

SUPERVISOR'S USE ONLY

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91262



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Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Mathematics and Statistics 2023

91262 Apply calculus methods in solving problems

Credits: Five

Achievement	Achievement with Merit	Achievement with Excellence
Apply calculus methods in solving problems.	Apply calculus methods, using relational thinking, in solving problems.	Apply calculus methods, using extended abstract thinking, in solving problems.

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

You should attempt ALL the questions in this booklet.

Show ALL working.

Make sure that you have the Formulae Sheet L2–MATHF.

If you need more room for any answer, use the extra space provided at the back of this booklet.

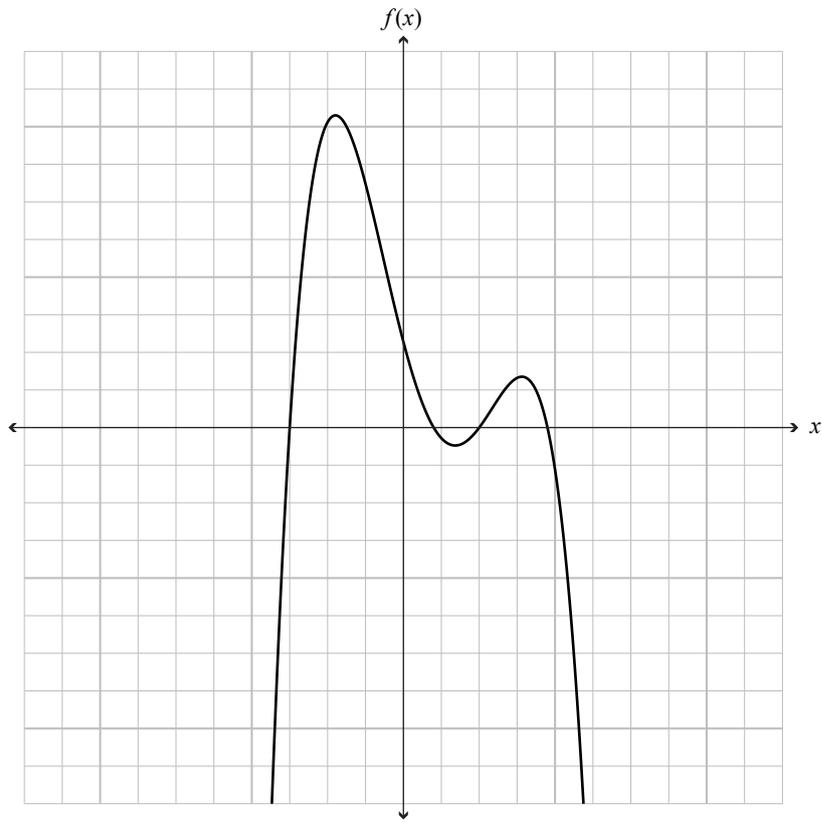
Check that this booklet has pages 2–12 in the correct order and that none of these pages is blank.

Do not write in any cross-hatched area (DO NOT WRITE). This area will be cut off when the booklet is marked.

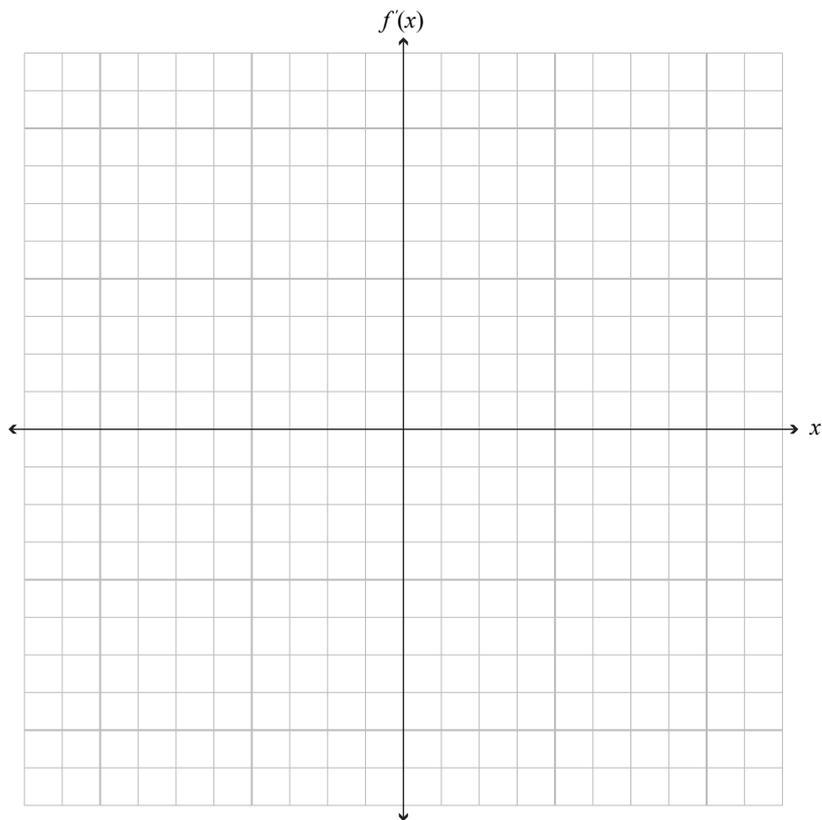
YOU MUST HAND THIS BOOKLET TO THE SUPERVISOR AT THE END OF THE EXAMINATION.

QUESTION TWO

- (a) The diagram below shows the graph of a function $y = f(x)$.



On the axes below, sketch the graph of the gradient function $y = f'(x)$.



If you need to redraw your graph, use the grid on page 11.

QUESTION THREE

- (a) (i) Find the gradient of the curve $y = 2x^3 - 9x^2 + 12x + 3$ at the point $(1, 8)$.

- (ii) Find the coordinates of another point on the curve that has the same gradient as in part (i).

- (b) The number of followers of a new social media account can be modelled by:

$$F = 5t^3 - 840t^2 + 42180t \quad (0 \leq t \leq 90)$$

Where t is days after the account is created, and F is the number of followers.

- (i) What is the rate of increase of followers on day 5?
