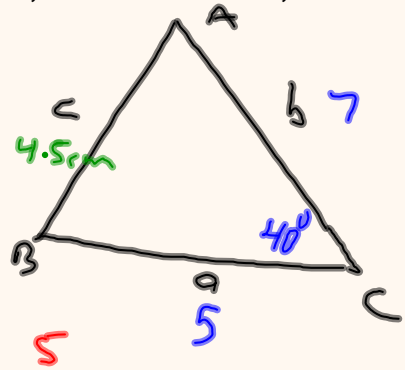
MBF 3C
4.4

Problems in Two Dimensions

Solve the Triangle

Solve ΔABC, if $\angle C = 40^\circ$, a = 5 cm, and b = 7 cm.



$c^2 = a^2 + b^2 - 2ab\cos C$

$= 5^2 + 7^2 - 2(5)(7)\cos 40^\circ$

$c^2 = 25 + 49 - 70\cos 40^\circ$

$c^2 = 74 - 53.62$

$c^2 = 20.4$

$c = \sqrt{20.4}$

$c = 4.5\text{ cm}$

$\frac{4.5}{\sin 40} = \frac{5}{\sin A}$

$5\sin 40^\circ = 4.5\sin A$

$\frac{5\sin 40}{4.5} = \sin A$

$0.714 = \sin A$

$A = 46^\circ$

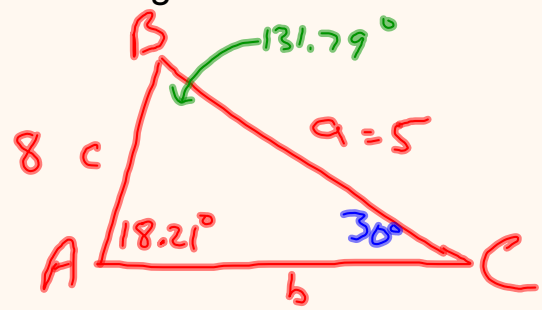
$B = 94^\circ$

Solve a Harder Triangle

Solve ΔABC, if $\angle A = 18.21^\circ$, a = 5 cm, and c = 8 cm.

In this case, there are actually two possible triangles that could be created.

Sketchpad File



$$\frac{5}{\sin 18.21} = \frac{8}{\sin C}$$

$$5\sin C = 8\sin 18.21$$

$$\sin C = \frac{8\sin 18.21}{5}$$

$$\angle C = 30^\circ$$

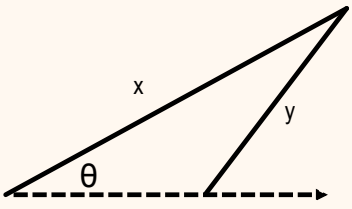
$$\frac{b}{\sin 131.79} = \frac{5}{\sin 18.21}$$

$$b = \frac{5\sin 131.79}{\sin 18.21}$$

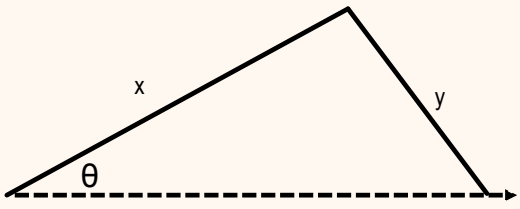
$b = 11.9$

The Ambiguous Case

We refer to the situation when two triangles are possible as the Ambiguous Case.
It only occurs if two sides, and one opposite angle are given.

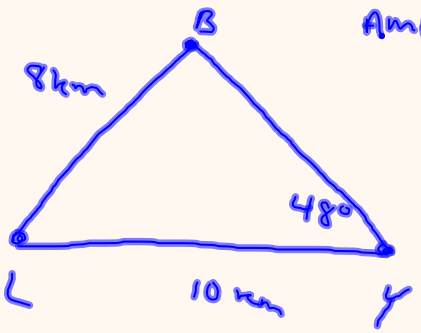


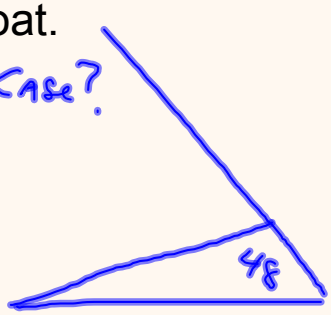
OR



Application

A lighthouse at point L is 10 km from a yacht at point Y and 8 km from a sailboat at point B. From the yacht, the lighthouse and the sailboat are separated by an angle of 48°. Determine the distance from the yacht to the sailboat.





Homework:

Solve ΔABC in each scenario:

a) ∠A = 58° , a = 12, and c = 10

b) ∠A = 35° , a = 6, and b = 8

c) ∠A = 50° , a = 10, and b = 20

d) ∠A = 32° , a = 30, and c = 42