

Please check the examination details below before entering your candidate information

Candidates surname	Other names
Centre Number	Candidate Number
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Pearson Edexcel International GCSE

Time 2 hours	Paper reference	4PM1/01R
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Further Pure Mathematics

PAPER 1R



Calculators may be used.	Total Marks
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Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Without sufficient working, correct answers may be awarded no marks.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You must **NOT** write anything on the formulae page.
Anything you write on the formulae page will gain NO credit.

Information

- The total mark for this paper is 100.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Check your answers if you have time at the end.

Turn over ►

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Q:1/1/1/1/




Pearson

International GCSE in Further Pure Mathematics Formulae sheet

MensurationSurface area of sphere = $4\pi r^2$ Curved surface area of cone = $\pi r \times$ slant heightVolume of sphere = $\frac{4}{3}\pi r^3$ **Series****Arithmetic series**Sum to n terms, $S_n = \frac{n}{2}[2a + (n-1)d]$ **Geometric series**Sum to n terms, $S_n = \frac{a(1-r^n)}{(1-r)}$ Sum to infinity, $S_\infty = \frac{a}{1-r}$ $|r| < 1$ **Binomial series** $(1+x)^n = 1 + nx + \frac{n(n-1)}{2!}x^2 + \dots + \frac{n(n-1)\dots(n-r+1)}{r!}x^r + \dots$ for $|x| < 1, n \in \mathbb{Q}$ **Calculus****Quotient rule (differentiation)**

$$\frac{d}{dx} \left(\frac{f(x)}{g(x)} \right) = \frac{f'(x)g(x) - f(x)g'(x)}{[g(x)]^2}$$

Trigonometry**Cosine rule**In triangle ABC : $a^2 = b^2 + c^2 - 2bc \cos A$

$$\tan \theta = \frac{\sin \theta}{\cos \theta}$$

$$\sin(A+B) = \sin A \cos B + \cos A \sin B$$

$$\sin(A-B) = \sin A \cos B - \cos A \sin B$$

$$\cos(A+B) = \cos A \cos B - \sin A \sin B$$

$$\cos(A-B) = \cos A \cos B + \sin A \sin B$$

$$\tan(A+B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

$$\tan(A-B) = \frac{\tan A - \tan B}{1 + \tan A \tan B}$$

Logarithms

$$\log_a x = \frac{\log_b x}{\log_b a}$$

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Question 2 continued

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(Total for Question 2 is 7 marks)



3

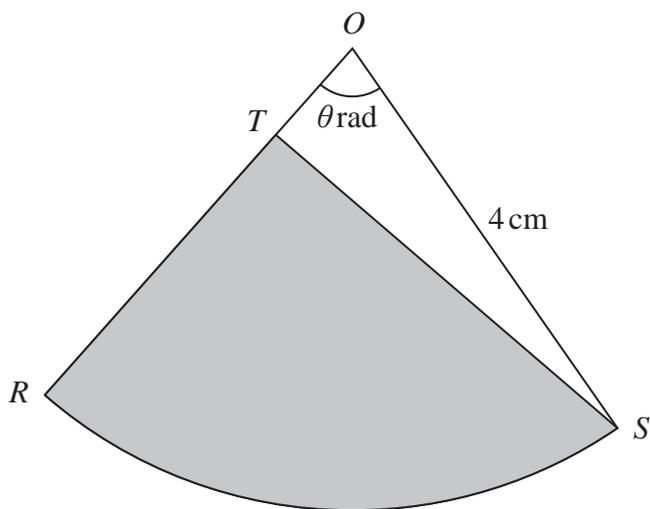


Diagram NOT accurately drawn

Figure 1

Figure 1 shows sector ORS of a circle with centre O and radius 4 cm .
The size of angle ROS is θ radians.

The area of sector ORS is $2\pi\text{ cm}^2$

(a) Find the exact value of θ (2)

(b) Find the perimeter, in cm to 3 significant figures, of the sector ORS . (2)

The point T lies on OR such that $OT : TR = 1 : 3$

The region shown shaded in Figure 1 is bounded by the line TR , the line TS and the arc RS of the sector.

