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ADDITIONAL MATHEMATICS

0606/12

Paper 1 Non-calculator

February/March 2026

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. Do **not** use correction fluid or tape.
- Do **not** write on any bar codes.
- Calculators must **not** be used in this paper.
- You must show all necessary working clearly.

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.

List of formulas

Equation of a circle with centre (a, b) and radius r .

$$(x-a)^2 + (y-b)^2 = r^2$$

Curved surface area, A , of cone of radius r , sloping edge l .

$$A = \pi r l$$

Surface area, A , of sphere of radius r .

$$A = 4\pi r^2$$

Volume, V , of pyramid or cone, base area A , height h .

$$V = \frac{1}{3}Ah$$

Volume, V , of sphere of radius r .

$$V = \frac{4}{3}\pi r^3$$

Quadratic equation

For the equation $ax^2 + bx + c = 0$,

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

Binomial theorem

$$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \dots + \binom{n}{r}a^{n-r}b^r + \dots + b^n,$$

where n is a positive integer and $\binom{n}{r} = \frac{n!}{(n-r)!r!}$

Arithmetic series

$$u_n = a + (n-1)d$$

$$S_n = \frac{1}{2}n(a+l) = \frac{1}{2}n\{2a + (n-1)d\}$$

Geometric series

$$u_n = ar^{n-1}$$

$$S_n = \frac{a(1-r^n)}{1-r} \quad (r \neq 1)$$

$$S_\infty = \frac{a}{1-r} \quad (|r| < 1)$$

Identities

$$\sin^2 A + \cos^2 A = 1$$

$$\sec^2 A = 1 + \tan^2 A$$

$$\operatorname{cosec}^2 A = 1 + \cot^2 A$$

Formulas for $\triangle ABC$

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

$$\Delta = \frac{1}{2}ab \sin C$$



Calculators must **not** be used in this paper.

1 A polynomial p is given by $p(x) = 4x^3 + 8x^2 - x - 2$.

(a) Show that $x + 2$ is a factor of $p(x)$.

[1]

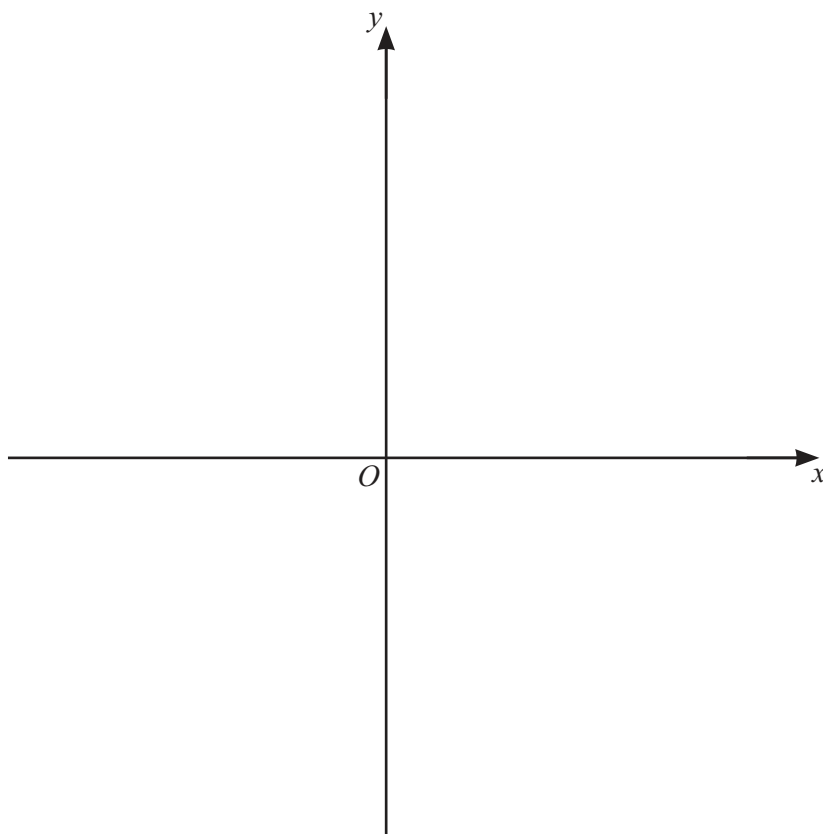
(b) Solve the equation $p(x) = 0$.

[3]



- 2 (a) On the axes, sketch the graph of $y = |x^2 - 2x - 3|$.
State the intercepts with the coordinate axes.

