

Cambridge International AS & A Level

	CANDIDATE NAME			
	CENTRE NUMBER		CANDIDATE NUMBER	
* 9 2	MATHEMATIC	S		9709/13
ω	Paper 1 Pure M	athematics 1	Oc	tober/November 2024
н б				1 hour 50 minutes
¢ 9 2 3 9 1 6 4 3 4	You must answe	er on the question paper.		

You will need: List of formulae (MF19)

INSTRUCTIONS

- Answer all questions. •
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs. •
- Write your name, centre number and candidate number in the boxes at the top of the page. •
- Write your answer to each question in the space provided.
- Do not use an erasable pen or correction fluid. •
- Do not write on any bar codes. •
- If additional space is needed, you should use the lined page at the end of this booklet; the question • number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a • calculator.

This document has 20 pages. Any blank pages are indicated.

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

INFORMATION

- The total mark for this paper is 75.
- The number of marks for each question or part question is shown in brackets [].

Find the 30th term of the progression.	[3]

* 000080000002 *





2 Find the exact solution of the equation

$\cos\frac{1}{6}\pi$ +	$\tan 2x + \frac{\sqrt{3}}{2}$	$\frac{3}{2} = 0$ for -	$-\frac{1}{4}\pi < x < -\frac{1}{4}\pi$	$\frac{1}{4}\pi$.	[2]
		••••••			
		•••••	•••••		
	•••••	•••••			
			••••••		
		•••••			
		•••••			

0000800000004	*
---------------	---



(a)	Find the coefficients of x^3 and x^4 in the expansion of $(3-ax)^5$, where <i>a</i> is a constant. Give ye answers in terms of <i>a</i> .
(b)	Given that the coefficient of x^4 in the expansion of $(ax+7)(3-ax)^5$ is 240, find the positivalue of <i>a</i> .
(b)	
(b)	
(b)	
(b)	value of <i>a</i> .



DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

Solve t	he equation	$4\sin^4\theta +$	$12\sin^2\theta$	-7 = 0 for	or $0^{\circ} \leq \theta$	≤ 360°.		
				••••••			 	••••••
						•••••	 	
						•••••	 	
	•••••					•••••	 	
•••••							 	•••••
•••••							 	
•••••							 	
•••••						••••••	 	•••••
•••••	•••••					•••••	 	•••••
•••••	•••••					••••••	 ,	•••••
•••••					•••••	•••••	 	
•••••							 	•••••
•••••					•••••	••••••	 	•••••
•••••	•••••	•••••		•••••	•••••	•••••	 	••••••
•••••				•••••	•••••	••••••	 	•••••
•••••				•••••		••••••	 , 	•••••
•••••					•••••	•••••	 	
	•••••	•••••			•••••	•••••	 	

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN





In the diagram, the graph with equation y = f(x) is shown with solid lines and the graph with equation y = g(x) is shown with broken lines.

(a) Describe fully a sequence of three transformations which transforms the graph of y = f(x) to the graph of y = g(x). [6] (b) Find an expression for g(x) in the form af(bx+c), where a, b and c are integers. [2]

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN



000080000007	
--------------	--

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

DO NOT WRITE IN THIS MARGIN

• •		7	I
6 The prog	first term of a convergent g ression is p and the sum of the	eometric progression is 10. The first 8 terms of the progression is a	sum of the first 4 terms of the q. It is given that $\frac{q}{p} = \frac{17}{16}$.
	the two possible values of the		[5]
•••••			
•••••			
•••••			
•••••			
© UCLES 20	24	9709/13/O/N/24	[Turn over





The diagram shows a metal plate ABCDEF consisting of five parts. The parts BCD and DEF are semicircles. The part BAFO is a sector of a circle with centre O and radius 20 cm, and D lies on this circle. The parts OBD and ODF are triangles. Angles BOD and DOF are both θ radians.

figures.	– 1.2, 111d	the area of th	le illetai piaŭ	e. Olve your	answer correct	





.....

		-	MARGIN
8 (a)	Express $3x^2 - 12x + 14$ in the form $3(x+a)^2 + b$, where <i>a</i> and <i>b</i> are constants to be found.	[2]	DO NOT WRITE IN THIS MARGIN
The	function $f(x) = 3x^2 - 12x + 14$ is defined for $x \ge k$, where k is a constant.	······	DO NOT WRITE IN THIS MARGIN
	Find the least value of k for which the function f^{-1} exists.	[1]	DO NOT M
	the rest of this question, you should assume that <i>k</i> has the value found in part (b) . Find an expression for $f^{-1}(x)$.	[3]	OT WRITE IN THIS MARGIN
		······································	DO NOT WRITE IN THIS MARGIN DO NO
© UCLES 20)24 9709/13/O/N/24	·······	DO NOT WRITE IN THIS MARGIN

	00	00	80	00	00)0	1	1	*
--	----	----	----	----	----	----	---	---	---



Hence or otherwise solve the equation $ff(x) = 29$. [3]







(0)	Find the area of the shaded region.	[4]
		••••••
		•••••
		•••••
		•••••
		•••••

© UCLES 2024





Points A and B have coordinates $(4, 3)$ and $(8, -5)$ respectively. A circle with radius 10 passes throu	gh
the points A and B.	

(a)	Show that the centre of the circle	e lies on the line $y = \frac{1}{2}x - 4$.	[4]
LES 2)24	9709/13/O/N/24	



* (
(b)	Find the two possible equations of the circle. [5]

© UCLES 2024

	16 requation of a curve is $y = kx^{\frac{1}{2}} - 4x^{2} + 2$, where k is a constant.	THIS MARGIN
(a)	Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ in terms of k. [2]	DO NOT WRITE IN THIS MARGIN
(b)	It is given that $k = 2$.	DO NOT WRITE IN THIS MARGIN
	Find the coordinates of the stationary point and determine its nature. [4]	DO NOT
		DO NOT WRITE IN THIS MARGIN
		DO NOT WRITE IN THIS MARGIN
© UCLES 2	024 9709/13/O/N/24	DO NOT WRITE IN THIS MARGIN





(c) Points *A* and *B* on the curve have *x*-coordinates 0.25 and 1 respectively. For a different value of *k*, the tangents to the curve at the points *A* and *B* meet at a point with *x*-coordinate 0.6.

Find this value of <i>k</i> .	[6]





Additional page

18

If you use the following lined page to complete the answer(s) to any question(s), the question number(s) must be clearly shown.

	••••••	
	•••••••••••••••••	
••••••	••••••	
	•••••••••••••••••••••••••••••••••••••••	
••••••	••••••	
	•••••	
	• • • • • • • • • • • • • • • • • • • •	
••••••	•••••••••••••••••••••••••••••••••••••••	
••••••	•••••	
@ LICLES 2024	NUSING	0700/12/0.01/24



9709/13/O/N/24



BLANK PAGE

© UCLES 2024





BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

Cambridge Assessment International Education is part of Cambridge Assessment. Cambridge Assessment is the brand name of the University of Cambridge Local Examinations Syndicate (UCLES), which is a department of the University of Cambridge.

© UCLES 2024



9709/13/O/N/24