



A Level Mathematics Year 2 Exam Questions by Topic
Chapter 2: Trigonometry

These questions are taken from the Specimen Exam materials and the real 2018 papers for the new syllabus AS and A-level mathematics courses and arranged by chapter of the textbooks by Goldie et al (available here: <https://amzn.to/39umfr5> and <https://amzn.to/3hE8kBL>). There are a mixture of questions from OCR A, OCR B (MEI), Edexcel and AQA. Although the style of questions varies a little across the exam boards the content of the syllabus is almost identical so these are suitable for students preparing for any exam board.

Free problem sets for all other chapters, as well as video solutions, full past papers and other content for GCSE and A-level maths can be found at:

<https://mathsaurus.com/>

AQA 2018 Paper 3 Question 5:

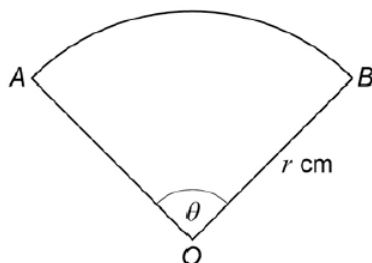
- 5 Show that, for small values of x , the graph of $y = 5 + 4 \sin \frac{x}{2} + 12 \tan \frac{x}{3}$ can be approximated by a straight line. **[3 marks]**

AQA Sample Paper 1 Question 3:

- 3 When θ is small, find an approximation for $\cos 3\theta + \theta \sin 2\theta$, giving your answer in the form $a + b\theta^2$ **[3 marks]**
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AQA Sample Paper 1 Question 5a:

- 5 The diagram shows a sector AOB of a circle with centre O and radius r cm.



The angle AOB is θ radians

The sector has area 9 cm^2 and perimeter 15 cm .

- 5 (a) Show that r satisfies the equation $2r^2 - 15r + 18 = 0$ [4 marks]

- 5 (b) Find the value of θ . Explain why it is the only possible value. [4 marks]

Edexcel 2018 Paper 1 Question 1:

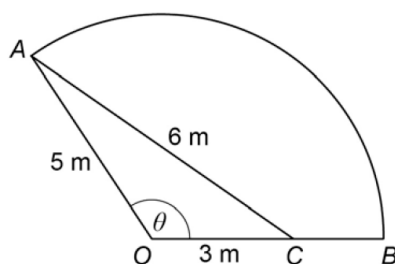
1. Given that θ is small and is measured in radians, use the small angle approximations to find an approximate value of

$$\frac{1 - \cos 4\theta}{2\theta \sin 3\theta}$$

(3)

AQA Sample Paper 3 Question 2a:

- 2 A wooden frame is to be made to support some garden decking. The frame is to be in the shape of a sector of a circle. The sector OAB is shown in the diagram, with a wooden plank AC added to the frame for strength. OA makes an angle of θ with OB .



- 2 (a) Show that the exact value of $\sin\theta$ is $\frac{4\sqrt{14}}{15}$ [3 marks]
- 2 (b) Write down the value of θ in radians to 3 significant figures. [1 mark]
- 2 (c) Find the area of the garden that will be covered by the decking. [2 marks]
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Edexcel 2018 Paper 1 Question 3:

3.

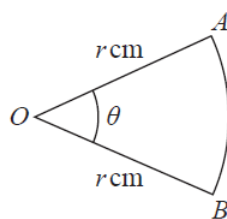


Figure 1

Figure 1 shows a sector AOB of a circle with centre O and radius $r\text{ cm}$.

The angle AOB is θ radians.

The area of the sector AOB is 11 cm^2

Given that the perimeter of the sector is 4 times the length of the arc AB , find the exact value of r .

(4)

Edexcel Sample Paper 1 Question 2:

2.

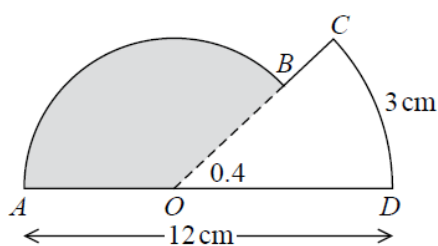


Figure 1

The shape $ABCDOA$, as shown in Figure 1, consists of a sector COD of a circle centre O joined to a sector AOB of a different circle, also centre O .

