



Advanced Higher Maths 2026 Paper 2 Practice Paper PRO PASS MASTERCLASS

Advanced
Higher Maths



TOPIC: Clelland Maths 2026 - Advanced Higher Maths Paper 2 Practice Paper

Paper 2 (Calculator)

Duration — 2 hours 30 minutes

Total marks — 80

Attempt ALL questions.
You may use a calculator.

To earn full marks you must show your working in your answers.
State the units for your answer where appropriate.
Write your answers clearly in the spaces provided.

1. Write down and simplify the binomial expansion of $\left(x^2 - \frac{2}{x}\right)^5$. **5**

2. A curve is defined by the parametric equations $x = 3t - \ln(2t)$ and $y = t^3$.
Find the exact value of $\frac{dy}{dx}$ when $t = \frac{1}{2}$. **4**

3. Given that $z = 3 + 2i$ is a root of the equation $z^4 - 7z^3 + 17z^2 - z - 26 = 0$,
find all the roots of this equation. **5**



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4. Matrix P represents a reflection in the x -axis. Matrix Q represents an anticlockwise rotation of $\frac{\pi}{6}$ radians about the origin. **2**
(a) State the matrices P and Q .

(b) Find the matrix M which represents the reflection followed by the rotation. **2**



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5. Use integration by parts to evaluate exactly $\int_0^{\pi/6} 2x \sin(3x) dx$.

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6. Find the particular solution of the differential equation

$$\frac{dy}{dx} + y \tan x = \sin x$$

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given that $y = \frac{1}{2}$ when $x = 0$, for $0 \leq x < \frac{\pi}{2}$.

7. Prove by induction that for all integers $n \geq 1$,

$$\sum_{r=1}^n (4r - 3) = n(2n - 1)$$

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8. A function is defined by $f(x) = \frac{x^2+5x+10}{x+2}$ for $x \neq -2$.

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(a) Find the equations of the vertical and non-vertical asymptotes of $f(x)$.

(b) Find the coordinates of the stationary points and determine their nature.

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9. A line L and a plane Π have equations:

$$L : \frac{x-1}{2} = \frac{y+2}{1} = \frac{z-3}{-1}$$

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$$\Pi : x + 2y + 3z = 10$$

(a) Find the coordinates of the point of intersection of L and Π .

(b) Calculate the acute angle between L and Π .

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10. Use the Euclidean algorithm to find integers a and b such that:

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$$204a + 57b = 3$$



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11. Find the general solution of the second-order differential equation:

$$\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 6e^{2x}$$

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12. A spherical snowball is melting such that its volume decreases at a constant rate of $15 \text{ cm}^3 \text{ s}^{-1}$.

Calculate the exact rate of change of its radius when the radius is 6 cm.

(The volume of a sphere is $V = \frac{4}{3}\pi r^3$)

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13. The curve $y = \sqrt{2x} e^{x/4}$ is rotated 2π radians about the x -axis between $x = 0$ and $x = 2$.

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Find the exact volume of the solid of revolution formed.

14. Find the first four non-zero terms of the Maclaurin series for $f(x) = \ln(1 - 2x)$.

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15. A geometric sequence has a third term of 24 and a sixth term of 192.
Find the value of the common ratio, the first term, and the eighth term.

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[END OF QUESTION PAPER 2]



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Final Answers

1. $x^{10} - 10x^7 + 40x^4 - 80x + \frac{80}{x^2} - \frac{32}{x^5}$
2. $\frac{3}{4}$
3. $3 \pm 2i, 2, -1$
4. (a) $P = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}, Q = \begin{pmatrix} \frac{\sqrt{3}}{2} & -\frac{1}{2} \\ \frac{1}{2} & \frac{\sqrt{3}}{2} \end{pmatrix}$ (b) $M = \begin{pmatrix} \frac{\sqrt{3}}{2} & \frac{1}{2} \\ \frac{1}{2} & -\frac{\sqrt{3}}{2} \end{pmatrix}$
5. $\frac{2}{9}$
6. $y = \cos x \left(\ln(\sec x) + \frac{1}{2} \right)$
7. *Proof completed by induction.*
8. (a) Vertical: $x = -2$, Non-vertical: $y = x + 3$ (b) $(0, 5)$ Minimum, $(-4, -3)$ Maximum
9. (a) $(9, 2, -1)$ (b) 6.3° (or 0.11 rad)
10. $a = 7, b = -25$
11. $y = (A + Bx)e^{2x} + 3x^2e^{2x}$
12. $-\frac{5}{48\pi} \text{ cm s}^{-1}$
13. 8π
14. $-2x - 2x^2 - \frac{8}{3}x^3 - 4x^4$
15. $r = 2, a = 6, T_8 = 768$

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