

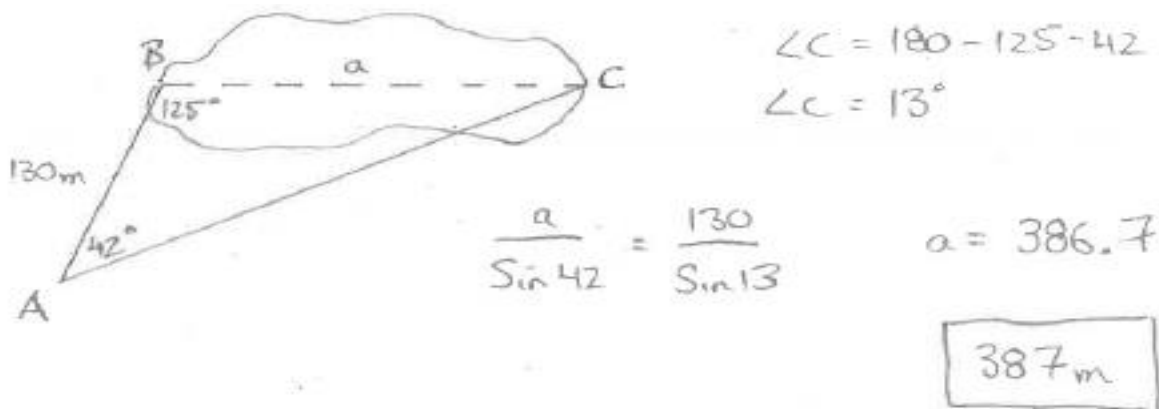
Section 7.7 – Applications of Trigonometry

This booklet belongs to: _____ Block: _____

- The LAW of SINES and LAW of COSINES are very useful when solving 'real' world problems
- Remember that using the LAW of COSINES for **SSS triangles**, solve for the **largest angle** first
- Remember that using the LAW of COSINES for **SAS triangles**, solve for the **smallest angle** first

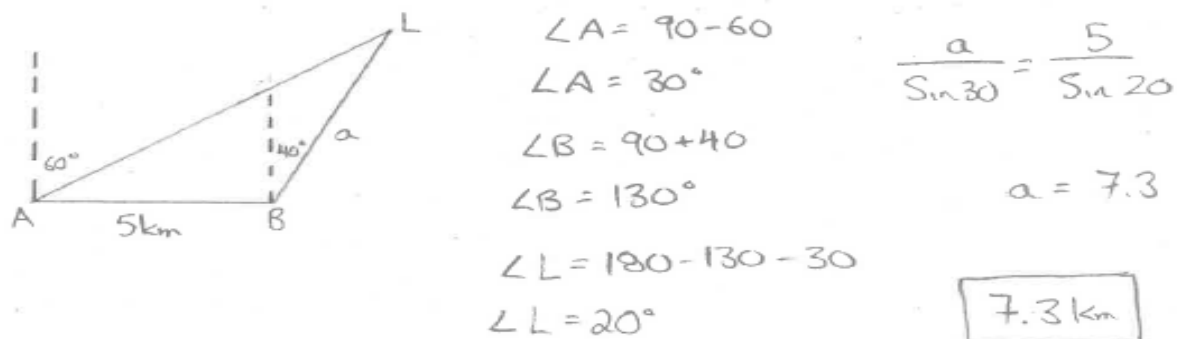
Example 1: To measure the length of a lake, a baseline AB is set and measured at $130m$. Angles A and B are measured to be 42° and 125° respectively. How long is the lake?

Solution 1:



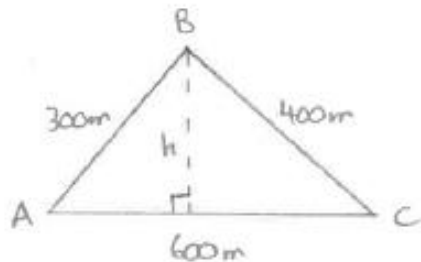
Example 2: A ship is heading due east and passes a rock A. At the time, the bearing to the lighthouse L is $N60^\circ E$. After travelling 5km, the bearing is $N40^\circ E$. How far is the ship from the lighthouse?

Solution 2:



Example 3: The length of the sides of a triangular parcel of land are approximately 300m, 400m, and 600m. Approximate the area of the parcel of land

Solution 3:



$\angle B$ 1st

$$\frac{b^2 - a^2 - c^2}{-2ac} = \cos B$$

$$\angle B = 117.3$$

$\angle A$ next

$$\frac{\sin A}{400} = \frac{\sin 117.3}{600}$$

$$\angle A = 36.3^\circ$$

$$h = 300 (\sin A)$$

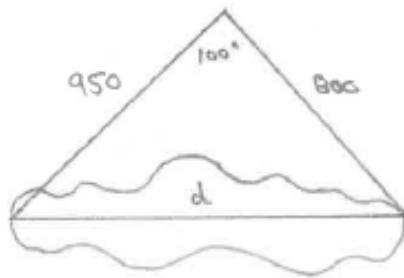
$$h = 300 (\sin 36.3)$$

$$h = 177.6$$

$$A = \frac{600(177.6)}{2} = \boxed{53\,327\text{m}^2}$$

Example 4: To approximate the length of a lake, a surveyor triangulates the distance to one side to be 950m and to the other 800m. If the angle between the two measures 100°, how long is the lake?

Solution 4:



$$d^2 = 950^2 + 800^2 - 2(950)(800) \cos 100^\circ$$

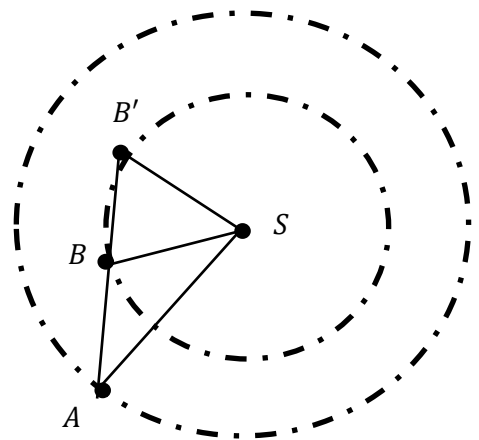
$$d^2 = 180\,6445.23$$

$$d = 1344$$

$$\boxed{1344\text{m}}$$

3. Two planes leave Victoria at 9 *am*. One plane travels due east at 500km/h , while the other plane travels 640km/h $N30^\circ W$. How far apart are the two planes at noon?

4. In our solar system, the distance from the Sun (S) to planets A and B are 85 and 61 million miles respectively. When $\angle A = 20^\circ$, how far is it from planet A to planet B and B' ?



Answer Key – 7.7

1. $1.42km$
2. $921km$
3. $2969.2km$
4. $AB' = 133.6 \text{ million miles}; AB = 26.4 \text{ million miles}$

Extra Work Space