5. **In this question you must show all stages of your working.**
Solutions relying entirely on calculator technology are not acceptable.

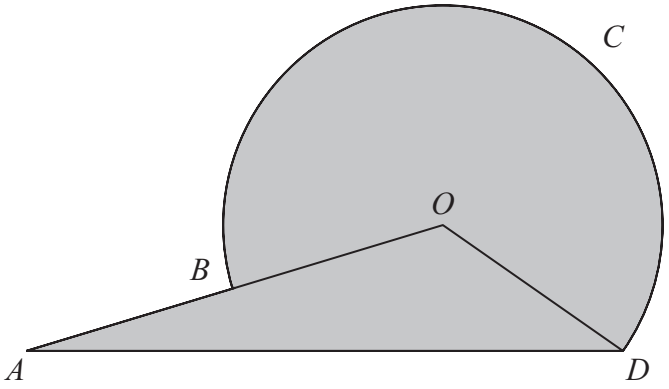


Diagram NOT to scale

Figure 2

Figure 2 shows the logo for the tourist board of an island.

The logo consists of a sector $BODCB$ of a circle centre O joined to a triangle AOD.

Given that

- ABO is a straight line
- $OD = 3$ cm
- $AD = 8$ cm
- angle $AOD = 2.5$ radians

(a) show that angle ODA is 0.415 radians to 3 significant figures.

(3)

(b) Find the total area of the logo, in cm^2, to one decimal place.

(3)

(c) Find the perimeter of the logo, $ABCDA$, in cm, to one decimal place.

(3)

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Question 5 continued

Question 5 continued

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Question 5 continued

(Total for Question 5 is 9 marks)

6.

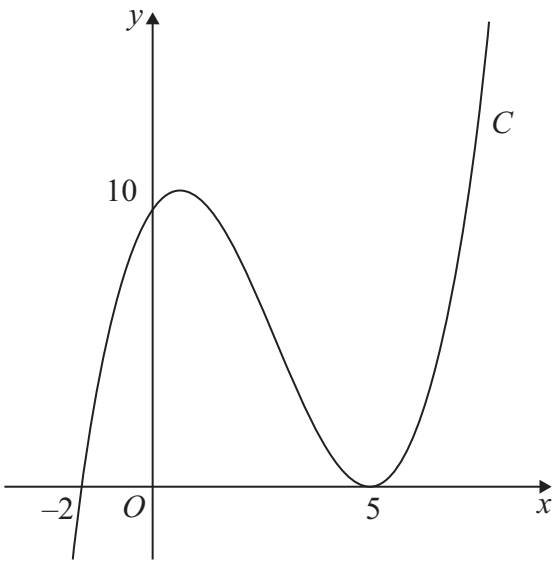


Figure 3

Figure 3 shows a sketch of the curve C with equation $y = f(x)$ where $f(x)$ is a cubic function in x.

The curve C

- cuts the x-axis at $(–2, 0)$ and cuts the y-axis at $(0, 10)$
- touches the x-axis at $(5, 0)$

as shown in Figure 3.

(a) Deduce the roots of the equation

(i) $f\left(\frac{1}{3}x\right) = 0$

(ii) $f(x – 3) = 0$

(2)

(b) Find an expression for $f(x)$. You should leave your answer in factorised form.

(3)

The curve C intersects the straight line $y = 10(x + 2)$ at exactly three points.

(c) Use algebra to find the exact x coordinates of the three points of intersection.

(*Solutions based entirely on calculator technology are not acceptable.*)

(4)

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