Date: _____

Today's Learning Goal(s):

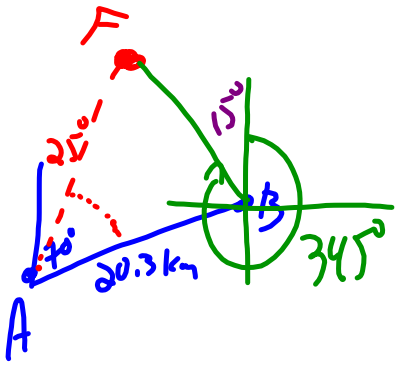
By the end of the class, I will be able to:

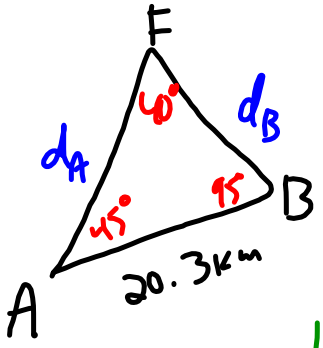
a) solve three dimensional problems using trigonometry.

Last day's work: pp. 325-327 #1b, 2b, 3bc, 4ac, 5, 6, 8 [12,14]

p. 327 #8 Previous year's soluon

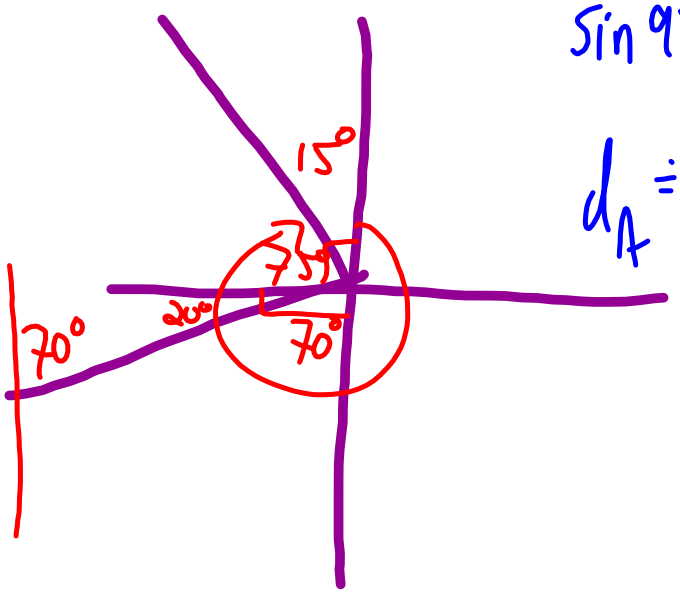
8. Two forest fire towers, A and B, are 20.3 km apart. From tower A, the bearing of tower B is 70°. The ranger in each tower observes a fire and radios the bearing of the fire from the tower. The bearing from tower A is 25° and from tower B is 345°. How far, to the nearest tenth of a kilometre, is the fire from each tower?





$$\frac{d_A}{\sin 95^\circ} = \frac{20.3}{\sin 40^\circ} \qquad \frac{d_B}{\sin 45^\circ} = \frac{20.3}{\sin 40^\circ}$$

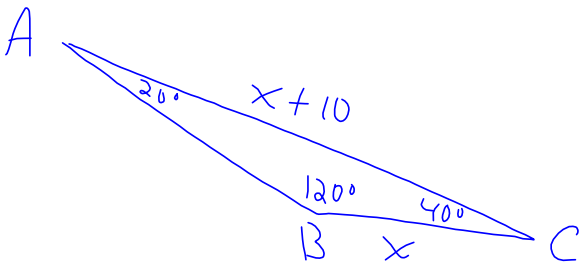
$d_A \doteq 31.5$ km $\qquad d_B \doteq 22.3$ km



p. 327 #12

Extending

12. The interior angles of a triangle are 120°, 40°, and 20°. The longest side is 10 cm longer than the shortest side. Determine the perimeter of the triangle to the nearest centimetre.



$$\frac{x}{\sin 20^\circ} = \frac{x+10}{\sin 120^\circ} = \frac{y}{\sin 40^\circ}$$

$$x = \frac{y \sin 20^\circ}{\sin 40^\circ} \qquad y = \sin 40^\circ \left(\frac{x+10}{\sin 20^\circ}\right)$$

$$y = \sin 40^\circ \left(\frac{\frac{y \sin 20^\circ}{\sin 40^\circ} + 10}{\sin 120^\circ}\right)$$

$$\frac{y}{\sin 40^\circ} \times \sin 120^\circ = \frac{y \sin 20^\circ}{\sin 40^\circ} + 10$$

