

Activity 5

Study these two questions - taken from the June 2019 Pure Paper 1.
Decide which AOs should be assigned to each question.

6 The line with equation $y = 4x + c$, where c is a constant, meets the curve with equation $y = x(x - 3)$ at only one point.

(a) Find the value of c . (4)

(b) Hence find the coordinates of the point of intersection. (3)

(Total for Question 6 is 7 marks)

7

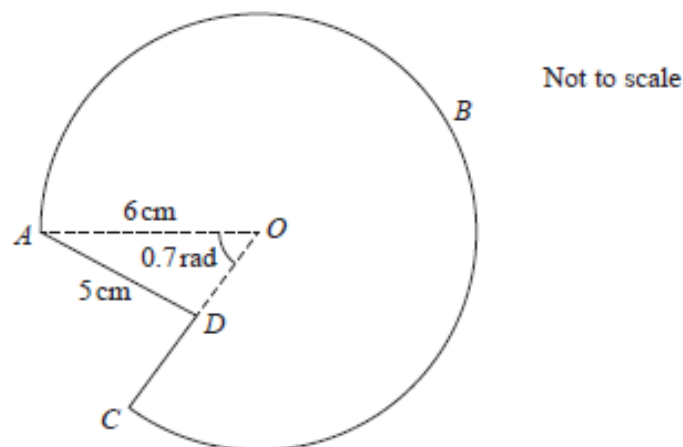


Figure 2

The shape $ABCD A$ consists of a sector $ABCOA$ of a circle, centre O , joined to a triangle AOD , as shown in Figure 2.

The point D lies on OC .

The radius of the circle is 6 cm, length AD is 5 cm and angle AOD is 0.7 radians.

(a) Find the area of the sector $ABCOA$, giving your answer to one decimal place. (3)

Given angle ADO is obtuse,

(b) find the size of angle ADO , giving your answer to 3 decimal places. (3)

(c) Hence find the perimeter of shape $ABCD A$, giving your answer to one decimal place. (4)



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(Total for Question 7 is 10 marks)

Markscheme

| Question Number | Scheme |
|-----------------|---|
| 6.(a) | Sets $4x + c = x(x - 3)$ and attempts to write as a 3TQ Uses $b^2 = 4ac$ for their $x^2 - 7x - c = 0$ Correct equation $49 = -4c$ or $49 + 4c = 0$ $c = -12.25$ oe |
| (b) | Attempt to solve $x^2 - 7x - c = 0$ with their c Attempt to find the y coordinate for their x coordinate $\left(\frac{7}{2}, \frac{7}{4}\right)$ oe |

a)

| Question Number | Scheme |
|-----------------|--|
| 7.(a) | Attempts to use $\frac{1}{2}r^2\theta$ with $r = 6$ and any allowable angle θ Full method to find area $\frac{1}{2} \times 6^2 \times (2\pi - 0.7)$ or $\pi \times 6^2 - \frac{1}{2} \times 6^2 \times 0.7$ $= 100.5 \text{ cm}^2$ (awrt) |
| (b) | Attempts $\frac{\sin \angle ADO}{6} = \frac{\sin 0.7}{5} \Rightarrow \sin \angle ADO = 0.77...$ $\angle ADO = 2.258$ (awrt) |
| (c) | Attempts arc length $ABC = 6 \times (2\pi - 0.7)$ 33.50 Attempts length OD $\frac{\sin(\pi - 0.7 - "2.258")}{OD} = \frac{\sin 0.7}{5} \Rightarrow OD = ...$ 1.42 Full method to find perimeter = $"33.50" + 5 + 6 - "1.42"$ $= 43.1 \text{ cm}$ |
| Alt (c) | Alternative for arc length $ABC = 12\pi - 6 \times 0.7$ Alternative for finding OD using the cosine rule $OD^2 = 6^2 + 5^2 - 2 \times 6 \times 5 \cos(\pi - 0.7 - "2.258") \Rightarrow OD$ |



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Assessment Objectives Mathematics

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|------------|--|
| A01 | Recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of contexts. |
| A02 | Construct rigorous mathematical arguments and proofs through use of precise statements, logical deduction and inference and by the manipulation of mathematical expressions, including the construction of extended arguments for handling substantial problems presented in unstructured form. |
| A03 | Recall, select and use their knowledge of standard mathematical models to represent situations in the real world; recognise and understand given representations involving standard models; present and interpret results from such models in terms of the original situation, including discussion of the assumptions made and refinement of such models. |
| A04 | Comprehend translations of common realistic contexts into mathematics; use the results of calculations to make predictions, or comment on the context; and, where appropriate, read critically and comprehend longer mathematical arguments or examples of applications. |
| A05 | Use contemporary calculator technology and other permitted resources (such as formulae booklets or statistical tables) accurately and efficiently; understand when not to use such technology, and its limitations. Give answers to appropriate accuracy. |