To be completed by Candidate and School:	
Name:	
NSN No:	
School Code:	

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SUPERVISOR'S USE ONLY

DAY 2
THURSDAY

NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Level 1 Mathematics and Statistics CAT, 2016

91027 Apply algebraic procedures in solving problems

Thursday 15 September 2016
Credits: Four

You should attempt ALL the questions in this booklet.

Calculators may NOT be used.

Show ALL working.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

You are required to show algebraic working in this paper. Guess and check and correct answer only methods do not demonstrate relational thinking and will limit the grade for that part of the question to a maximum of an Achievement grade. Guess and check and correct answer only may only be used a maximum of one time in the paper and will not be used as evidence of solving a problem.

A candidate cannot gain Achievement in this standard without solving at least one problem.

Answers must be given in their simplest algebraic form.

Where a question is given in words you will be expected to write an equation.

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.

ASSESSOR'S USE ONLY	**Achievement Criteria**	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Apply algebraic procedures in solving problems.	Apply algebraic procedures, using relational thinking, in solving problems.	Apply algebraic procedures, using extended abstract thinking, in solving problems.
		Overall level of performance

QUESTION ONE

ASSESSOR'S USE ONLY

(a) (i) A rectangle has an area of $x^2 + 5x - 36$.

What are the lengths of the sides of the rectangle in terms of x?

(ii) If the area of the rectangle is 114 cm^2, what is the value(s) of x?

(b) Jake and Mele deliver newspapers.
Jake has more newspapers to deliver than Mele.
If Jake gave Mele 23 newspapers, they would have the same number of newspapers.
If, instead, Mele gave Jake 7 newspapers, Jake would then have twice as many as Mele.

How many newspapers does each person actually have?

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(c) Show that $\frac{3}{2x}+\frac{x+4}{4}$ is the same as $\frac{2x^2+8x+12}{8x}$.

(d) For what value of x will $9 \times 3^x = 3^{5x+4}$?

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QUESTION TWO

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(a) A parabola has the equation $y = 3x^2 - 5x + 7$

What is the value of y when $x = 2$?

(b) For what values of x is $(x - 3)(x + 3) < (x - 4)(x + 2)$?

(c) If p is a whole number, for what values of p is $10 \times 2^{p-1} < 165$?

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(d) $M = 5(a^2 - 3a + 4) + a^2$

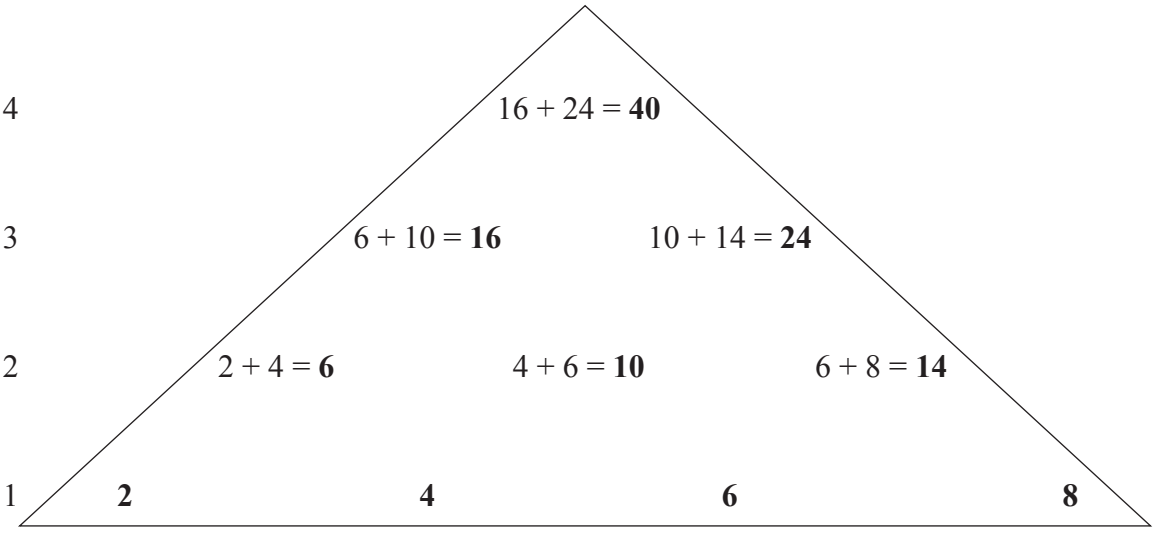
$N = (3a - 5)(2a - 4) + 7a$

Give an expression for M in terms of N.

(e) Janine writes down 4 numbers: 2, 4, 6, and 8.

She adds the pairs of numbers to form a triangle as shown below.

She stops when she gets to a single number at the top of the triangle.



(i) Investigate what happens when Janine changes the order of the numbers in Line 1.

Does she get the same answer as in Line 4?

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(ii) Find, using algebra, the relationship of the numbers in the first line to the numbers in the fourth line when she changes the order of the numbers in Line 1.

Explain your answer.

(iii) If Janine writes 4 consecutive numbers in order, what do you know about the numbers if the number at the top of the triangle is divisible by 3?

Explain your answer.

QUESTION THREE

ASSESSOR'S USE ONLY

(a) (i) The area of a rectangle is $n^2 - 4n - 5$, where n is a positive number.

If one side is has length $n + 1$, give the second side in terms of n.

(ii) What do you know about the value of n for this rectangle?

ASSESSOR'S USE ONLY

(b) The area of a piece of a circular pizza is given by the formula $A = \frac{3}{4}\pi r^2$.

Write the formula that could be used to find the radius of the piece of this circular pizza.

(c) Solve $x^2 - 3x - 10 = 0$.

(d) Solve $\frac{x^2 - 3x - 10}{(x+5)(x-5)} = \frac{x}{2}$.

Question Three continues on the following page.

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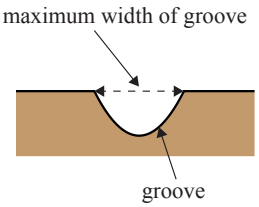
(e) A game has a groove that a small ball is rolled along.



http://offers.kd2.org/en/gb/lidl/pbaHo/

The groove can be modelled by

$y = x^2 - 4x$, where $0 \le x \le 4$, and x and y are measured in centimetres.

(i) What does y measure?

(ii) What percentage of the maximum horizontal width of the groove is the width of the groove when it's at a vertical depth of 3 cm?

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

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

QUESTION NUMBER

ASSESSOR'S USE ONLY

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