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

1

SUPERVISOR'S USE ONLY

DAY 1
TUESDAY

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

Tuesday 13 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 2–10 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

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(a) (i) The area of a rectangle is $x^2 - x - 2$.

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

(ii) What do you know about the value of x for this rectangle?
Explain your answer.

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(b) Ranee has more money than Hone.

If Ranee gave Hone $20, they would have the same amount.

If instead Hone gave Ranee $22, Ranee would then have twice as much as Hone.

How much money does each person actually have?

(c) $A = 3(n^2 - 4n + 2) + n$

and $B = (2n + 1)(n - 6) + n^2 + 3$

Give an expression for A in terms of B.

(d) For what value(s) of x will $4 \times 2^x = 2^{6x+3}$?

QUESTION TWO

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

What is the value of y when $x = 4$?

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

(c) If n is a whole number, for what values of n is $6 \times 2^{n+1} > 123$?

(d) Solve $x^2 + 2x - 8 = 0$.

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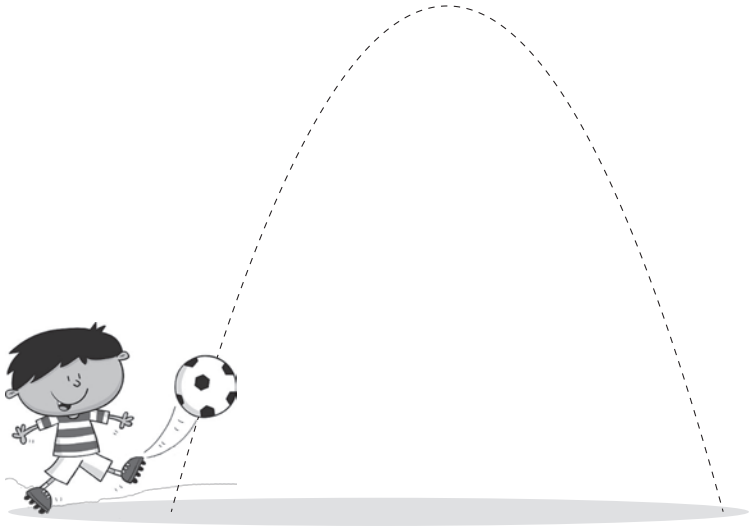
(e) Solve $\dfrac{x^2+2x-8}{(x+2)(x-2)}=\dfrac{x}{2}$.

(f) Raj kicks a ball. The flight path of the ball can be modelled by $y=-(x^2-4x)$ where x and y are measured in metres.



(i) What does x measure?

(ii) For what percentage of the horizontal distance that the ball travels will it be 3 metres or more above the ground?

QUESTION THREE

ASSESSOR'S USE ONLY

(a) A rectangle has an area of $x^2 + 4x - 12$.

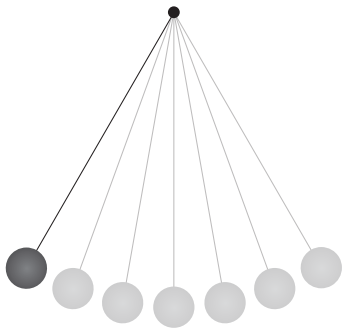
(i) What are the lengths of the sides in terms of x, for all values of x?

(ii) If the area of the rectangle is 128 cm^2, what is the value(s) of x?

(b) Brook knows that the time it takes for a pendulum to swing from one side to the other and back is given by the formula:

$$T = 2\pi\sqrt{\frac{L}{9.8}}$$

where L is the length of the string.



Write a formula that she could use to find the length of the string in terms of the time, T, taken for one swing.

(c) Show that $\frac{2}{x} + \frac{3+x}{5}$ is the same as $\frac{x^2+3x+10}{5x}$.

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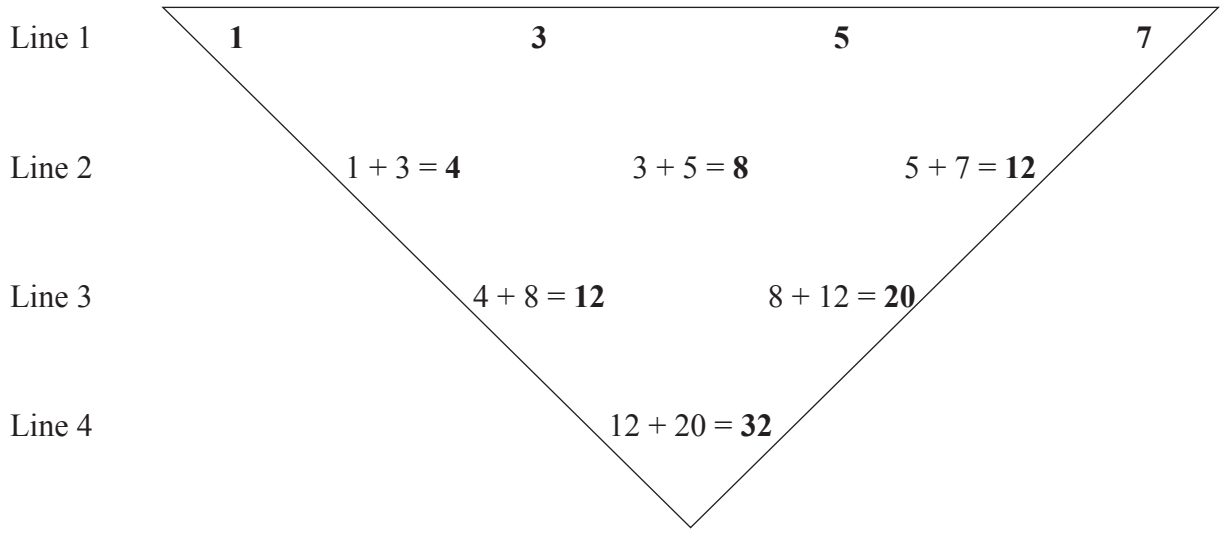
(d) Jason writes down 4 numbers: 1, 3, 5, and 7.

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

He stops when he gets to a single number at the bottom of the triangle.



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

Does he get the same answer 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 he changes the order of the numbers in Line 1.

Explain your answer.

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

Explain your answer.

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

QUESTION NUMBER

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