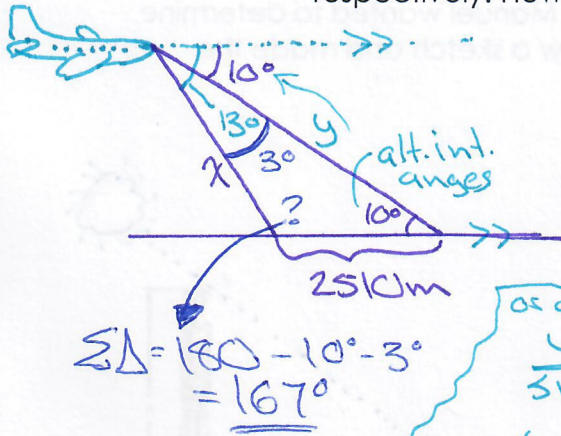




Lesson #3.4 – Solving Problems Using Acute Triangles

**Example 1:** When a plane is coming into land at a 2510 m long runway, the angle of depression to the ends of the runway are  $10^\circ$  and  $13^\circ$  respectively. How far is the plane from the end of the runway?



use sine law to find x

$$\frac{x}{\sin 10^\circ} = \frac{2510}{\sin 3^\circ}$$

$$x = \frac{2510 \sin 10^\circ}{\sin 3^\circ} = 8328 \text{ m}$$

or  
 $8.3 \text{ km}$

from end of the runway.

$$\Sigma \Delta = 180 - 10^\circ - 3^\circ = 167^\circ$$

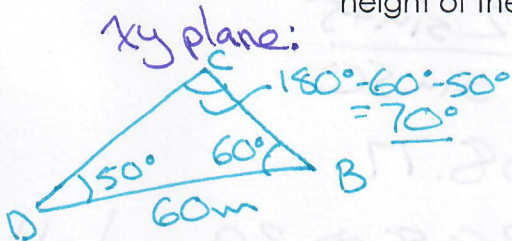
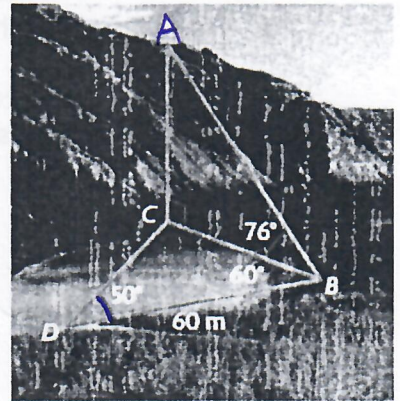
or other end use

$$\frac{y}{\sin 167^\circ} = \frac{2510}{\sin 3^\circ}$$

$$y = \frac{2510 \sin 167^\circ}{\sin 3^\circ} = 10789 \text{ m}$$

or 10.8 km

**Example 2:** Brendan and Diana plan to climb the cliff at Dry Island Buffalo Jump, Alberta. They need to know the height of the climb before they start. Brendan stands at point B, as shown in the diagram. He uses a clinometer to determine  $\angle ABC$ , the angle of elevation to the top of the cliff. Then he estimates  $\angle CBD$ , the angle of between the base of the cliff, himself, and Diana who is standing at point D. Diana estimates  $\angle CDB$ , the angle between the base of the cliff, herself, and Brendan. Determine the height of the cliff to the nearest metre.



find CB:

$$\frac{CB}{\sin 50^\circ} = \frac{60}{\sin 70^\circ}$$

$$CB = \frac{60 \sin 50^\circ}{\sin 70^\circ} = 48.9 \text{ m}$$

find AC:

$$\tan 76^\circ = \frac{AC}{48.9}$$

$$AC = 48.9 \tan 76^\circ$$

$$AC = 196.2 \text{ m}$$

cliff is 196 m tall

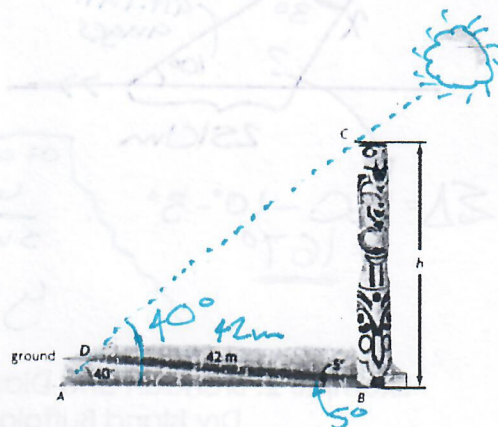
# FOUNDATIONS OF MATH 11

## Chapter 3 – Acute Triangle Trigonometry

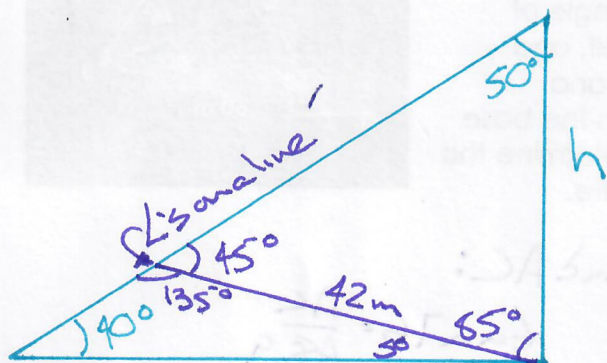


**Example 3:** The world's tallest free-standing totem pole is located in Beacon Hill Park in Victoria, BC. It was carved from a single cedar log by noted carver Chief Mungo Martin of the Kwakiutl (Kwakwaka'wakw), with the team that included his son's David and Henry Hunt. It was erected in 1956. While visiting the park, Manuel wanted to determine the height of the totem pole, so he drew a sketch and made the following measurements:

- He walked along the shadow of the totem pole and counted 42 paces, estimating that each pace was about 1 m.
- He estimated that the angle of elevation of the sun was about  $40^\circ$ .
- He observed the shadow ran uphill and estimated the angle of the hill made with the horizontal was about  $5^\circ$ .



How can Manuel determine the height of the Totem pole to the nearest metre?



use sine law to find h

$$\frac{h}{\sin 45^\circ} = \frac{42}{\sin 50^\circ}$$

$$h = \frac{42 \sin 45^\circ}{\sin 50^\circ}$$

$$h = 38.77$$

$$h = 38.8 \Rightarrow \underline{39 \text{ m tall}}$$

**Practice Questions: Page 147, #'s 3-6, 8, 12**