

# Cambridge International AS & A Level

CANDIDATE NAME						
CENTRE NUMBER				CANDIDATE NUMBER		

8671641646

MATHEMATICS 9709/11

Paper 1 Pure Mathematics 1

May/June 2024

1 hour 50 minutes

You must answer on the question paper.

You will need: List of formulae (MF19)

#### **INSTRUCTIONS**

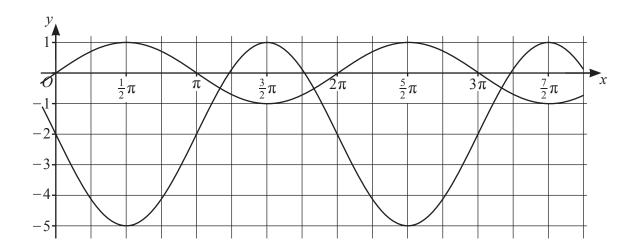
- Answer all questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do not use an erasable pen or correction 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.
- 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 [ ].

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

	Express $3y^2 - 12y - 15$ in the form $3(y+a)^2 + b$ , where a and b are constants.	
<b>(b)</b>	Hence find the exact solutions of the equation $3x^4 - 12x^2 - 15 = 0$ .	
(0)		
(6)		



The diagram shows two curves. One curve has equation  $y = \sin x$  and the other curve has equation y = f(x).

(a)	In order to transform the curve $y = \sin x$ to the curve $y = f(x)$ , the curve $y = \sin x$ is first reflected in the x-axis.
	Describe fully a sequence of two further transformations which are required. [4]
(b)	Find $f(x)$ in terms of $\sin x$ . [2]

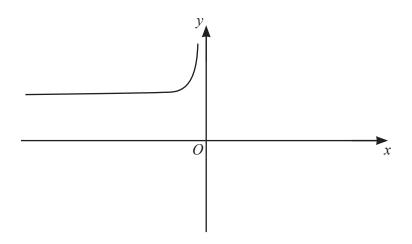
ne (	coefficient of $x^3$ in the expansion of $(3 + ax)^6$ is 160.	
.)	Find the value of the constant $a$ .	
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The equation of a curve is y = f(x), where  $f(x) = (2x-1)\sqrt{3x-2} - 2$ . The following points lie on the

) F	ind the value of k.	. Give your an	swer correct	to 5 decimal p	laces.		
••							
ne ta	ble shows the grad	dients of the c	hords <i>AB</i> , <i>AC</i>	C, $AD$ and $AF$ .			
	Chord	AB	AC	AD	AE	AF	
	Gradient of chord	6.2501	6.2511	6.2608		7.2288	
) E	ind the gradient of	f the chord 4B	Give your s	answer correct	to A decim	al places	
•••							
  	Deduce the value o	of f'(2) using t	the values in	the table.			
   	Deduce the value o	of f'(2) using t	the values in	the table.			
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    	Deduce the value o	of f'(2) using t	the values in	the table.			
  	Deduce the value o	of f'(2) using t	the values in	the table.			

a)	Prove the identity $\frac{\sin^2 x - 1}{1 + 1}$	$\cos x = -\cos x$	λ.	
		•••••		
h)	Hence solve the equation	$\frac{\sin^2 x - \cos x - 1}{\sin^2 x - \cos x - 1}$	$= \frac{1}{2} \text{ for } 0^{\circ} \le x \le 360^{\circ}$	
<b>b</b> )	Hence solve the equation	$\frac{\sin^2 x - \cos x - 1}{2 + 2\cos x} =$	$= \frac{1}{4} \text{ for } 0^{\circ} \leqslant x \leqslant 360^{\circ}.$	
b)	Hence solve the equation	$\frac{\sin^2 x - \cos x - 1}{2 + 2\cos x} =$	$= \frac{1}{4} \text{ for } 0^{\circ} \leqslant x \leqslant 360^{\circ}.$	
b)	Hence solve the equation	$\frac{\sin^2 x - \cos x - 1}{2 + 2\cos x} =$	$= \frac{1}{4} \text{ for } 0^{\circ} \leqslant x \leqslant 360^{\circ}.$	
<b>b</b> )	Hence solve the equation	$\frac{\sin^2 x - \cos x - 1}{2 + 2\cos x} =$	$= \frac{1}{4} \text{ for } 0^{\circ} \leqslant x \leqslant 360^{\circ}.$	
<b>b</b> )	Hence solve the equation	$\frac{\sin^2 x - \cos x - 1}{2 + 2\cos x} =$	$= \frac{1}{4} \text{ for } 0^{\circ} \leqslant x \leqslant 360^{\circ}.$	
b)	Hence solve the equation	$\frac{\sin^2 x - \cos x - 1}{2 + 2\cos x} =$	$= \frac{1}{4} \text{ for } 0^{\circ} \leqslant x \leqslant 360^{\circ}.$	
<b>b</b> )				
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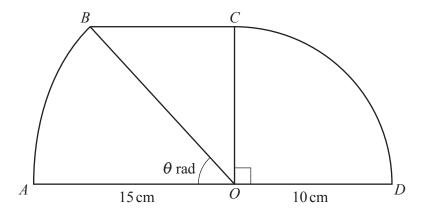
The function f is defined by  $f(x) = \frac{2}{x^2} + 4$  for x < 0. The diagram shows the graph of y = f(x).