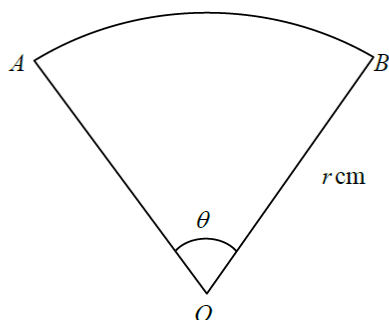
Given that arc length $CD = 3$ cm, $\angle COD = 0.4$ radians and AOD is a straight line of length 12 cm,

(a) find the length of OD , (2)

(b) find the area of the shaded sector AOB . (3)

OCR A Sample Paper 1 Question 4:

4



The diagram shows a sector AOB of a circle with centre O and radius r cm. The angle AOB is θ radians. The arc length AB is 15 cm and the area of the sector is 45 cm².

(i) Find the values of r and θ . [4]

(ii) Find the area of the segment bounded by the arc AB and the chord AB . [3]

OCR A Sample Paper 3 Question 4:

4 Show that, for a small angle θ , where θ is in radians,

$$1 + \cos \theta - 3 \cos^2 \theta \approx -1 + \frac{5}{2} \theta^2.$$

[4]

OCR B MEI 2018 Paper 3 Question 3:

- 3 Fig. 3 shows a circle with centre O and radius 1 unit. Points A and B lie on the circle with angle $AOB = \theta$ radians. C lies on AO , and BC is perpendicular to AO .

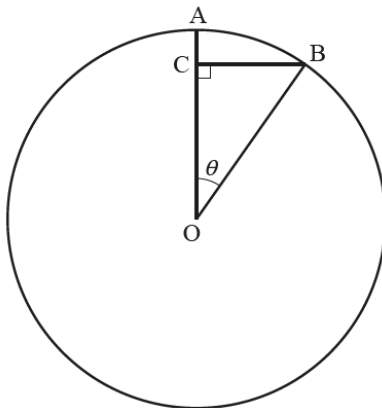


Fig. 3

Show that, when θ is small, $AC \approx \frac{1}{2}\theta^2$. [2]

OCR B MEI Sample Paper 1 Question 1:

- 1 Fig. 1 shows a sector of a circle of radius 7 cm. The area of the sector is 5 cm^2 .

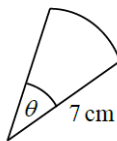


Fig. 1

Find the angle θ in radians. [2]

5 In this question you must show detailed reasoning.

Fig. 5 shows the circle with equation $(x-4)^2 + (y-1)^2 = 10$. The points $(1, 0)$ and $(7, 0)$ lie on the circle. The point C is the centre of the circle.

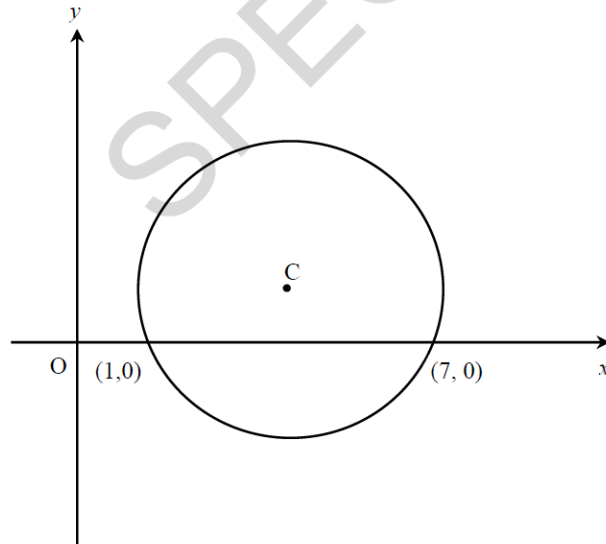


Fig. 5

Find the area of the part of the circle below the x -axis.

[5]