The area of this region is $A\text{ cm}^2$

(c) Find the exact value of A (2)

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Question 3 continued

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(Total for Question 3 is 6 marks)



Question 4 continued

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(Total for Question 4 is 7 marks)



Question 5 continued

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(Total for Question 5 is 8 marks)



Question 6 continued

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Question 6 continued

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(Total for Question 6 is 8 marks)



7 A curve C has equation $y = \log_{10}(x + 2)$

(a) Using the axes below, sketch the graph of C .

Label the coordinates of the points of intersection of C with the coordinate axes.

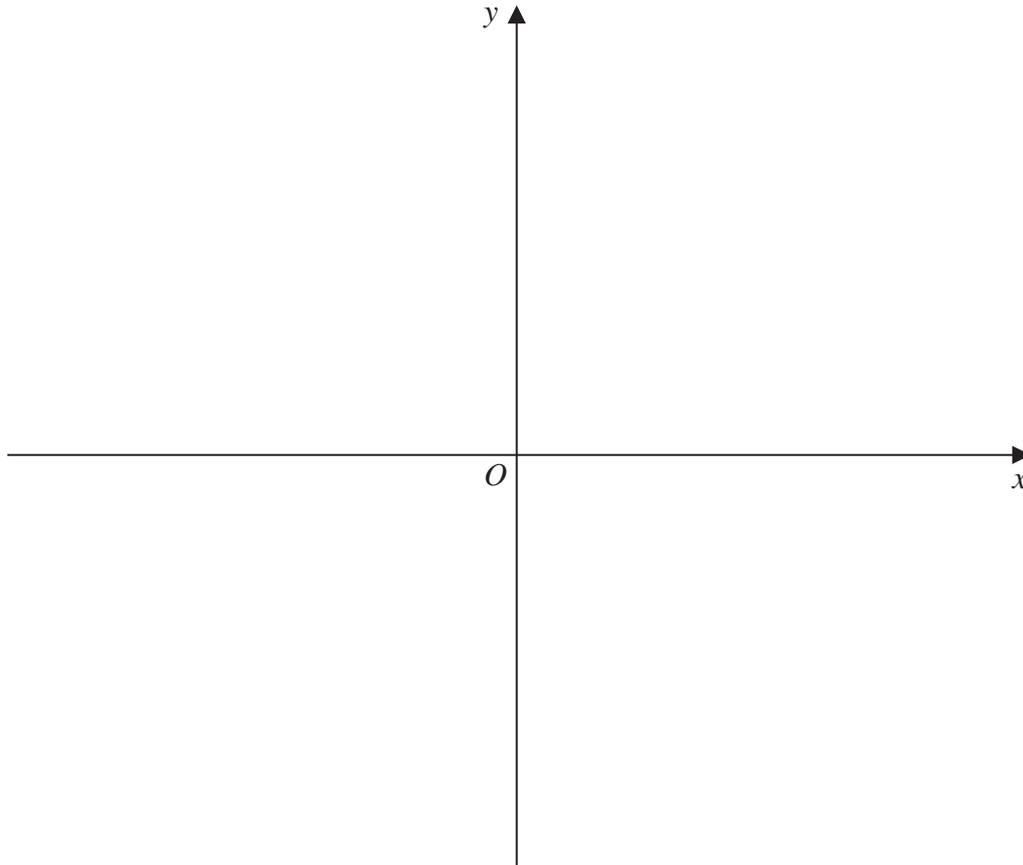
(2)

(b) Solve the equation $2(\log_a 4 + \log_a 16) = 1$

(3)

(c) Solve the equation $5\log_q 16 + 4\log_2 q = 24$

(6)



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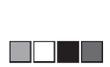
Question 7 continued

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Question 7 continued

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(Total for Question 7 is 11 marks)



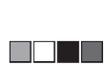
Question 8 continued

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Question 8 continued

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(Total for Question 8 is 10 marks)



Question 9 continued

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Question 9 continued

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(Total for Question 9 is 10 marks)



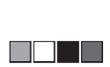
Question 10 continued

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Question 10 continued

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(Total for Question 10 is 11 marks)



Question 11 continued

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Question 11 continued

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