

91261



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Mana Tohu Mātauranga o Aotearoa
 New Zealand Qualifications Authority

Level 2 Mathematics and Statistics 2025

91261 Apply algebraic methods in solving problems

Credits: Four

Achievement	Achievement with Merit	Achievement with Excellence
Apply algebraic methods in solving problems.	Apply algebraic methods, using relational thinking, in solving problems.	Apply algebraic 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 the margins (✂✂✂). 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.

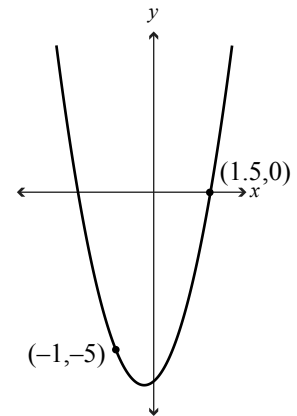
QUESTION ONE

(a) Simplify $5y \times \sqrt{\frac{y^6}{64}}$.

(b) Rearrange the expression $2y = \sqrt[3]{7x - 5}$ to make x the subject.

- (c) Consider the graph of $y = 2x^2 + ax + b$, where a and b are constants. One of the points where the graph crosses the x -axis is at $(1.5, 0)$. The point $(-1, -5)$ also lies on the graph.

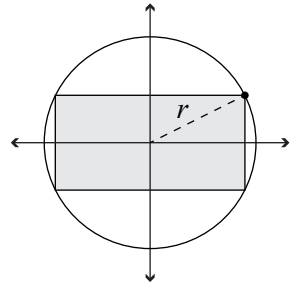
Find the values of a and b .



- (d) A rectangle is inscribed in a circle with radius r , as shown in the diagram. The length of the rectangle is twice its width.

Find a fully simplified expression for the area of the rectangle in terms of r .

Pythagoras' Theorem: $a^2 + b^2 = c^2$



QUESTION TWO

- (a) What is the value of k needed to write $9x^2 - 30x + k$ as a perfect square?

- (b) Simplify fully $\frac{6x^3 + 26x^2 - 20x}{5x^2 + 23x - 10}$.

- (c) The solutions to the equation $\frac{10}{(3x-1)^2} = 2$ can be written in the form $\frac{1+\sqrt{a}}{b}$ and $\frac{1-\sqrt{a}}{b}$.

Find the values of a and b .

- (e) The values of x and y satisfy the simultaneous equations

$$y - 2x = 13$$

$$x^2 + 2ky = 6k$$

where k is a non-zero constant.

Given that there is only one solution to the equations, find the value of k .

Find the solution to these simultaneous equations.

QUESTION THREE

- (a) Solve $\log_{\sqrt{x}} 8 = 6$.

- (b) A quadratic equation, $ax^2 + bx + c = 0$, has solutions of $\frac{1}{5}$ and $\frac{-2}{3}$.

Find the values of the integers a , b , and c .

- (c) If $p = \log_a 3$ and $q = \log_a 5$, write $\log_a 75$ in terms of p and q .

- If a and b are solutions of the equation $x^2 - mx + n = 0$, find an expression for $a^2 + b^2$ in terms of m and n .

Question Three continues
on the next page.

- The start (tee) is 2 m above ground level (i.e the flag).

The tree is 7.5 m high, and is 200 m away from the start.

Will the golf ball be high enough to clear the tree?

Extra space if required.
Write the question number(s) if applicable.

QUESTION
NUMBER

Extra space if required.
Write the question number(s) if applicable.

QUESTION
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