IQM3003

LEVEL 3 · CONTROLLED STAFF DOCUMENT

INTO QUALIFICATIONS

Mathematics and Data Handling

Component 1: Paper 1 examination

STAFF ONLY · Mark scheme

Duration
1 hour 50 minutes

Total marks
100

Assessment window
_____

Assessment set
Set S of 2026

Audience
Staff only

Release timing
exam release

Exam date
_____

Assessment set ID
2026-S

Assessment window _____	**Exam date** _____
Paper P1	**Assessment set** Sample 2026 Stored ID 2026-S

General marking principles

- Use only the approved item-specific mark scheme for this assessment set.
- Award method, accuracy and independent marks exactly as specified; apply follow-through only where stated.
- Credit equivalent valid methods and answers where the item-specific scheme permits them.
- Record each awarded mark in the corresponding OCR-readable annotation on the candidate answer booklet.
- Escalate genuinely valid alternatives not anticipated by the scheme for standardisation; do not change the controlled scheme locally.

M1 is one method mark; A1 is one accuracy mark dependent on the associated method; B1 is one independent mark. Accept equivalent valid methods and exact forms. Correct answers can imply method. Accept numerical answers to 3 significant figures or more unless the question specifies accuracy. No follow-through is awarded unless stated.

Item-specific mark scheme

Q	Question / requirement	Solution and mark allocation	Alternatives / notes	Max
1	A bicycle price rises from £240 to £276. Calculate the percentage increase.	M1: Increase = 276 − 240 = 36; calculate $\frac{36}{240}\times 100$. A1: 15%.	No follow-through. Apply the general marking principles.	2
2	£3,200 is invested at 4% compound interest per year. Calculate the value after 5 years, to the nearest penny.	M1: Use 3200×1.04^5. A1: Unrounded value 3893.28928768. A1: £3,893.29.	No follow-through. Apply the general marking principles.	3
3	(a) Expand and simplify $(2x-3)(x+4)$. [2] (b) Simplify $a^7\div a^3$, where $a\neq 0$. [1]	M1: Four products $2x^2+8x-3x-12$. A1: $2x^2+5x-12$. B1: a^4.	No follow-through. Apply the general marking principles.	3

Q	Question / requirement	Solution and mark allocation	Alternatives / notes	Max
4	A(−2, 1), B(4, 9) and C(4, 1) are points in a coordinate plane. (a) Find the equation of AB. [3] (b) Find the length AB. [2] (c) Find the area of triangle ABC. [2] (d) State the coordinates where AB meets the y-axis. [1]	M1: Gradient $\frac{9-1}{4-(-2)}$. A1: Gradient $\frac{4}{3}$. A1: $y=\frac{4}{3}x+\frac{11}{3}$. M1: $AB=\sqrt{6^2+8^2}$. A1: AB = 10. M1: Area = $\frac{1}{2}\times 6\times 8$. A1: Area = 24 square units. B1: $(0,\frac{11}{3})$.	No follow-through. Apply the general marking principles.	8
5	Simplify fully, showing your working. (a) $\sqrt{72}-\sqrt{8}$. [2] (b) $\frac{5}{\sqrt{3}+1}$, leaving a rational denominator. [2]	M1: $\sqrt{72}=6\sqrt{2}$ and $\sqrt{8}=2\sqrt{2}$. A1: $4\sqrt{2}$. M1: Multiply numerator and denominator by $\sqrt{3}-1$. A1: $\frac{5(\sqrt{3}-1)}{2}$.	No follow-through. Apply the general marking principles.	4
6	Express $\frac{5x+1}{(x+1)(x-2)}$ in partial fractions.	M1: Set numerator equal to $A(x-2)+B(x+1)$. A1: $A=\frac{4}{3}$. A1: $\frac{4}{3(x+1)}+\frac{11}{3(x-2)}$.	No follow-through. Apply the general marking principles.	3
7	Let $f(x)=x^2-6x+5$. (a) Write f(x) in completed-square form. [2] (b) Solve $f(x)=0$. [2] (c) Sketch $y=f(x)$, labelling all axis intercepts and the turning point. [3]	M1: Form $(x-3)^2$ plus a constant. A1: $(x-3)^2-4$. M1: $(x-1)(x-5)=0$ or correct quadratic formula. A1: x = 1 and x = 5. B1: Upward parabola with roots (1, 0) and (5, 0). B1: Turning point (3, −4). B1: y-intercept (0, 5).	No follow-through. Apply the general marking principles.	7
8	Use the discriminant to determine the number of real roots of $3x^2+2x+5=0$.	M1: $b^2-4ac=4-60=-56$. A1: No real roots because the discriminant is negative.	No follow-through. Apply the general marking principles.	2
9	Let $g(x)=x^3-2x^2-5x+6$. (a) Show that x − 1 is a factor. [1] (b) Divide g(x) by x − 1. [2] (c) Hence solve $g(x)=0$. [2]	B1: $g(1)=1-2-5+6=0$. M1: Correct polynomial-division process or coefficient comparison. A1: Quotient x^2-x-6. M1: Quotient factorises to $(x-3)(x+2)$. A1: x = −2, 1, 3.	No follow-through. Apply the general marking principles.	5

