Captivate
EDUCATION

Given name/s	
Family name	
Teacher	

Trial 1 external assessment 2027

Question and response book

Mathematical Methods

Paper 1 — Technology-free

SAMPLE

Time allowed

- Perusal time — 5 minutes
- Working time — 90 minutes

General instructions

- Answer all questions in this question and response book.
- Calculators are not permitted.
- QCAA formula book provided.
- Planning paper will not be marked.

Section 1 (10 marks)

- 10 multiple choice questions

Section 2 (45 marks)

- 9 short response questions

Practice material in the layout of the 2025 QCAA external assessment. Not a QCAA assessment.

Sample pages only. Full paper and marking guide: captivateeducation.com.au/trial-exams/qce/mathematical-methods

Section 1

Instructions

- This section has 10 questions and is worth 10 marks.
- Use a 2B pencil to fill in the A, B, C or D answer bubble completely.
- Choose the best answer for Questions 1–10.
- If you change your mind or make a mistake, use an eraser to remove your response and fill in the new answer bubble completely.

	A	B	C	D
Example:	●	○	○	○

	A	B	C	D
1.	○	○	○	○
2.	○	○	○	○
3.	○	○	○	○
4.	○	○	○	○
5.	○	○	○	○
6.	○	○	○	○
7.	○	○	○	○
8.	○	○	○	○
9.	○	○	○	○
10.	○	○	○	○

Ensure you have filled an answer bubble for each question.

SAMPLE

Do not write outside this box.

Section 2

Instructions

- Write using black or blue pen.
- Questions worth more than one mark require mathematical reasoning and/or working to be shown to support answers.
- If you need more space for a response, use the additional pages at the back of this book.
  - On the additional pages, write the question number you are responding to.
  - Cancel any incorrect response by ruling a single diagonal line through your work.
  - Write the page number of your alternative/additional response, i.e. See page …
  - If you do not do this, your original response will be marked.
- This section has nine questions and is worth 45 marks.

DO NOT WRITE ON THIS PAGE
THIS PAGE WILL NOT BE MARKED

SAMPLE

Do not write outside this box.

QUESTION 11 (5 marks)

Determine the derivative of each of the following. Give each answer in simplest factorised form.

a) $y = x^2e^{3x}$ *[2 marks]*

b) $y = \dfrac{e^{2x}}{1+x}$ *[3 marks]*

SAMPLE

Do not write outside this box.

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Mathematical Methods marking guide and response

Trial 1 external assessment 2027 · Paper 1 — Technology-free · 55 marks

Teacher copy – not for distribution to students.

Where a response does not meet any of the descriptors for a question or a criterion, a mark of '0' will be recorded.

SAMPLE

Marking guide

Multiple choice

Question	Response	Explanation
1	**B**	**Correct:** $\int x^5\,dx = x^6/6 + c$ by the power rule for integration. **Common errors** • (A) differentiates instead of integrating. • (C) raises the index but forgets to divide by the new index. • (D) divides by the old index 5 instead of the new index 6.
2	**A**	**Correct:** $\frac{d}{dx} e^{f(x)} = f'(x)e^{f(x)}$ with $f(x) = 3x^2$, so $f'(x) = 6x$. **Common errors** • (B) moves the exponent to a product of exponents. • (C) applies the polynomial power rule to the exponent. • (D) differentiates $3x^2$ as 6, dropping the x.

3	**C**	**Correct:** $\log_3(54) - \log_3(2) = \log_3(54/2) = \log_3(27) = 3$. **Common errors** • (A) evaluates $\log_3(27)$ as 2 by miscounting powers of 3. • (B) subtracts the arguments instead of dividing them. • (D) stops at 27 without evaluating the logarithm.
4	**D**	**Correct:** the margin of error has $\sqrt{n}$ in the denominator, so a larger sample gives a smaller margin of error. **Common errors** • (A) inverts the relationship between n and the margin of error. • (B) treats the margin of error as fixed by the confidence level alone. • (C) assumes a proportional (rather than inverse square root) relationship.
5	**B**	**Correct:** $\int_0^{\pi/3} \sin(x)dx = [-\cos(x)]_0^{\pi/3} = -½ + 1 = ½$. **Common errors** • (A) reverses the limits (or drops the negative in −cos). • (C) evaluates $\sin(\pi/3)$ instead of integrating. • (D) adds $\cos(\pi/3)$ to 1 instead of subtracting from 1 correctly signed.
6	**C**	**Correct:** Var = $p(1 - p) = 0.3 \times 0.7 = 0.21$. **Common errors** • (A) squares p. • (B) gives the mean p. • (D) gives $1 - p$.

SAMPLE

7	**A**	**Correct:** f has a maximum then a minimum, so f' is positive, zero at $x = -1$, negative, zero at $x = 2$, then positive — an upward parabola with roots −1 and 2. **Common errors** • (B) inverts the sign pattern (reads maximum/minimum backwards). • (C) uses roots with the wrong signs. • (D) makes both errors.
8	**D**	**Correct:** $E(X) = 0(0.1) + 1(0.3) + 2(0.4) + 3(0.2) = 0.3 + 0.8 + 0.6 = 1.7$. **Common errors** • (A) averages the x-values 0–3 without weighting. • (B) gives the mode (the x-value with the highest probability). • (C) sums the probabilities weighted incorrectly.
9	**A**	**Correct:** area $= \frac{1}{2} \times 6 \times 8 \times \sin(30°) = 24 \times \frac{1}{2} = 12$ cm². **Common errors** • (B) omits the factor of ½. • (C) uses $\cos(30°)$ (or $\sin(60°)$) instead of $\sin(30°)$. • (D) makes both errors.
10	**C**	**Correct:** $\sqrt{(0.5 \times 0.5 / 25)} = \sqrt{0.01} = 0.1$. **Common errors** • (A) gives the variance, not the standard deviation. • (B) gives p. • (D) divides p by n without the square root structure.

SAMPLE