

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.

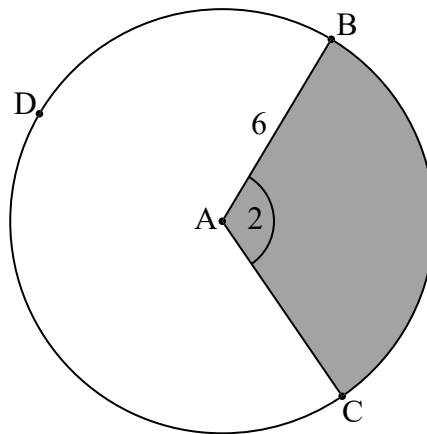
### Section A

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  $\widehat{BAC} = 2$  radians.

- Find the area of the shaded sector. [2]
- Find the perimeter of the non-shaded sector ABDC. [4]

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7. [Maximum mark: 6]

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

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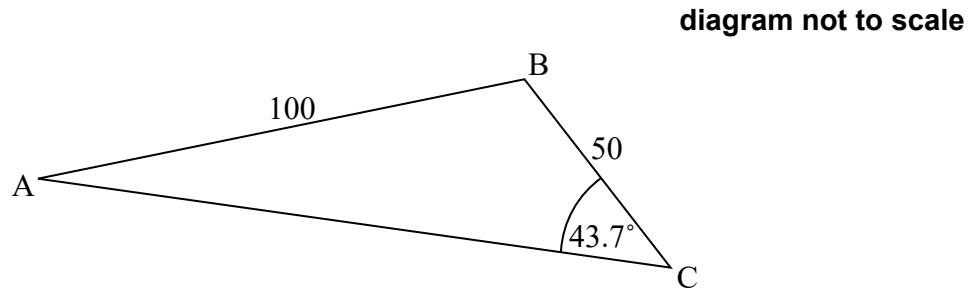
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5. [Maximum mark: 15]

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



- (a) Show that the size of angle  $\hat{BAC}$  is  $20.2^\circ$ , 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.

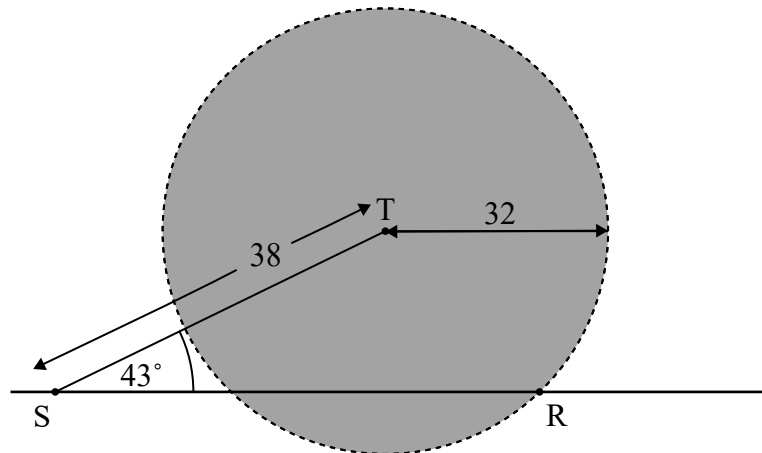
- (d) Calculate the angle of elevation of  $T$  from,  $M$ , the midpoint of the side  $AC$ . [5]

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  $\hat{RST} = 43^\circ$ .

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]

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