$$y \sin 120^\circ = y \sin 20^\circ + 10 \sin 40^\circ$$

$$y \sin 120^\circ - y \sin 20^\circ = 10 \sin 40^\circ$$

$$y(\sin 120^\circ - \sin 20^\circ) = 10 \sin 40^\circ$$

$$y = \frac{10 \sin 40^\circ}{\sin 120^\circ - \sin 20^\circ}$$

$$\doteq \frac{6.427}{0.524}$$

$$\doteq 12.26$$

$$\doteq 12.3$$

$$\frac{x}{\sin 20^\circ} = \frac{y}{\sin 40^\circ}$$

$$x \doteq \sin 20^\circ \times \frac{12.3}{\sin 40^\circ}$$

$$\doteq 6.54$$

$$\doteq 6.5$$

$$\therefore x + 10 = 16.5$$

Perimeter = 16.5
+ 12.3
+ 6.5
35.3

$\therefore$ Perimeter $\doteq$ 35 m

5.8 Solving 3-Dimensional Problems Using Trigonometry

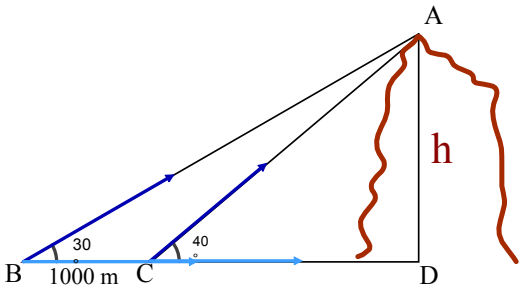
Date: May 2/19

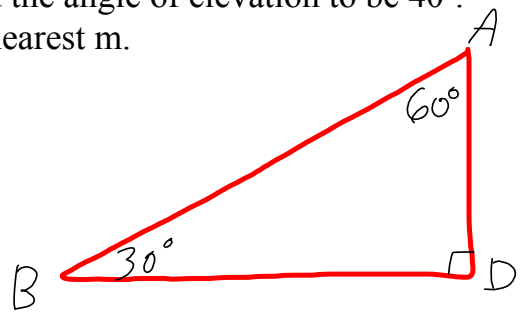
Success Criteria:

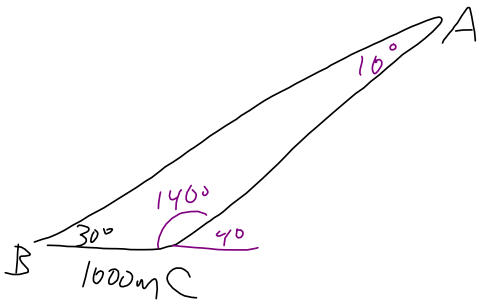
- sketch a diagram
- ask: **Is it a Right Triangle?**
  - » If yes, use SOH CAH TOA
- ask: **Is there an Opposite Pair?**
  - » If yes, use Sine Law (don't forget the ambiguous case!)
- ask: **Is there a contained angle, or all 3 sides given?**
  - » If yes, use Cosine Law
  - » Are you finding a side or an angle?
- substitute in the numbers, and isolate the variable
- use your calculator to solve
- give a concluding statement
- ensure you have answered the question asked

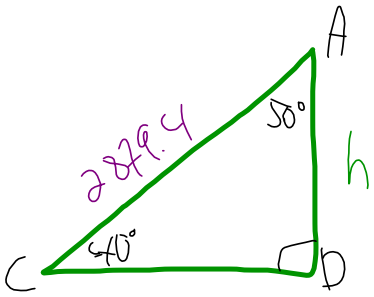
Ex. 1

To determine the height of a hill, you measure the angle of elevation of the top to be 30º . You then move 1000 m closer and find the angle of elevation to be 40º. Calculate the height of the hill, to the nearest m.









SOH: $\sin 40^\circ = \frac{h}{2879.4}$

$h = 2879.4 \sin 40^\circ$

$= 1850.83$

$\doteq 1851$ m

$\frac{AC}{\sin 30^\circ} = \frac{1000}{\sin 10^\circ}$

$AC = \sin 30^\circ \times \frac{1000}{\sin 10^\circ}$

$\doteq 2879.38$

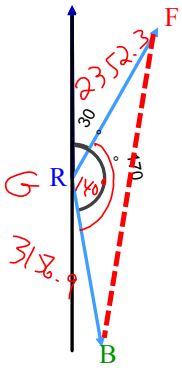
$\doteq 2879.4$ m

∴ the height of the hill is 1851 m.

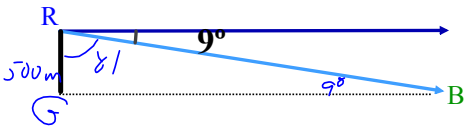
1851 m

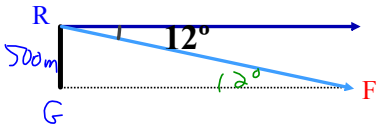
Ex. 2
Ranger Rick is in his watch tower 500 m above a valley floor.
He spots "smoke" on a bearing of 030º (N30ºE). The angle of depression is 12º.
Fireman Bob is on a bearing of 170º (S10ºE) and his angle of depression is 9º.
How far, to the nearest m, is Fireman Bob from the fire?

From Above



From Ground Level





TOA $\tan 9^\circ = \frac{500}{GB}$

$GB = \frac{500}{\tan 9}$

$\doteq 3156.87$

$\doteq 3156.9\text{ m}$

TOA: $\tan 12^\circ = \frac{500}{GF}$

$GF = \frac{500}{\tan 12^\circ}$

$\doteq 2352.31$

$\doteq 2352.3$

$BF^2 = 2352.3^2 + 3156.9^2 - 2(2352.3)(3156.9)\cos 140^\circ$

$BF \doteq 5184.2$

Bob is 5184 m from the fire.

Are there any Homework Questions you would like to see on the board?

Last day's work: pp. 325-327 #1b, 2b, 3bc, 4ac, 5, 6, 8 [12,14]

Today's Homework Practice includes:

pp. 332-335 #3 – 6 [7, 14]