



# Cambridge IGCSE™

CANDIDATE NAME



CENTRE NUMBER

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**ADDITIONAL MATHEMATICS**

**0606/22**

Paper 2

**May/June 2025**

**2 hours**

You must answer on the question paper.

No additional materials are needed.

## 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.
- You should use a scientific calculator where appropriate.
- You must show all necessary working clearly.
- 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.
- For  $\pi$ , use either your calculator value or 3.142.

## INFORMATION

- The total mark for this paper is 80.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages.

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3

1 Solve the inequality  $|5x + 2| \geq 3$ .

[4]



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2 In this question, all lengths are in metres and time is in seconds.



A particle  $P$  moves in a straight line such that its displacement  $s$  from a fixed point  $O$  at time  $t$  is given by  $s = (t-4)^2(t-1)$  for  $t \geq 0$ .

(a) On the axes, sketch the displacement–time graph of  $P$ , stating the intercepts with the axes. [2]



(b) Find an expression for the velocity,  $v$ , of  $P$ .  
Give your answer in a factorised form. [2]





(c) On the axes, sketch the velocity–time graph of  $P$ , stating the intercepts with the axes.

[2]



(d) Find an expression for the acceleration,  $a$ , of  $P$ .

[1]

(e) On the axes, sketch the acceleration–time graph of  $P$ , stating the intercepts with the axes.

[3]



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3 Functions  $f$  and  $g$  are such that



$$f(x) = \frac{3x}{x+4} \quad \text{for } x > 0$$

$$g(x) = \sqrt{x+2} \quad \text{for } x > -2.$$

Solve the equation  $fg(x) = 1$ .

[4]





- 4 (a) Given that  $y = 4 \sin 2x \cos 2x$ , find the value of  $\frac{dy}{dx}$  when  $x = \frac{\pi}{6}$ .

[4]



- (b) A curve has equation  $y = 4 \sin 2x \cos 2x$ .

The normal to the curve at the point where  $x = \frac{\pi}{6}$  meets the  $x$ -axis at the point  $P$ .

Find the exact coordinates of  $P$ .

[5]





- 5 (a) A 4-digit number is to be formed using the digits 0, 2, 4, 5, 6 and 8.  
The 4-digit number must **not** start with 0.  
Any digit may be used at most once in the 4-digit number.

7

(i) Find how many 4-digit numbers can be formed. [1]

(ii) Find how many even 4-digit numbers can be formed. [2]

(iii) Find how many 4-digit numbers that are divisible by 5 can be formed. [2]

(b) Solve the equation  $(n+1) \times {}^{n+1}C_{12} = 33(n-10) \times {}^nC_{10}$ . [3]





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- 6 The volume,  $V$ , of a sphere is increasing at the constant rate of  $2\pi \text{ cm}^3 \text{ s}^{-1}$ .  
Find the rate of change of the surface area,  $S$ , of this sphere when the volume of the sphere is  $36\pi \text{ cm}^3$ .  
[6]





7 The first three terms of an arithmetic progression can be written as

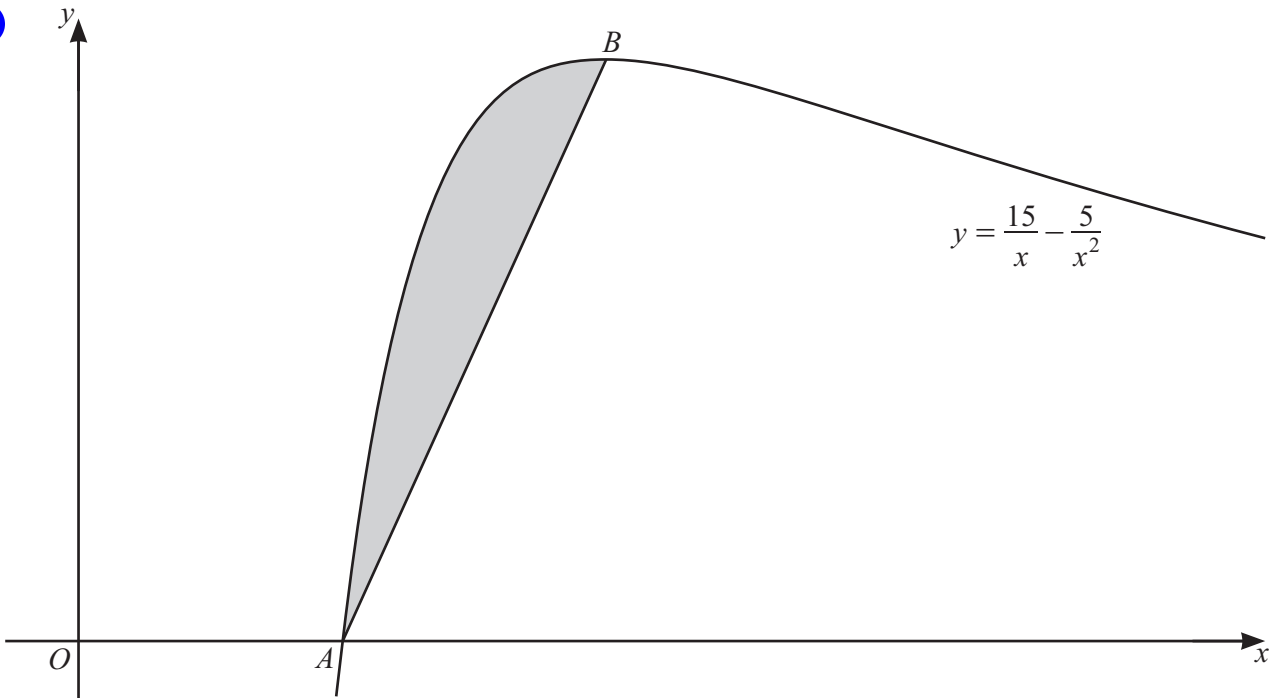


$$2 \ln(x^3), 5 \ln(x^2), 2 \ln(x^7).$$

- (a) Given that  $x > 1$ , find the least number of terms for the sum of this progression to be greater than  $43 \ln(x^{24})$ . [6]

- (b) Given that the 25th term of this progression is equal to 408, find the exact value of  $x$ . [3]



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The diagram shows part of the curve  $y = \frac{15}{x} - \frac{5}{x^2}$ .

The curve meets the  $x$ -axis at the point  $A$ .  
The curve has a maximum at the point  $B$ .

Find the area of the shaded region enclosed by the line  $AB$  and the curve.

Give your answer in exact form.

[11]





9 (a) Solve the equation  $3 \sec 3x = \sqrt{3} \operatorname{cosec} 3x$  for  $-120^\circ \leq x \leq 120^\circ$ .

[5]



(b) Solve the equation  $2 \cos\left(y + \frac{\pi}{3}\right) \sin\left(y + \frac{\pi}{3}\right) = \sin\left(y + \frac{\pi}{3}\right)$  for  $0 \leq y < 2\pi$ .

[5]





10 The first three terms, in descending powers of  $x$ , in the expansion of  $(3x^2 - a)^n \left(1 + \frac{1}{x^2}\right)^2$  can be written as  $729x^{12} + 972x^{10} + bx^8$ , where  $a$ ,  $b$  and  $n$  are constants.



Find the values of  $a$ ,  $b$  and  $n$ .

[9]

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