

Cambridge International Examinations

Cambridge International Advanced Subsidiary and Advanced Level

NAME			
CENTRE NUMBER		CANDIDATE NUMBER	
MATHEMATICS			9709/11
Paper 1 Pure Mathe	ematics 1 (P1)		May/June 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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2	Relative to an	n origin O , the	position v	vectors of 1	points A	and B are	given l	by

$$\overrightarrow{OA} = \begin{pmatrix} 3 \\ -6 \\ p \end{pmatrix} \quad \text{and} \quad \overrightarrow{OB} = \begin{pmatrix} 2 \\ -6 \\ -7 \end{pmatrix},$$

and angle $AOB = 90^{\circ}$.

(i)) Find the value of p .	[2]
The	e point C is such that $\overrightarrow{OC} = \frac{2}{3}\overrightarrow{OA}$.	
	e point C is such that $\overrightarrow{OC} = \frac{2}{3}\overrightarrow{OA}$. Find the unit vector in the direction of \overrightarrow{BC} .	[4]
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Prove the identity	$\sin \theta$	$1 + \cos \theta$	$\sin \theta$.		[3]
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Hence solve the equation	$\frac{1+\cos\theta}{\sin\theta} + \frac{\sin\theta}{1+\cos\theta} =$	$= \frac{3}{\cos \theta} \text{ for } 0^{\circ} \leqslant \theta \leqslant 360^{\circ}.$	[3]

4	(a)	An arithmetic progression has a first term of 32, a 5th term of 22 and a last term of -28 sum of all the terms in the progression.	3. Find the [4]
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Find the total a	amount allocate	ed in the year	rs 2005 to 20	014 inclusive	Э.	
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5	The equation of a curve is $y = 2 \cos x$.

(i)	Sketch the graph of $y = 2 \cos x$ for $-\pi \le x \le \pi$, st	tating the coordinates of the point of intersection
	with the y-axis.	[2]

Points P and Q lie on the curve and have x-coordinates of $\frac{1}{3}\pi$ and π respectively.

(ii)	Find the length of PQ correct to 1 decimal place.	[2]

The line through P and Q meets the x-axis at H(h, 0) and the y-axis at K(0, k). (iii) Show that $h = \frac{5}{9}\pi$ and find the value of k. [3]

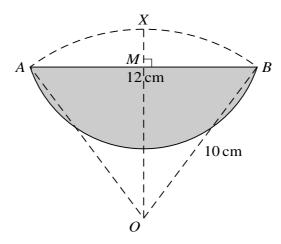
6 The horizontal base of a solid prism is an equilateral triangle of side x cm. The sides of the prism are vertical. The height of the prism is h cm and the volume of the prism is 2000 cm³.
(i) Express h in terms of x and show that the total surface area of the prism, A cm², is given by

$A = \frac{\sqrt{3}}{2}x^2 + \frac{24000}{\sqrt{3}}x^{-1}.$	[3]
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Given that x can vary, find the value of x for which A has a stationary value.	[
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Determine, showing all necessary working, the nature of this stationary value.	
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Find the equation of the cur	rve.			
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Find the set of va	alues of x for which	ch the gradient of th	ne curve is positive.	
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In the diagram, OAXB is a sector of a circle with centre O and radius $10 \, \text{cm}$. The length of the chord AB is $12 \, \text{cm}$. The line OX passes through M, the mid-point of AB, and OX is perpendicular to AB. The shaded region is bounded by the chord AB and by the arc of a circle with centre X and radius XA.

(i)	Show that angle <i>AXB</i> is 2.498 radians, correct to 3 decimal places. [3]
(ii)	Find the perimeter of the shaded region. [3]

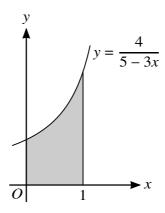
(iii)	Find the area of the shaded region. [3]

) I	Find an expression for $f^{-1}(x)$.	
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The function g is defined by $g: x \mapsto 4x + a$ for $x \in \mathbb{R}$, where a is a constant.

Find	the value	e of a for	r which	gf(-1) =	3.					
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Find	the possi	ble valu	es of a g	given that	the equa	ition f ⁻¹ ($(x) = g^{-1}($	(x) has tv	vo equal	roots.
Find	the possi	ble valu	es of <i>a</i> g	given that	the equa	ntion f ⁻¹ ($f(x) = g^{-1}(x)$	(x) has tv	vo equal	roots.
Find	the possi	ble valu	es of <i>a</i> §	given that	the equa	ntion f ⁻¹ ($\mathbf{g}(\mathbf{x}) = \mathbf{g}^{-1}(\mathbf{x})$	(x) has tv	vo equal	roots.
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The diagram shows part of the curve $y = \frac{4}{5 - 3x}$.

(i)	Find the equation of the normal to the curve at the point where $x = 1$ in the form $y = mx + c$, where m and c are constants. [5]

The shaded region is bounded by the curve, the coordinate axes and the line x = 1.

through 360° about the x-axis.			
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