Q	Question / requirement	Solution and mark allocation	Alternatives / notes	Max
10	A theatre models weekly profit P pounds from selling x tickets by $P=-2x^2+120x-1000$, for $0\le x\le 60$. (a) Find the two break-even values of x. [3] (b) Find the maximum modelled profit and the number of tickets giving it, without calculus. [3] (c) State the integer ticket sales for which profit is strictly positive. [1]	M1: Set $-2x^2+120x-1000=0$. M1: Obtain $(x-10)(x-50)=0$. A1: 10 and 50 tickets. M1: $P=-2(x-30)^2+800$ or symmetry $x=\frac{10+50}{2}$. A1: 30 tickets. A1: Maximum profit £800. B1: x = 11, 12, …, 49.	No follow-through. Apply the general marking principles.	7
11	Solve simultaneously $3x+2y=16$ and $x-y=2$. Show your working.	M1: Use $x=y+2$ or a valid elimination. A1: $5y=10$. A1: y = 2. A1: x = 4.	No follow-through. Apply the general marking principles.	4
12	Find all points of intersection of $y=x+2$ and $y=x^2-4$.	M1: Set $x+2=x^2-4$. M1: Solve $x^2-x-6=0$. A1: x = −2 and x = 3. A1: Points (−2, 0) and (3, 5).	No follow-through. Apply the general marking principles.	4
13	(a) Solve $5-2x<11$. [2] (b) Solve $x^2-x-12\le 0$. [3] (c) Give the set of values satisfying both inequalities. [1]	M1: $-2x<6$ and reverse inequality on dividing by −2. A1: x > −3. M1: Factorise $(x-4)(x+3)$. M1: Use upward parabola/sign analysis between roots. A1: $-3\le x\le 4$. B1: $-3<x\le 4$.	No follow-through. Apply the general marking principles.	6
14	Write $2\log_{10}x-\log_{10}4$ as a single logarithm, for x > 0.	M1: $2\log_{10}x=\log_{10}(x^2)$. A1: $\log_{10}(\frac{x^2}{4})$.	No follow-through. Apply the general marking principles.	2
15	(a) Solve $3^{2x-1}=27$. [2] (b) Solve $\log_2(x-1)=3$. [2]	M1: Equate $2x-1=3$. A1: x = 2. M1: $x-1=2^3=8$. A1: x = 9.	No follow-through. Apply the general marking principles.	4

