

Using Properties of Triangles

Date _____

Length of an arc

$$l = \theta r$$

Area of a sector

$$A = \frac{1}{2} \theta r^2$$

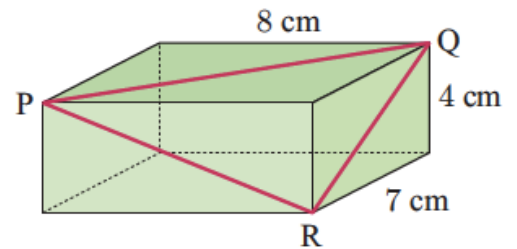
Area of Triangle: $A = \frac{1}{2} ab \sin C$

Cosine Rule: $c^2 = a^2 + b^2 - 2ab \cos C$ or $\cos C = \frac{a^2 + b^2 - c^2}{2ab}$ Sine Rule: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

1. Two observation posts A and B are 12 km apart. A third observation post C is located such that \widehat{CAB} is 42° and \widehat{CBA} is 67° . Find the distance of C from A and from B.

2. An orienteer runs for $4\frac{1}{2}$ km, then turns through an angle of 32° and runs for another 6 km. How far is she from her starting point?

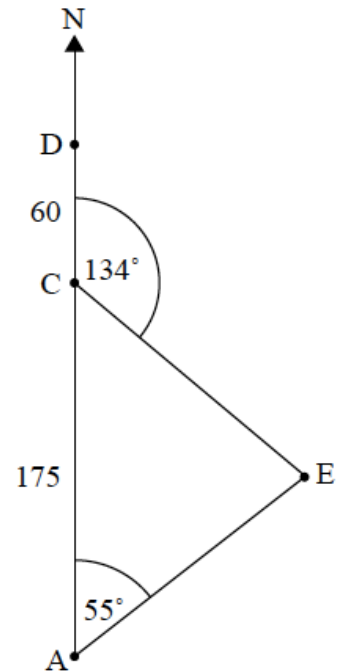
3. Find the measure of angle PQR in the rectangular box to the right.



4. IB Test question from 2017.

A ship is sailing north from a point A towards point D. Point C is 175 km north of A. Point D is 60 km north of C. There is an island at E. The bearing of E from A is 055° . The bearing of E from C is 134° . This is shown in the following diagram.

- (a) Find the bearing of A from E.
- (b) Find CE.
- (c) Find DE.



- (d) When the ship reaches D, it changes direction and travels directly to the island at 50 km per hour. At the same time as the ship changes direction, a boat starts travelling to the island from a point B. This point B lies on (AC), between A and C, and is the closest point to the island. The ship and the boat arrive at the island at the same time. Find the speed of the boat.

- (e) How many square kilometers of ocean are there in the Triangle ACE?