

National Qualifications Clelland Maths 2026 Higher Maths Practice Papers

Mathematics Paper 2 (Calculator)

Duration — 1 hour 30 minutes

Total marks — 65

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 in this booklet.



Higher Maths 2026 Paper 2 Practice Paper PRO PASS MASTERCLASS

Higher
Mathematics



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

1. The number of bacteria in a laboratory culture, $P(t)$, after t hours is modelled by the formula

$$P(t) = P_0 e^{kt}$$

where P_0 is the initial population and k is a constant.

4

(a) The initial population is 2000. After 3 hours, the population has grown to 5500.

Find the value of k , correct to 3 decimal places.

(b) Calculate the time taken for the population to exceed 15,000 cells.

4



Higher Maths 2026 Paper 2 Practice Paper **PRO PASS MASTERCLASS**

Higher
Mathematics



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

2. (a) Find the coordinates of the points of intersection of the line $y = 7 - x$ and the circle $x^2 + y^2 - 8x - 6y + 17 = 0$. **5**

(b) Hence, calculate the exact length of the chord formed by this intersection. **2**



Higher Maths 2026 Paper 2 Practice Paper PRO PASS MASTERCLASS

Higher
Mathematics



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

3. Vectors $\mathbf{u}$ and $\mathbf{v}$ are defined by $\mathbf{u} = \begin{pmatrix} 3 \\ -1 \\ 4 \end{pmatrix}$ and $\mathbf{v} = \begin{pmatrix} 2 \\ 5 \\ -1 \end{pmatrix}$. 5
- Calculate the size of the angle between $\mathbf{u}$ and $\mathbf{v}$.

4. A circle has equation $x^2 + y^2 + 6x - 4y - 12 = 0$. 5
- Find the equation of the tangent to this circle at the point $P(1, 5)$.

5. Solve the equation $\cos(2x) - 3 \cos x + 2 = 0$ 5
- for $0 \leq x < 360^\circ$.



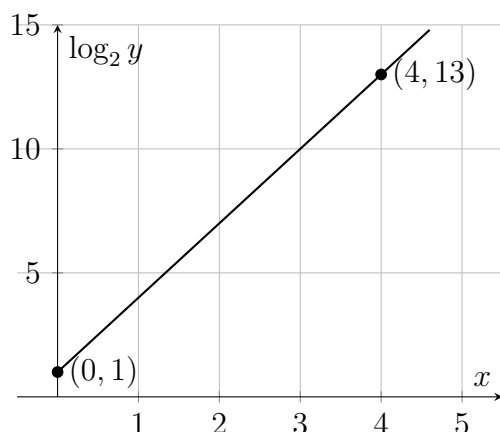
Higher Maths 2026 Paper 2 Practice Paper PRO PASS MASTERCLASS

Higher
Mathematics



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

6. Two variables x and y are connected by the relationship $y = ab^x$.
The graph of $\log_2 y$ against x is a straight line passing through the points $(0, 1)$ and $(4, 13)$.



5

Find the values of a and b .

7. A sequence is generated by the recurrence relation $u_{n+1} = 0.75u_n + 12$.

(a) Explain why this sequence approaches a limit as $n \rightarrow \infty$ and calculate this limit. **3**

(b) Given that $u_0 = 10$, find the smallest value of n for which $u_n > 40$.

2



Higher Maths 2026 Paper 2 Practice Paper PRO PASS MASTERCLASS

Higher
Mathematics



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

8. (a) Express $5 \cos x^\circ - 12 \sin x^\circ$ in the form $k \cos(x + \alpha)^\circ$, where $k > 0$ and $0 \leq \alpha < 360$. **4**

(b) Hence, or otherwise, find the minimum value of $f(x) = 15 + 5 \cos x^\circ - 12 \sin x^\circ$ and the value of x for which it occurs, where $0 \leq x < 360$. **3**



Higher Maths 2026 Paper 2 Practice Paper PRO PASS MASTERCLASS

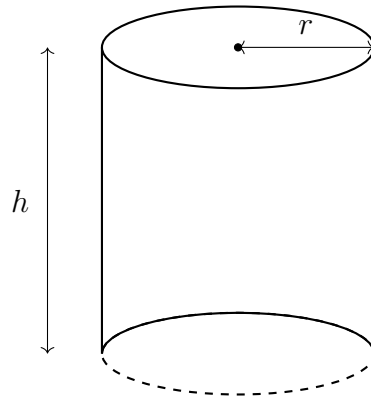
Higher
Mathematics



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

9. A company manufactures a closed cylindrical container with radius r cm and height h cm.

The total surface area of the cylinder is fixed at $150\pi \text{ cm}^2$.



3

(a) Show that the volume, $V \text{ cm}^3$, of the cylinder is given by the formula

$$V(r) = 75\pi r - \pi r^3$$



Higher Maths 2026 Paper 2 Practice Paper PRO PASS MASTERCLASS

Higher
Mathematics



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

9. (continued)

(b) Find the value of r that maximizes the volume of the container, and calculate this maximum volume. **6**

10. Evaluate the definite integral:

$$\int_0^{\frac{\pi}{4}} 4 \cos \left(2x - \frac{\pi}{4} \right) dx$$

4



Higher Maths 2026 Paper 2 Practice Paper **PRO PASS MASTERCLASS**

Higher
Mathematics



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

11. A curve for which $\frac{dy}{dx} = 6x^2 - \frac{4}{x^2}$ passes through the point $(2, 15)$.
Express y in terms of x .

5

[END OF QUESTION PAPER 2]

Want deeper walkthroughs?

Scan the QR or click for full video solutions.

 [**Watch Video Solutions**](#)



Higher Maths 2026 Paper 2 Practice Paper PRO PASS MASTERCLASS

Higher
Mathematics



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

Final Answers — Paper 2 (Calculator)

Q1: (a) $k = 0.337$

(b) $t = 5.98$ hours

Q2: (a) $(2, 5)$ and $(6, 1)$

(b) $4\sqrt{2}$ units

Q3: $\theta = 96.2^\circ$ (or 1.68 radians)

Q4: $4x + 3y - 19 = 0$ (or equivalent)

Q5: $x = 0^\circ, 60^\circ, 300^\circ$

Q6: $a = 2, b = 8$

Q7: (a) Limit exists since $-1 < 0.75 < 1$. Limit $L = 48$.

(b) $n = 6$

Q8: (a) $13 \cos(x + 67.4)^\circ$

(b) Minimum value = 2 occurring at $x = 112.6^\circ$

Q9: (a) Proof

(b) $r = 5$, Maximum Volume = $250\pi \text{ cm}^3$

Q10: $2\sqrt{2}$ (or approx. 2.83)

Q11: $y = 2x^3 + \frac{4}{x} - 3$