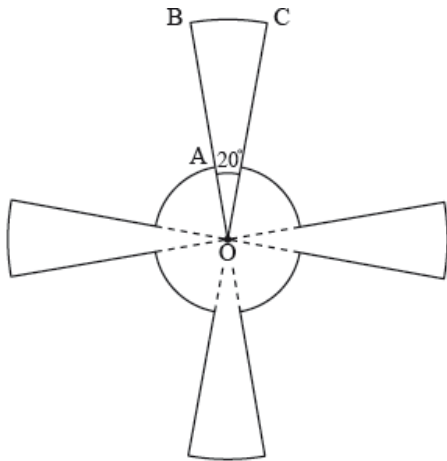


Arcs and sectors *[37 marks]*

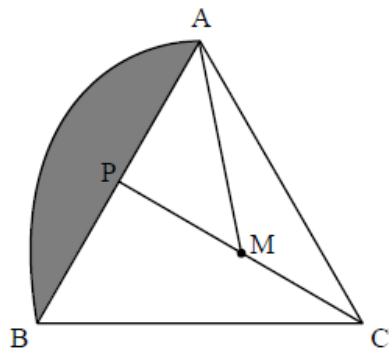
1. This diagram shows a metallic pendant made out of four equal sectors of *[4 marks]* a larger circle of radius $OB = 9$ cm and four equal sectors of a smaller circle of radius $OA = 3$ cm. The angle $BOC = 20^\circ$.



Find the area of the pendant.

A large rectangular box containing 15 horizontal dotted lines, intended for writing or drawing.

Consider the following diagram.



The sides of the equilateral triangle ABC have lengths 1 m. The midpoint of [AB] is denoted by P. The circular arc AB has centre, M, the midpoint of [CP].

2a. Find AM.

[3 marks]

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2b. Find \hat{AMP} in radians.

[2 marks]

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2c. Find the area of the shaded region.

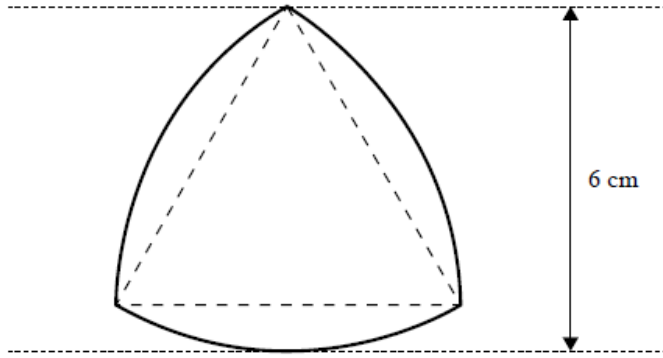
[3 marks]



A large rectangular box with a solid black border, intended for a student's answer. Inside the box, there are six horizontal dotted lines spaced evenly down the page, providing a guide for writing.

The following shape consists of three arcs of a circle, each with centre at the opposite vertex of an equilateral triangle as shown in the diagram.

diagram not to scale



For this shape, calculate

4a. the perimeter.

[2 marks]

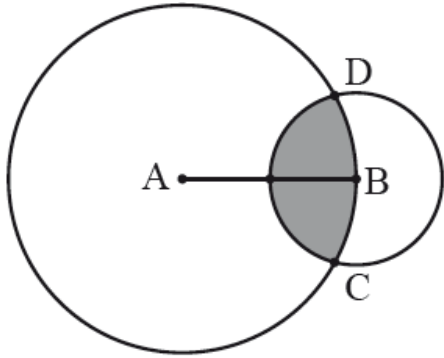
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4b. the area.

[5 marks]

A large rectangular box containing 15 horizontal dotted lines for writing.

The diagram shows two circles with centres at the points A and B and radii $2r$ and r , respectively. The point B lies on the circle with centre A. The circles intersect at the points C and D.



Let α be the measure of the angle CAD and θ be the measure of the angle CBD in radians.

6a. Find an expression for the shaded area in terms of α , θ and r . *[3 marks]*

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6b. Show that $\alpha = 4 \arcsin \frac{1}{4}$. *[2 marks]*

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6c. Hence find the value of r given that the shaded area is equal to 4. [3 marks]

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