12°$ $\doteq -16.42$ $\therefore$ only 1 triangle is possible.	

Ex. 3 Solve $\triangle ABC$, $\angle A = 144°$, a = 10.5 cm, and b = 12.5 cm.



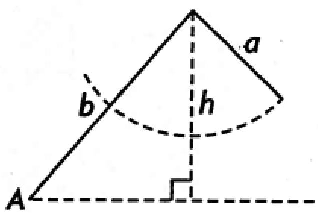
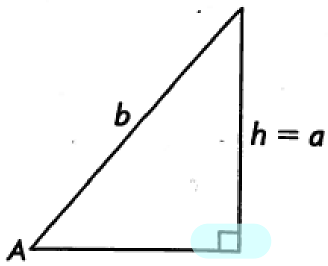
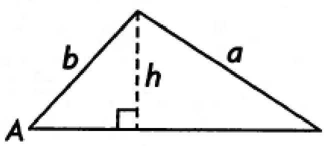
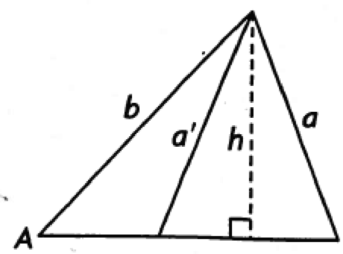


$\angle B$	$\angle C$	**Today's Assigned Work:**
$\frac{\sin B}{12.5} = \frac{\sin 144°}{10.5}$ $B = \sin^{-1}\left(12.5 \times \frac{\sin 144°}{10.5}\right)$ $\doteq 44.406$ $\doteq 44.41°$	$C \doteq 180° - 144° - 44.41°$ $\doteq -8.41°$ ∴ No triangles possible.	**5.4.2 2,6,12a** **(SWYK 5.1 next class)** **See Next Slide for New Summaries**

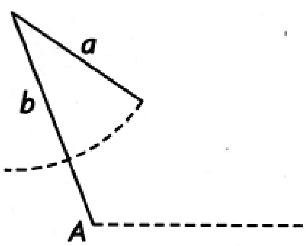
The ambiguous case arises in a SSA (side, side, angle) triangle. In this situation, depending on the size of the given angle and the lengths of the given sides, the sine law calculation may lead to 0, 1, or 2 solutions.

Need to Know

- In the ambiguous case, if $\angle A$, a, and b are given and $\angle A$ is acute, there are four cases to consider. In each case, the height of the triangle is $h = b \sin A$.

If $\angle A$ is acute and $a < h$, no triangle exists. 	If $\angle A$ is acute and $a = h$, one right triangle exists. 
If $\angle A$ is acute and $a > b$, one triangle exists. 	If $\angle A$ is acute and $h < a < b$, two triangles exist. 

If $\angle A$, a, and b are given and $\angle A$ is obtuse, there are two cases to consider.

If $\angle A$ is obtuse and $a < b$ or $a = b$, no triangle exists. 	If $\angle A$ is obtuse and $a > b$, one triangle exists.