SUPERVISOR'S USE ONLY

2

91261

912610

Draw a cross through the box (☒) if you have NOT written in this booklet

+

NZQA | Mana Tohu Mātauranga o Aotearoa
New Zealand Qualifications Authority

Level 2 Mathematics and Statistics 2026

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.

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

Show ALL working.

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.

© New Zealand Qualifications Authority, 2026. All rights reserved.
No part of this publication may be reproduced by any means without the prior permission of the New Zealand Qualifications Authority.

QUESTION ONE

(a) Simplify $\left(\frac{x^{13}}{32x^3}\right)^{\frac{-1}{5}}$.

(b) A magic square in mathematics is a grid filled with numbers, where the sum of numbers in every row, every column, and both main diagonals is the same, known as the "magic constant" or "magic sum". An example is shown on the right, where the magic sum is 15.

2	**7**	**6**
9	**5**	**1**
4	**3**	**8**

Consider this magic square with a variable t.

Set up and solve a quadratic equation to find the values of t that satisfy this magic square:

$17t^2 - 1$		
	$2t^2 - 6t$	$t^2 + 7$
$t^2 + 8t$		

(c) Simplify this expression as a single fraction in its simplest form:

$$\frac{x+2}{x^2-4x+3}-\frac{x-5}{3x^2-8x-3}$$

(d) Sala invests an initial amount P into a savings account. The account earns interest of 4% per annum, compounded annually.

(i) Write an equation to model the value (V) of Sala's investment over time in years (t), in terms of P and t.

(ii) Jaycob invests the same amount (P) as Sala, but starts his investment three years later than Sala. His account earns interest of 6%, compounded annually.

Determine algebraically when both investments will be worth the same amount.

Show all working clearly.

(e) The quadratic equation $x^2 - (k+3)x + 5k = 0$ has two real roots. The roots are in the ratio 2:5.

Find all the values of k.

QUESTION TWO

(a) Solve $2\log_3(5m+2)=6$.

(b) Using algebraic methods, find all the factors for the expression $45n^3-5n$.

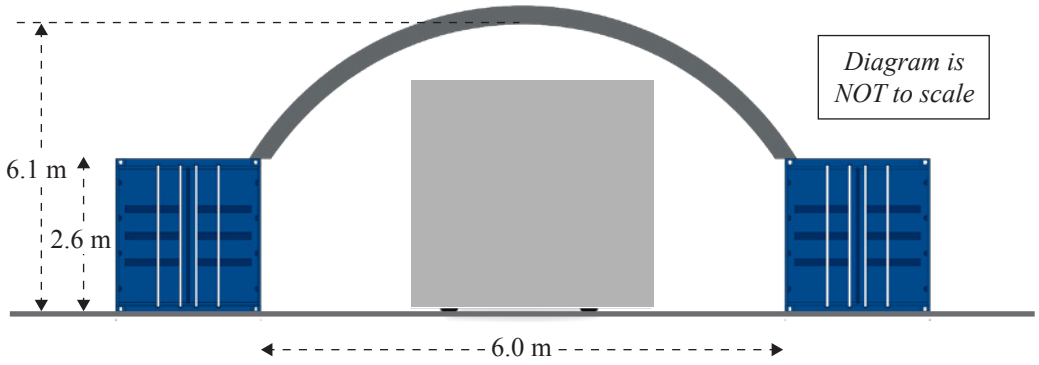
(c) The three sides of a triangle are n^2-1, n^2+1, and $2n$, where $n>1$.

Using algebraic methods, show that this is a right-angled triangle.
Pythagoras' theorem: $a^2+b^2=c^2$

(d) Solve $5^{2p+2} = \dfrac{225}{5^p}$.

(e) Niko runs a motorhome repair business. He wants to create a shelter to use when repairing motorhomes.

- The shelter is made using two containers as a base to support the roof – as shown in the diagram.
- The containers are 2.6 m high and 6.0 m apart.
- The maximum height of the roof of the shelter is 6.1 m. The roof can be modelled by a quadratic function.



Adapted from: www.baileyofbristol.co.uk/motorhomes/adamo/adamo-60-2/ and www.allshelter.com.au/product/container-domes-shelters/

(i) Form an equation to model the roof structure.

(ii) In New Zealand, the legal limits for the width of a motorhome is 2.55 m, and for the height it is 4.3 m. To allow access to a motorhome roof, Niko needs a clearance of at least 1.5 m from the top of the motorhome to the roof of the shelter.

Will his shelter be big enough to fit a motorhome which has the maximum allowed height and width in New Zealand?

QUESTION THREE

(a) Find the value of the discriminant for the quadratic equation $x(5x-3)=4$.

(b) Solve $\frac{6}{d}-1=\frac{2}{d-1}$.

(c) Given that $x=3^m$ and $y=9^n$, find an expression for $\log_3(x^2y^3)$ in terms of m and n.

Question Three continues on the following page.

(d) Find the solution to $3(x+1)+\frac{11}{2}\sqrt{x+1}-5=0$.

Hint: Let $y=\sqrt{x+1}$.

(e) Consider the quadratic function $y=x^2+mx+k$, where m and k are constants.

Find the coordinates of the vertex in terms of m and k.

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 NUMBER