IQM3004

LEVEL 3 · CONTROLLED ASSESSMENT

INTO QUALIFICATIONS

Mathematics

Component 1: Paper 1 written examination

Candidate question paper

Duration
1 hour 30 minutes

Total marks
75

Assessment window
Sample assessment

Assessment set
Set S of 2026

Response instruction
Write all answers in the separate answer booklet.

Release timing
exam release

Paper
P1

Assessment set ID
2026-S

INTO QUALIFICATIONS LEARNER ID

DELIVERY CENTRE ID (OPTIONAL)

EXAM DATE
_____

ASSESSMENT SET
Set S of 2026

Do not open this paper until instructed. Record every answer in the separate answer booklet.

FOR MARKER USE ONLY

Marker initials	**Mark / 75**

Instructions

- Follow the answer route stated at the start of each section.
- Write all answers in the separate answer booklet and identify each question clearly.
- Show all working where relevant.
- Use the supplied controlled formula sheet and a non-programmable, non-graphing scientific calculator. Calculators with CAS, text/image/document storage, or internet capability are not permitted. Phones, tablets and smart watches are not permitted. No candidate-provided materials or AI are permitted.
- The mark allocation is shown beside each question.

All questions are compulsory. Give non-exact numerical answers to 3 significant figures unless another accuracy is stated.

Section A · Short answer questions

Answer all six questions. 30 marks.

Question A1 · 5 marks

(a) Simplify $x^{3/2}x^{5/2}$, where $x>0$. 1

(b) Rationalise the denominator of $6/(\sqrt{5}-1)$. 2

(c) Express $(5x+1)/[(x+1)(x-2)]$ in partial fractions. 2

Question A2 · 5 marks

(a) Find the gradient of the line through $(-2,1)$ and $(4,13)$. 1

(b) Find the equation of the line through $(-2,1)$ and $(4,13)$. 2

(c) Find the intersection of $y=2x+5$ and $3x+y=15$. 2

Question A3 · 5 marks

(a) For $f(x)=x^2-6x+5$, find $f(0)$. 1

(b) Write x^2-6x+5 in completed-square form and state the minimum value. 2

(c) Solve $x^2-6x+5<0$. 2

Question A4 · 5 marks

(a) Convert 150° to radians, giving an exact answer. 1

(b) Two sides of a triangle are 6 cm and 8 cm, enclosing an angle of 60°. Find the exact length of the third side. 2

(c) A circle has radius 6 cm. Find the exact area of the minor segment subtended by an angle of $\pi/3$ radians at the centre. 2

Question A5 · 5 marks

(a) Find dy/dx for $y = 3x^4 - 5x + 2$. 1

(b) Find $f(x)$ given $f'(x) = 6x - 4$ and $f(1) = 5$. 2

(c) Evaluate $\int_0^2 (3x^2 - 4x)\ dx$. 2

Question A6 · 5 marks

(a) Disprove the claim that $n^2 + n + 11$ is prime for every positive integer n. 2

(b) Using exhaustion, prove that for $n \in \{1, 2, 3, 4\}$, n^2 leaves remainder 0 or 1 when divided by 4. 3

Section B · Structured questions

Answer all three questions. 45 marks.

Question B1 · 15 marks

(a) Let $f(x) = x^3 - 3x^2 - 4x + 12$. Use the Factor Theorem to show that $(x - 2)$ is a factor. 2

(b) For $f(x) = x^3 - 3x^2 - 4x + 12$, divide by $(x - 2)$ and hence solve $f(x) = 0$. 4

(c) Sketch $y = x^3 - 3x^2 - 4x + 12$, labelling all intercepts with the coordinate axes. 2

(d) Find the equation of the tangent to $y = x^3 - 3x^2 - 4x + 12$ at $x = 0$. 2

(e) The graph of $y = f(x)$ is translated by vector $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$. Write the equation of the new graph in terms of f, and give the image of the point $(0, 12)$. 2

(f) For what real values of k does $x^2 - 3x + k = 0$ have two distinct real roots? Justify your answer. 3

Question B2 · 15 marks

(a) A circular garden has centre $C=(2,-1)$ and passes through $P=(5,3)$. Coordinates are measured in metres. Find its radius and equation. 2

(b) Find the equation of the tangent at $P=(5,3)$ to the circle with centre $(2,-1)$ and radius 5. 2

(c) Find the points where the line $y=3$ intersects $(x-2)^2+(y+1)^2=25$. 2

(d) For $C=(2,-1)$, $P=(5,3)$ and $Q=(-1,3)$, find the area of triangle CPQ. 2

(e) A straight path follows $y=3$ inside the circular garden $(x-2)^2+(y+1)^2\le 25$. State the path length inside the garden and explain how you obtain it. 2

(f) A rectangular flower bed has vertices $(0,0),(3,0),(3,2),(0,2)$. On a labelled coordinate diagram, shade the portion satisfying $x+y\le 3$, and find its area. 3

(g) The circle $(x-2)^2+(y+1)^2=25$ models the garden boundary. State one assumption of this model and explain how a survey could test it. 2

Question B3 · 15 marks

(a) An open rectangular enclosure is built against a straight wall using 40 m of fencing for the other three sides. Let x m be each side perpendicular to the wall. Show that its area is $A=40x-2x^2$, and state the physical range of x. 2

(b) Use calculus to find the maximum of $A=40x-2x^2$ for $0<x<20$, and justify that it is a maximum. 4

(c) For $A=40x-2x^2$, find the rate of change of area with respect to x at $x=6$, including units. 2

(d) State one practical reason why the enclosure model $A=40x-2x^2$ might overestimate usable area. 1

(e) For the separate curve $y=x^2-4$, find the intercepts with the x-axis and state where it is below the x-axis. 2

(f) Find the total area between $y=x^2-4$ and the x-axis for $-2\le x\le 2$. 3

(g) The line $y=0$ and curve $y=x^2-4$ bound a region. Explain why the signed integral of (x²−4) from -2 to 2 is negative although the area is positive. 1