Q	Question / requirement	Solution and mark allocation	Alternatives / notes	Max
16	Sketch $y = 2^x$ and $y = \log_2 x$ on separate axes. Label each intercept, its asymptote and one further point on each curve.	B1: Increasing exponential through (0, 1). B1: Horizontal asymptote y = 0 and point (1, 2). B1: Increasing logarithmic curve through (1, 0), only x > 0. B1: Vertical asymptote x = 0 and point (2, 1).	No follow-through. Apply the general marking principles.	4
17	(a) Expand $(1+2x)^4$ in ascending powers of x. [3] (b) Use your expansion at x = 0.01 to estimate 1.02^4 by retaining terms up to x^2. [1] (c) Explain whether this estimate is above or below the exact value. [1]	B1: Constant 1 and linear term 8x. B1: Quadratic term $24x^2$. B1: Cubic and quartic terms $32x^3 + 16x^4$. B1: 1 + 0.08 + 0.0024 = 1.0824. B1: Below, because both omitted terms are positive when x = 0.01.	No follow-through. Apply the general marking principles.	5
18	A sector has radius 6 cm and angle 120°. (a) Express the angle in radians. [1] (b) Find the exact area of the sector. [2]	B1: $\frac{2\pi}{3}$ radians. M1: Area = $\frac{1}{2} \times 6^2 \times \frac{2\pi}{3}$, or $\frac{120}{360}\pi 6^2$. A1: 12π cm².	No follow-through. Apply the general marking principles.	3
19	Triangle ABC has AB = 7 cm, AC = 9 cm and angle BAC = 60°. Let BC = a. (a) Find the exact value of a. [3] (b) Find angle ABC to 1 decimal place using the cosine rule. [3] (c) Calculate the area of triangle ABC to 3 significant figures. [2] (d) A circular sector has radius 7 cm and angle 60°. Find the exact length of its arc. [2] (e) Triangle DEF has angle D = 30°, angle E = 45° and EF = 8 cm. Find the exact length DF. [2]	M1: $a^2 = 7^2 + 9^2 - 2 \times 7 \times 9 \cos 60^\circ$. A1: $a^2 = 67$. A1: $a = \sqrt{67}$ cm. M1: $\cos B = \frac{7^2 + 67 - 9^2}{2 \times 7 \times \sqrt{67}}$. A1: $\cos B = \frac{35}{14\sqrt{67}}$. A1: B = 72.2°. M1: Area = $\frac{1}{2} \times 7 \times 9 \sin 60^\circ$. A1: 27.3 cm². M1: Arc = $7 \times \frac{\pi}{3}$. A1: $\frac{7\pi}{3}$ cm. M1: $\frac{DF}{\sin 45^\circ} = \frac{8}{\sin 30^\circ}$. A1: $DF = 8\sqrt{2}$ cm.	No follow-through. Apply the general marking principles.	12

Q	Question / requirement	Solution and mark allocation	Alternatives / notes	Max
20	A tank initially contains 500 litres of water. A model predicts $V = 500(0.92)^t$ litres after t whole days. (a) Interpret 0.92. [1] (b) Calculate V after 4 days to 1 decimal place. [2] (c) Find the first whole day for which V < 250 litres. [2] (d) Give one limitation of applying this model indefinitely. [1]	B1: 92% remains each day, equivalent to an 8% daily decrease. M1: 500×0.92^4. A1: 358.2 litres. M1: $t > \frac{\log(0.5)}{\log(0.92)} = 8.31\ldots$. A1: Day 9. B1: A contextual limitation, e.g. leakage rate may change as water pressure falls; a fixed proportional rate may not persist.	No follow-through. Apply the general marking principles.	6
21	A club invests £5,000 for 3 years. Account A pays 4% simple interest per year. Account B pays 3.8% compound interest per year. There are no fees or withdrawals. (a) Calculate each final balance to the nearest penny. [4] (b) Recommend the better account on final balance alone and calculate its advantage. [2]	M1: $A = 5000(1 + 0.04 \times 3)$. A1: A = £5,600.00. M1: $B = 5000(1.038)^3$. A1: B = £5,591.93. B1: Recommend A because its final balance is larger. B1: Advantage £8.07.	No follow-through. Apply the general marking principles.	6