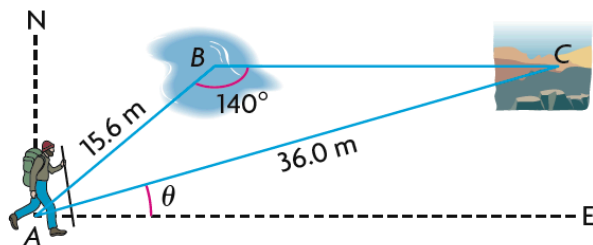


## MCR3U Chapter 5: Trigonometric Ratio

### Lesson 5.3: Sine and Cosine law

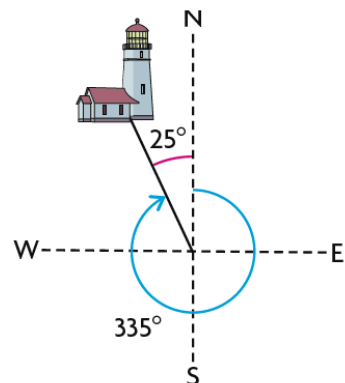
#### Example 1: Sine law

Karl's campsite is 15.6 m from a lake and 36.0 m from a scenic lookout as shown. From the lake, the angle formed between the campsite and the lookout is  $140^\circ$ . Karl starts hiking from his campsite to go to the lookout. What is the **bearing** of the lookout from Karl's position ( $\angle NAC$ )?



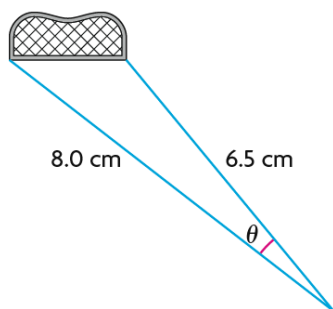
#### bearing

the direction in which you have to move in order to reach an object. A bearing is a clockwise angle from magnetic north. For example, the bearing of the lighthouse shown is  $335^\circ$ .

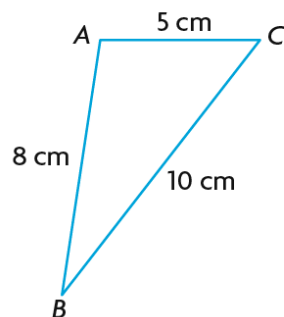


#### Example 2: Cosine law

The posts of a hockey goal are 2.0 m apart. A player attempts to score by shooting the puck along the ice from a point 6.5 m from one post and 8.0 m from the other. Within what angle  $\theta$  must the shot be made? Round your answer to the nearest degree.

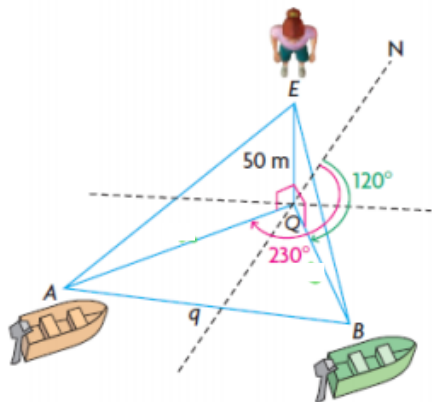


### Example 3: Solve unknown angles



### Example 4: Solving 3D problem

Emma is on a 50 m high bridge and sees two boats anchored below. From her position, boat A has a bearing of  $230^\circ$  and boat B has a bearing of  $120^\circ$ . Emma estimates the angles of depression to be  $38^\circ$  for boat A and  $35^\circ$  for boat B. How far apart are the boats to the nearest meter?



**Practice from textbook:**

A sailor out in a lake sees two lighthouses 11 km apart along the shore and gets bearings of  $285^\circ$  from his present position for lighthouse A and  $237^\circ$  for lighthouse B. From lighthouse B, lighthouse A has a bearing of  $45^\circ$ .

- How far, to the nearest kilometre, is the sailor from both lighthouses?
- What is the shortest distance, to the nearest kilometre, from the sailor to the shore?

Two hot-air balloons are moored to level ground below, each at a different location. An observer at each location determines the angle of elevation to the opposite balloon as shown at the right. The observers are 2.0 km apart.

- What is the distance separating the balloons, to the nearest tenth of a kilometre?
- Determine the difference in height (above the ground) between the two balloons. Round your answer to the nearest metre.

