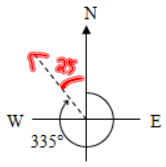
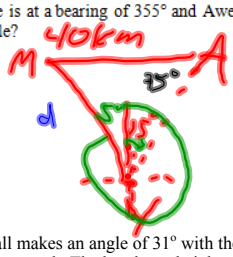
Unit 5 – Solving Problems Using Acute-Triangle Models

Date: Apr. 21/11

Bearing – A bearing is a clockwise angle from magnetic north. For example, the dashed line shows a bearing of 335°.



Ex. 0: Mathville is 40 km due west of Awesometown.
From where you are, Mathville is at a bearing of 355° and Awesometown is a bearing of 15°.
How far are you from Mathville?



$\frac{d}{\sin 75^\circ} = \frac{40}{\sin 20^\circ}$

$d = 112.967$ km

∴you are 112.97 km from Mathville

Ex. 1: A ladder leaning against a wall makes an angle of 31° with the wall. The ladder touches a box that is flush against the wall and the ground. The box has a height of 64 cm and a width of 27 cm.
How long, to the nearest centimetre is the ladder?

$\sin 31^\circ = \frac{27}{x}$

$x = \frac{27}{\sin 31^\circ}$

$\doteq 52.42$

$\sin 59^\circ = \frac{64}{y}$

$y = \frac{64}{\sin 59^\circ}$

$\doteq 74.66$

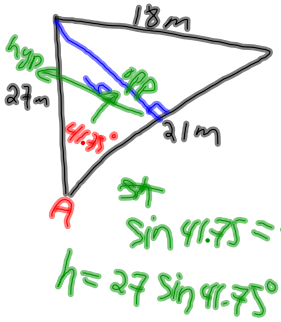
$L = x + y$

$\doteq 127.08$

$\doteq 127.0$ cm

∴the ladder is 127 cm in length

Ex. 2: Jim has a triangular backyard with side lengths of 27 m, 21 m and 18 m.
If 1 bag of fertilizer covers 400 m^2, does he have enough fertilizer to cover the lawn twice?
HINT: Find∠A first !!!! and then find "h"



$\sin 41.75 = \frac{h}{27}$

$h = 27 \sin 41.75^\circ$

$A = \frac{1}{2}bh$

$= \frac{1}{2}(21)(27\sin 41.75^\circ)$

$\doteq 189.777$

$\doteq 188.78$ m^2

$\cos A = \frac{27^2 + 21^2 - 18^2}{2(27)(21)}$

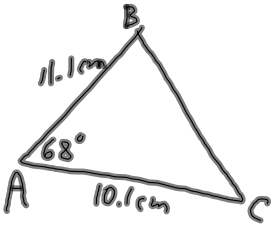
$A \doteq \cos^{-1}(0.74)$

$A \doteq 41.752^\circ$

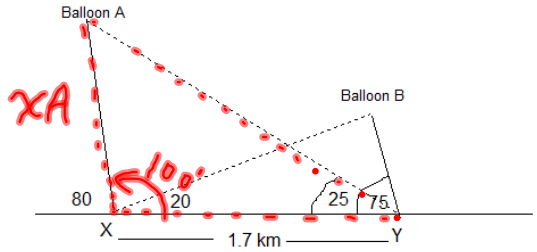
$\doteq 41.75^\circ$

∴Jim has enough fertilizer to cover the lawn twice, with 22.44 m^2 left over.

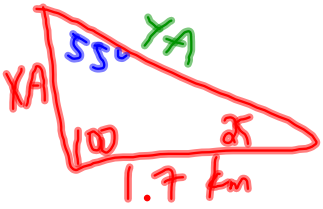
Ex. 3: Solve $\Delta ABC : \angle A = 68°,\ b = 10.1cm, c = 11.1cm$



Ex. 4: Two observers standing at points X and Y are 1.7 km apart. Each person measures angles of elevation to two balloons, A and B, flying overhead as shown. (Round your answers to the nearest tenth of a km)



a) How far is balloon A from point X? From point Y?



$$\frac{XA}{\sin 25^\circ} = \frac{1.7}{\sin 55^\circ}$$

$$XA = \frac{1.7 \sin 25^\circ}{\sin 55^\circ}$$

$$\doteq 0.87$$

$$\doteq 0.9 \text{ km}$$

∴balloon A is 0.9 km from X

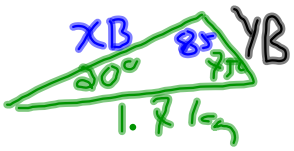
$$\frac{YA}{\sin 100} = \frac{1.7}{\sin 55^\circ}$$

$$YA \doteq 2.04$$

$$\doteq 2.0 \text{ km}$$

∴balloon A is 2.0 km from Y

b) How far is balloon B from point X? From point Y?



$$\frac{XB}{\sin 75^\circ} = \frac{1.7}{\sin 85^\circ}$$

$$XB = \frac{1.7 \sin 75^\circ}{\sin 85}$$

$$\doteq 1.64$$

$$\doteq 1.6 \text{ km}$$

∴balloon B is 1.6 km from X

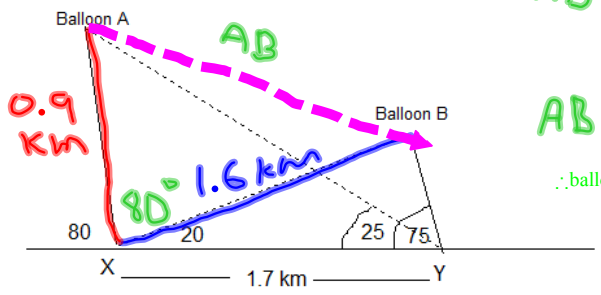
$$YB = \frac{1.7 \sin 20^\circ}{\sin 85^\circ}$$

$$\doteq 0.58$$

$$\doteq 0.6 \text{ km}$$

∴balloon B is 0.6 km from Y

c) How far apart are balloons A and B?



$$AB^2 = 1.6^2 + 0.9^2 - 2(1.6)(0.9)\cos 80^\circ$$

$$\doteq 2.86$$

$$AB \doteq 1.69 \text{ km}$$

∴balloons A and B are 1.69 km apart

Ex. 5: Do p. 310 # 11 (if time permits)

Homework: p. 309 # 1 – 10, 12, 13
p. 313 READ
(Work ahead on the review)