

## **Cambridge International Examinations**

Cambridge International Advanced Subsidiary and Advanced Level

CANDIDATE NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
MATHEMATICS			9709/11
Paper 1 Pure Mathem	natics 1 (P1)	Octo	ober/November 2017
			1 hour 45 minutes
Candidates answer on	the Question Paper.		
Additional Materials:	List of Formulae (MF9)		

## **READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name in the spaces at the top of this page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

## Answer all the questions.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.

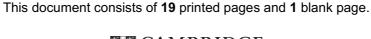
The use of an electronic calculator is expected, where appropriate.

You are reminded of the need for clear presentation in your answers.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [] at the end of each question or part question.

The total number of marks for this paper is 75.





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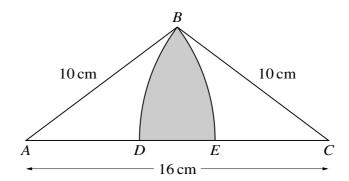
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same sum of the first $n$ terms. Find the value of $n$ .	
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V cn	chines in a factory make cardboard cones of base radius $r$ cm and vertical height $h$ cm. The volume $m^3$ , of such a cone is given by $V = \frac{1}{3}\pi r^2 h$ . The machines produce cones for which $h + r = 18$ .
<b>(i)</b>	Show that $V = 6\pi r^2 - \frac{1}{3}\pi r^3$ . [1]
(ii)	Given that $r$ can vary, find the non-zero value of $r$ for which $V$ has a stationary value and show that the stationary value is a maximum. [4

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(iii)	Find the maximum volume of a cone that can be made by these machines.	[1]
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The diagram shows an isosceles triangle ABC in which AC = 16 cm and AB = BC = 10 cm. The circular arcs BE and BD have centres at A and C respectively, where D and E lie on AC.

(1)	Show that angle $BAC = 0.6435$ radians, correct to 4 decimal places. [1]
(ii)	Find the area of the shaded region. [5]


The points A(1, 1) and B(5, 9) lie on the curve  $6y = 5x^2 - 18x + 19$ .

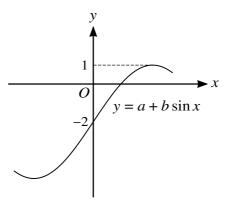
6

Show that the equation of the perpendicular bisector of AB is $2y = 13 - x$ .	[4]

The perpendicular bisector of AB meets the curve at C and D.

Find, by calculation, the distance $CD$ , giving your answer in the form $\sqrt{\left(\frac{p}{q}\right)}$ , where $p$ and	q
integers.	
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7 (a)



The diagram shows part of the graph of $y = a + b \sin x$ . Find the values of the constants $a$ and $b$ . [2]

(b) (i) Show that the equality	<b>(b)</b>	w that the ed	quation
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<b>(i)</b>	Show that the equation
	$(\sin\theta + 2\cos\theta)(1 + \sin\theta - \cos\theta) = \sin\theta(1 + \cos\theta)$
	may be expressed as $3\cos^2\theta - 2\cos\theta - 1 = 0$ . [3]
(ii)	Hence solve the equation
	$(\sin\theta + 2\cos\theta)(1 + \sin\theta - \cos\theta) = \sin\theta(1 + \cos\theta)$
	for $-180^{\circ} \le \theta \le 180^{\circ}$ . [4]

of $R$ in terms of $\mathbf{p}$ and $\mathbf{q}$	, simpinging your unsw	C1.	

values of $a$ and $b$ , showing all necessary working.	[
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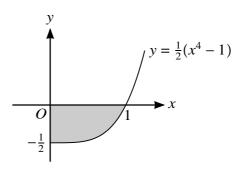
9 F	Functions	f and	g are	defined	for $x >$	3 by
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$$f: x \mapsto \frac{1}{x^2 - 9},$$
  
$$g: x \mapsto 2x - 3.$$

(i)	Find and simplify an expression for $gg(x)$ .	[2]
(ii)	Find an expression for $f^{-1}(x)$ and state the domain of $f^{-1}$ .	[4]

(iii)	Solve the equation $fg(x) = \frac{1}{7}$ . [4]

10



The diagram shows part of the curve  $y = \frac{1}{2}(x^4 - 1)$ , defined for  $x \ge 0$ .

1	Find, showing all necessary working, the area of the shaded region.	[3
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	Find, showing all necessary working, the volume obtained when the shaded region through $360^{\circ}$ about the <i>x</i> -axis.	
		[4
	through $360^{\circ}$ about the $x$ -axis.	
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	through $360^{\circ}$ about the $x$ -axis.	
	through $360^{\circ}$ about the $x$ -axis.	
	through $360^{\circ}$ about the $x$ -axis.	

(iii)	Find, showing all necessary working, the volume obtained when the shaded region is rotated through 360° about the <i>y</i> -axis. [5]

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