

National Qualifications Clelland Maths - 2026 Higher Maths Practice

Mathematics Paper 1 (Non-calculator)

Duration — 1 hour 15 minutes

Total marks — 55

Attempt ALL questions.

You must NOT 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.



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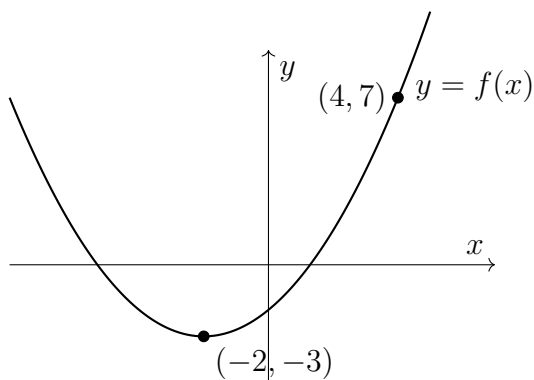


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1. Triangle PQR has vertices $P(-3, -1)$, $Q(5, 3)$ and $R(1, 9)$.
Find the equation of the altitude through P .

3

2. The diagram below shows the graph of $y = f(x)$. It passes through the point $(4, 7)$ and has a minimum turning point at $(-2, -3)$.



2

State the coordinates of the corresponding points on the graph of $y = 5 - f(x)$ and specify the nature of the turning point.



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3. (a) Show that $(x + 2)$ is a factor of $f(x) = x^3 - 2x^2 - 5x + 6$.

2

(b) Hence, or otherwise, solve the equation $x^3 - 2x^2 - 5x + 6 = 0$.

4



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- 4.** A straight line makes an angle of $\frac{2\pi}{3}$ radians with the positive direction of the x -axis. **2**
Find the exact value of the gradient of the line.

- 5.** A function f is defined on a suitable domain by $f(x) = \sin^4(3x)$. **3**
Find $f'(x)$.

- 6.** Solve the equation: **4**
$$\log_2(x) + \log_2(x - 7) = 3$$

- 7.** Functions f and g are defined on the set of real numbers by $f(x) = 3 - 4x$ and $g(x) = x^3 + 2$. **2**
(a) Find an expression for $h(x) = f(g(x))$.

- (b) Find the inverse function, $g^{-1}(x)$. **3**



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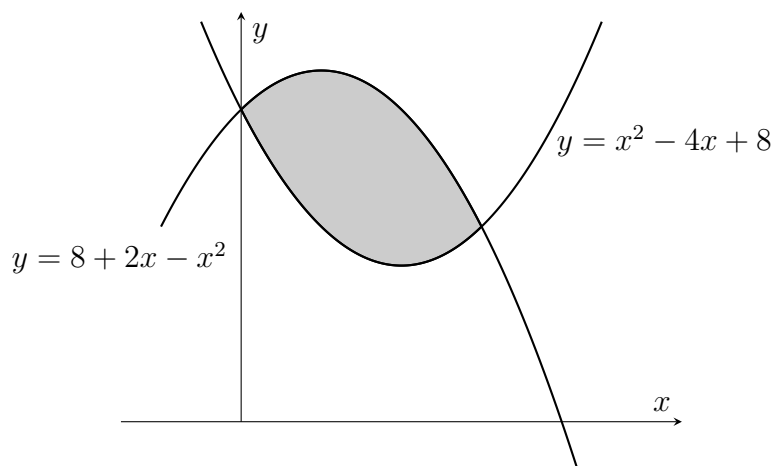
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8. The diagram below shows the curves with equations $y = 8 + 2x - x^2$ and $y = x^2 - 4x + 8$.



6

Calculate the shaded area enclosed between the two curves.

9. Find the range of values of p for which the equation

$$x^2 + (p - 2)x + (p + 1) = 0$$

4

has two distinct real roots.



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10. Angles P and Q are acute.

Given that $\sin P = \frac{3}{5}$ and $\tan Q = \frac{5}{12}$, find the exact value of $\cos(P + Q)$.

4

11. The points A , B and C have coordinates $(-3, 2, 4)$, $(-1, -2, 7)$ and $(3, -10, 13)$ respectively.

3

(a) Show that the points A , B and C are collinear.

(b) State the ratio in which B divides AC .

1

(c) Given that $\overrightarrow{CD} = \begin{pmatrix} -1 \\ 5 \\ 2 \end{pmatrix}$, find the coordinates of D .

1



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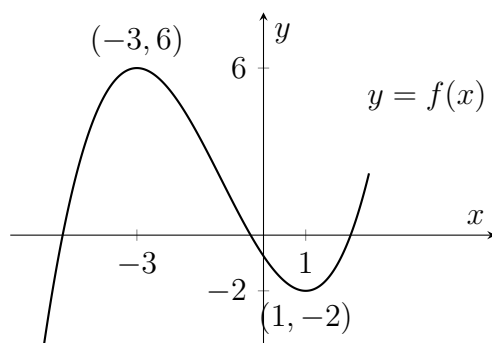
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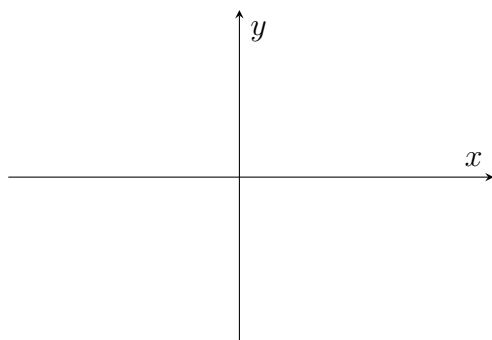
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12. The diagram shows the graph of a cubic function $y = f(x)$ with a local maximum at $(-3, 6)$ and a local minimum at $(1, -2)$.



On the blank axes provided below, sketch the graph of the derived function $y = f'(x)$. You must clearly show the coordinates of the points where the graph crosses the x-axis and the nature of any turning points.

3





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13. A curve has equation $y = \frac{8}{\sqrt{x}} + x$, where $x > 0$.

Find the equation of the tangent to the curve at the point where $x = 4$.

4

14. A function is defined on the set of real numbers by $f(x) = x^3 + 3x^2 - 24x + 10$.

Determine the interval on which the function is strictly decreasing.

4

[END OF QUESTION PAPER 1]

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Final Answers — Paper 1 (Non-Calculator)

Q1: $2x - 3y + 3 = 0$ (or equivalent)

Q2: $(4, -2)$ and $(-2, 8)$ which is a Maximum Turning Point

Q3: (a) Proof ($f(-2) = 0$ or remainder $= 0$)
(b) $x = -2, x = 1, x = 3$

Q4: $m = -\sqrt{3}$

Q5: $f'(x) = 12 \sin^3(3x) \cos(3x)$

Q6: $x = 8$

Q7: (a) $h(x) = -4x^3 - 5$
(b) $g^{-1}(x) = \sqrt[3]{x - 2}$

Q8: 9 square units

Q9: $p < 0$ or $p > 8$

Q10: $\frac{33}{65}$

Q11: (a) Proof ($\overrightarrow{BC} = 2\overrightarrow{AB}$ and B is a common point)
(b) 1 : 2
(c) $D(2, -5, 15)$

Q12: An upward-opening parabola (U -shape) crossing the x -axis at $(-3, 0)$ and $(1, 0)$, with a minimum turning point on the axis of symmetry at $x = -1$.

Q13: $x - 2y + 12 = 0$ (or $y = \frac{1}{2}x + 6$)

Q14: $-4 < x < 2$ (or $[-4, 2]$)