(a)	On this diagram	, sketch the graph of	$v = f^{-1}(x)$	) Show any	v relevant miri	ror line	[2]
(4)	On this diagram	, sketen the graph of	y = (A	j. Dilow uii	y i cic valit illili	or mic.	-

<b>(b)</b>	Find an expression for $f^{-1}(x)$ .	[3]

(c)	Solve the equation $f(x) = 4.5$ .	[1

(d) Explain why the equation 
$$f^{-1}(x) = f(x)$$
 has no solution. [1]



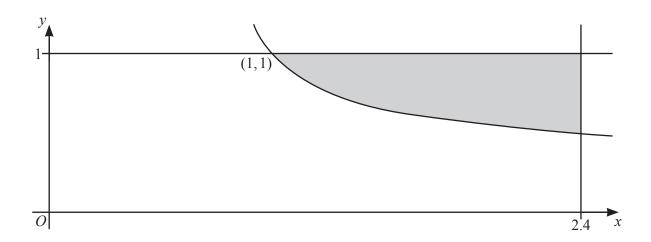
In the diagram, AOD and BC are two parallel straight lines. Arc AB is part of a circle with centre O and radius 15 cm. Angle  $BOA = \theta$  radians. Arc CD is part of a circle with centre O and radius 10 cm. Angle  $COD = \frac{1}{2}\pi$  radians.

(a)	Show that $\theta = 0.7297$ , correct to 4 decimal places.	[1]
(b)	Find the perimeter and the area of the shape <i>ABCD</i> . Give your answers correct to figures.	3 significant [7]

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Find the value of the tenth term of the progression.	
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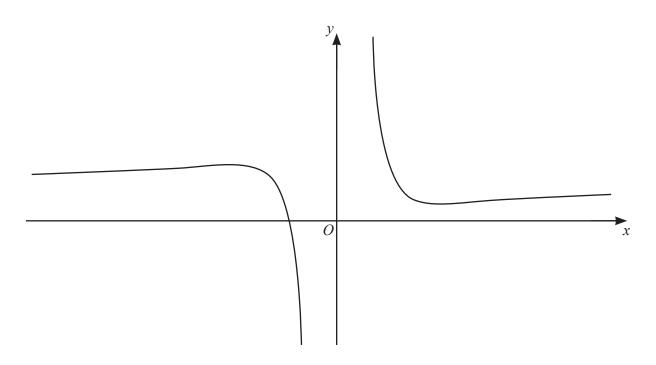
I	Find the sum to infinity of the progression.	



The diagram shows part of the curve with equation  $y = \frac{1}{(5x-4)^{\frac{1}{3}}}$  and the lines x = 2.4 and y = 1. The curve intersects the line y = 1 at the point (1,1).

Find the exact volume of the solid generated when the shaded region is rotated through 360° ab e-axis.	out the [6]
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Find the two pos the tangent touch	sible values of <i>m</i> are the circle.	and, for each valu	the of $m$ , find the co	ordinates of the poi	nt at w
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A function is defined by  $f(x) = \frac{4}{x^3} - \frac{3}{x} + 2$  for  $x \ne 0$ . The graph of y = f(x) is shown in the diagram.

Find the set of values of $x$ for which $f(x)$ is decreasing.	[5]

Find the area of the tri	angle. Give your answer correct to 3 significant figures.	
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## Additional page

If you use the following page to complete the answer to any question, the questions shown.	on number must be clearly

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