[4]



- (b) The function g is defined by $g(x) = 4e^{x-2} - 1$ for all real x .

Find an expression for $g^{-1}(x)$.

[2]



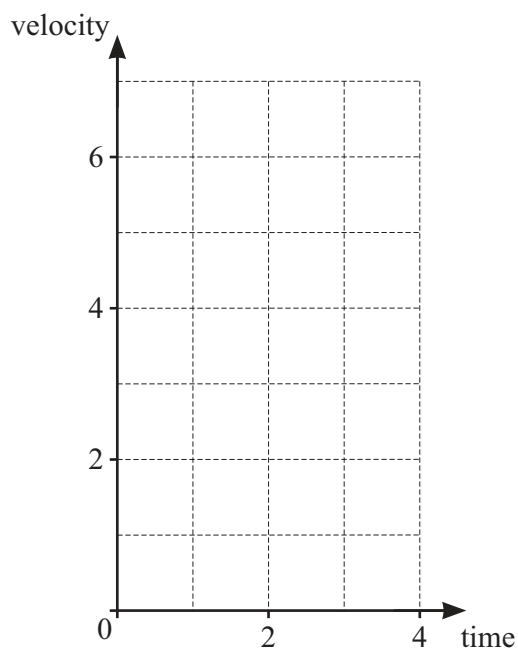
- 3 In this question, time t is in seconds and displacement s is in metres.

A particle starts from rest at the origin O and moves in a straight line with constant positive acceleration.

When $t = 4$, $s = 6$.

- (a) Draw the velocity–time graph for $0 \leq t \leq 4$.

[2]



- (b) Hence find the acceleration.

[1]



4 In an arithmetic progression:

- the common difference is -2
- the sum of the first 4 terms is equal to the sum of the first 10 terms.

Find the first term.

[3]





- 5 A curve has equation $y = \frac{x^2 - 8}{3 - x}$.

P and Q are the stationary points on the curve.

Find $\frac{dy}{dx}$ and the exact length of the line PQ .

[7]



6 (a) Solve the equation $|3x + 2| = 7$.

[3]

(b) Solve the inequality $|2x - 4| > |x + 1|$.

[4]



- 7 The variables x and y are related by $y = 3\sqrt{x} + \frac{1}{\sqrt{x}}$.

Use calculus to find the approximate change in y when x increases from 4 to $4 + h$, where h is small.

[4]



8 A curve has equation $y = xe^{2x+1}$.

(a) Find $\frac{dy}{dx}$.

[3]

(b) The line L is the tangent to the curve at the point where $x = \frac{1}{2}$.

Find the exact coordinates of the two points where L meets the axes.

[5]



(c) Use your answer to **8(a)** to find $\int x e^{2x+1} dx$.

[4]



- 9 (a) In this question, time is in seconds and distances are in metres.

At time $t = 0$, particle A starts at the origin and moves with velocity $\begin{pmatrix} 2 \\ 1 \end{pmatrix}$.

At the same time, particle B starts from the point with position vector $\begin{pmatrix} -3 \\ 4 \end{pmatrix}$ and moves with velocity $\begin{pmatrix} 4 \\ -2 \end{pmatrix}$.

- (i) Write down the position vector of B at time t . [1]

- (ii) Determine whether or not the particles collide. [4]



- (b) The point Q has position vector $3\mathbf{i} + 2\mathbf{j}$.
The point R has position vector $-\mathbf{i} + 4\mathbf{j}$.
The point S has position vector $a\mathbf{i} + b\mathbf{j}$, where a and b are integers.

It is given that:

- S lies on the straight line QR
- $|\overrightarrow{RS}| = \sqrt{5}$.

Find the possible values of a and b .

[5]





10 (a) Given that $\log_5(x^2) - \log_5 x - 3 \log_x 5 = 2$, find x .

[6]

(b) Solve the equation $2 \times 8^{2x+1} - 3 \times 2^{3x+4} - 64 = 0$.

[4]



- 11 A curve has equation $y = -x^2 + 3ax - 2a^2$ where a is a positive constant.
The area of the region enclosed by the curve and the x -axis is $\frac{9}{16}$.

Find the value of a .

[6]

Question 12 is on the back page.





- 12 Find the coordinates of the points of intersection of the circles with equations $x^2 + 2x + y^2 - 4y - 20 = 0$ and $x^2 - 12x + y^2 - 6y + 20 = 0$.

[8]

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