Cambridge International AS & A Level

CANDIDATE NAME									
CENTRE NUMBER						CANDIE NUMBE			

MATHEMATICS 9709/12

Paper 1 Pure Mathematics 1

May/June 2022

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.

Find the	value of the	e positive co	onstant <i>a</i> .					
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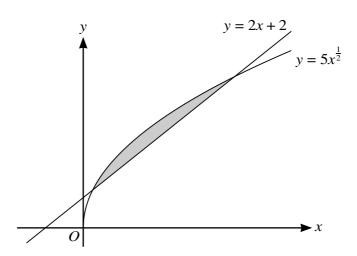
Find the sum to infinity.			[4]
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Find the equation of the curve.	[4

(4)	Find the value of the constant k .	
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(b)	Find the sum of the first 30 terms of the progression.	
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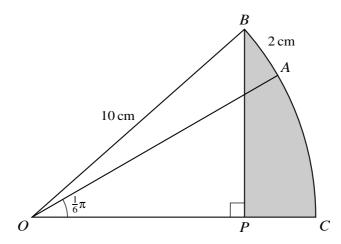
(a)	Given that the curve and the line intersect at the points with x-coordinates 0 and $\frac{3}{4}$, find the values of k and a. [4]

(b)	Given instead that $a = -\frac{7}{2}$, find the values of k for which the line is a tangent to the curve. [5]



The diagram shows the curve with equation $y = 5x^{\frac{1}{2}}$ and the line with equation $y = 2x + 2$.
Find the exact area of the shaded region which is bounded by the line and the curve. [5]

(a)



The diagram shows a sector OBAC of a circle with centre O and radius 10 cm. The point P lies on OC and BP is perpendicular to OC. Angle $AOC = \frac{1}{6}\pi$ and the length of the arc AB is 2 cm.

Find the angle <i>BOC</i> .	[2]

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Find the values of a and b and hence find the coordinates of the centre of the circle.

px + q	qy = k, who	ere p , q and	d <i>k</i> are in	itegers.						
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9	The equation of a curve is $y = 3x + 1 - 4(3x + 1)^{\frac{1}{2}}$	for $x > -\frac{1}{3}$

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$.	[3

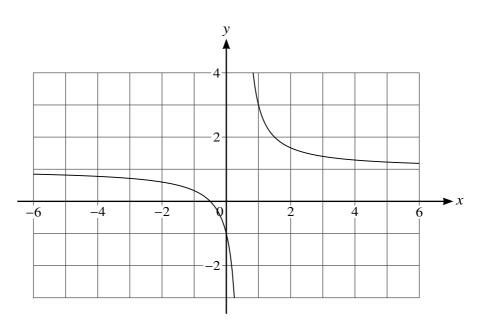
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10 Functions f and g are defined as follows:

$$f(x) = \frac{2x+1}{2x-1}$$
 for $x \neq \frac{1}{2}$,

$$g(x) = x^2 + 4$$
 for $x \in \mathbb{R}$.

(a)



The diagram shows part of the graph of y = f(x).

	State the domain of f^{-1} .	[1]
(b)	Find an expression for $f^{-1}(x)$.	[3]
		•••••

(c) Find gf⁻¹(3). [2]

,	Explain why $g^{-1}(x)$ cannot be found.	
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		•••••
	Show that $1 + \frac{2}{2x - 1}$ can be expressed as $\frac{2x + 1}{2x - 1}$. Hence find the area of the triangle by the tangent to the curve $y = f(x)$ at the point where $x = 1$ and the x - and y -axes.	e enclo
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Given that $k = 3$, find the exact solutions of the equation $f(x) = 0$.

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