

91261



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

QUALIFY FOR THE FUTURE WORLD
KIA NOHO TAKATŪ KI TŌ ĀMUA AO!

2

SUPERVISOR'S USE ONLY

Level 2 Mathematics and Statistics, 2019

91261 Apply algebraic methods in solving problems

9.30 a.m. Thursday 21 November 2019
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 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.

You are required to show algebraic working in this paper. Guess-and-check methods, and correct answer(s) only, will generally limit grades to Achievement.

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

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

TOTAL

ASSESSOR'S USE ONLY

QUESTION ONE

(a) Solve each of the following equations:

(i) $3x^2 - 6 = 7x$

(ii) $\frac{3}{x^2} + \frac{4}{x} = 5$

(b) A drug is used to reduce the level of cholesterol in the blood. For a daily dose of the drug, the cholesterol level C in the blood t months after taking the first dose may be modelled by the function

$$C = 0.02t^2 - 0.6t + k,$$

where k is the initial cholesterol level and the function is valid for the first 15 months only.

A person with an initial cholesterol level of 9.18 is given the drug.

How long will it take the person's cholesterol level to reduce to 5.05?

- (c) Factorise fully $fm - 6gn + 3fn - 2gm$.

- (d) The shape below is divided into rectangles. All measurements are in cm.

This diagram has been corrected from that used in the examination.

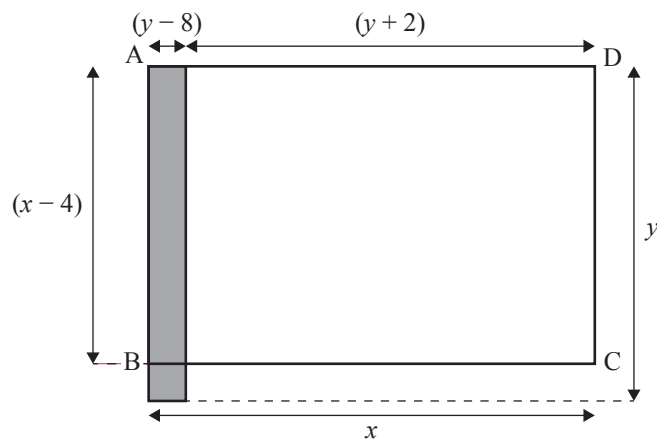


Diagram is
NOT to scale

The shaded rectangle has an area of 9 cm^2 .

Find the area of the rectangle ABCD.

- (d) (i) The number of people N suffering from a contagious virus increases exponentially at a constant rate of 5.3% each week after the virus was initially diagnosed.

If N_0 is the number of people initially diagnosed with the virus, then t weeks after the virus was initially diagnosed, N can be modelled by the function $N = N_0 (1.053)^t$.

How long will it take for the number of people diagnosed with the virus to be three times the number initially diagnosed?

- (ii) The number of people N suffering from a different virus also increases exponentially at a constant rate of r % each week. 2500 people were initially diagnosed with this virus. After 10 weeks, the number of people suffering from this virus had increased to 4250.

Find r , assuming the form of model in part (i) still applies.

Question 3 continues on page 10 ►

ASSESSOR'S
USE ONLY

--

