

Please check the examination details below before entering your candidate information

Candidate surname

Other names

**Pearson
Edexcel GCE**

Centre Number

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Candidate Number

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Thursday 20 June 2019

Morning (Time: 1 hour 30 minutes)

Paper Reference **6666/01**

Core Mathematics C4

Advanced

You must have:

Mathematical Formulae and Statistical Tables (Pink)

Total Marks

Candidates may use any calculator allowed by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B). Coloured pencils and highlighter pens must not be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided – *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information

- The total mark for this paper is 75.
- 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.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

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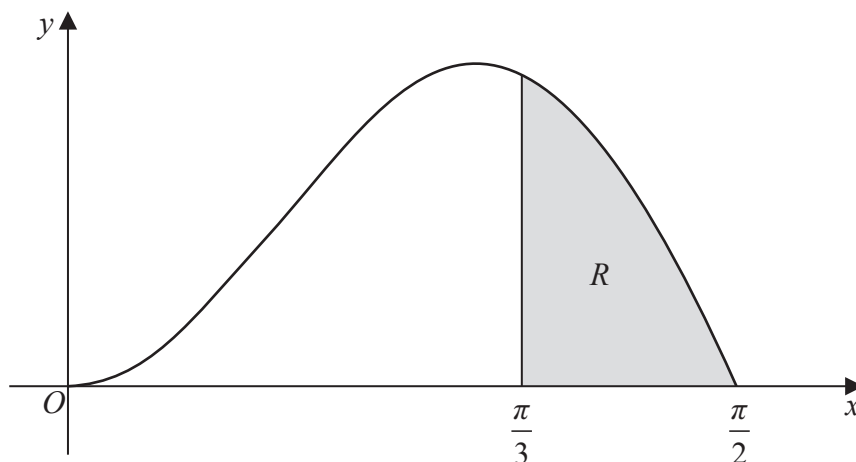


Figure 1

Figure 1 shows a sketch of the curve with equation

$$y = \sin 2x \sin x \quad 0 \leq x \leq \frac{\pi}{2}$$

The finite region R , shown shaded in Figure 1, is bounded by the curve, the x -axis and the line with equation $x = \frac{\pi}{3}$

The table below shows corresponding values of x and y for $y = \sin 2x \sin x$, with the values of y given to 5 significant figures where appropriate.

x	$\frac{\pi}{3}$	$\frac{7\pi}{18}$	$\frac{4\pi}{9}$	$\frac{\pi}{2}$
y	0.75	0.60402	0.33682	0

- (a) Use the trapezium rule, with all the values of y in the table, to find an estimate for the area of R , giving your answer to 4 significant figures. (3)
- (b) Use calculus to find the exact area of R , giving your answer in the form $a + b\sqrt{3}$, where a and b are constants to be found.
(Solutions based entirely on graphical or numerical methods are not acceptable.) (4)

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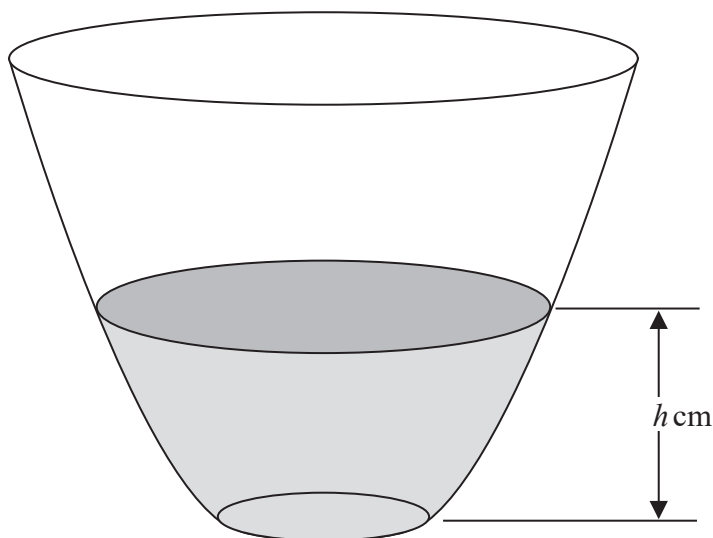


Figure 3

A container with a circular cross-section is shown in Figure 3.

Initially the container is empty. At time t seconds after water begins to flow into the container, the height of water in the container is h cm.

The height of water in the container satisfies the differential equation

$$\frac{dh}{dt} = \frac{k}{h+4} \quad 0 \leq h \leq 35$$

where k is a constant.

When $h = 16$, the height of water in the container is increasing at a rate of 0.6 cm s^{-1}

(a) Find the value of k . (1)

(b) Find the time taken to fill the container with water from empty to a height of 30 cm. (4)

Given that the water flows into the container at a constant rate of $96\pi \text{ cm}^3 \text{ s}^{-1}$

(c) find the volume of water in the container when $h = 30$
 Give your answer in cm^3 to 3 significant figures. (2)

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