

Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

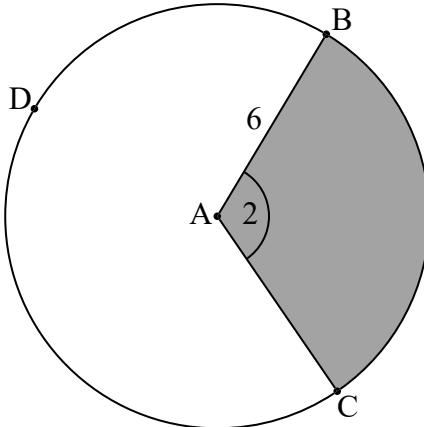
Section A

Answer **all** questions. Answers must be written within the answer boxes provided. Working may be continued below the lines if necessary.

1. [Maximum mark: 6]

The following diagram shows a circle with centre A and radius 6 cm.

diagram not to scale



The points B, C, and D lie on the circle, and $\hat{BAC} = 2$ radians.

- (a) Find the area of the shaded sector. [2]

(b) Find the perimeter of the non-shaded sector ABDC. [4]



7. [Maximum mark: 6]

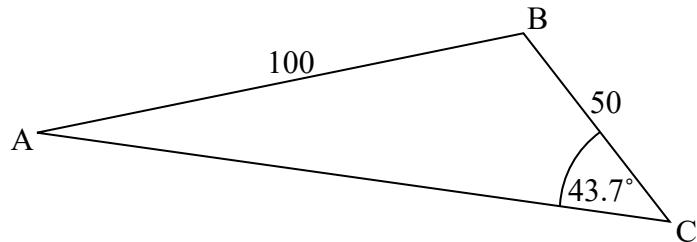
Given that $\sin x = \frac{1}{3}$, where $0 < x < \frac{\pi}{2}$, find the value of $\cos 4x$.



5. [Maximum mark: 15]

A flat horizontal area, ABC, is such that $AB = 100\text{ m}$, $BC = 50\text{ m}$ and angle $A\hat{C}B = 43.7^\circ$ as shown in the diagram.

diagram not to scale



- (a) Show that the size of angle $B\hat{A}C$ is 20.2° , correct to 3 significant figures. [3]
- (b) Calculate the area of triangle ABC. [4]
- (c) Find the length of AC. [3]

A vertical pole, TB, is constructed at point B and has height 25 m.

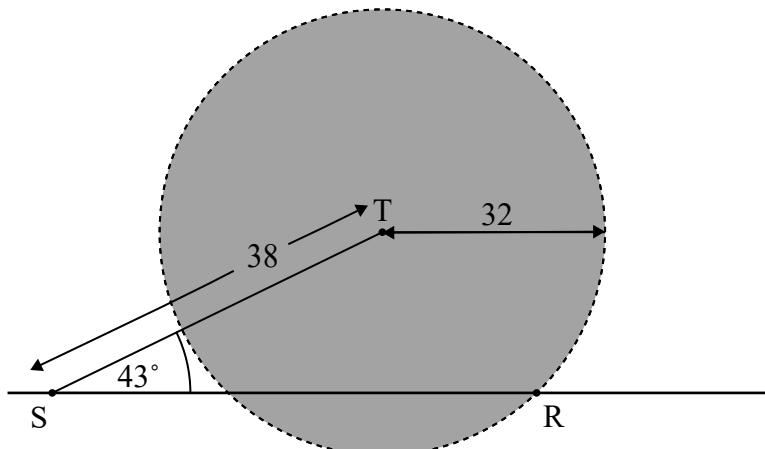
- (d) Calculate the angle of elevation of T from, M, the midpoint of the side AC. [5]

7. [Maximum mark: 6]

A communication tower, T, produces a signal that can reach cellular phones within a radius of 32 km. A straight road passes through the area covered by the tower's signal.

The following diagram shows a line representing the road and a circle representing the area covered by the tower's signal. Point R is on the circumference of the circle and points S and R are on the road. Point S is 38 km from the tower and $\hat{R}ST = 43^\circ$.

diagram not to scale



- (a) Let $SR = x$. Use the cosine rule to show that $x^2 - (76 \cos 43^\circ)x + 420 = 0$. [2]

(b) Hence or otherwise, find the total distance along the road where the signal from the tower can reach cellular phones. [4]

