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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 1 Mathematics, 2008

90799 Demonstrate an understanding of straightforward algebraic methods

Credits: Four
9.30 am Monday 24 November 2008

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 answer ALL the questions in this booklet.

You should 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.

Check that this booklet has pages 2–8 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.

For Assessor's use only	**Achievement Criteria**		
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Demonstrate an understanding of straightforward algebraic strategies. ☐	Demonstrate an understanding of a range of algebraic methods in solving problem(s). ☐	Demonstrate an understanding of algebraic methods in investigating and solving complex problems. ☐
Overall Level of Performance ☐		

You are advised to spend 30 minutes answering the questions in this booklet.

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QUESTION ONE

As part of a mathematics experiment Tanya videos a bouncing ball.
She thinks that the height of each bounce is a constant amount less than the previous bounce.
Tanya measures the height, h, of each bounce on her video.
The ball was dropped from a height of 122 cm.
The height of the first bounce is 112 cm. The height of the second bounce is 102 cm.

(a) Write a linear equation to model the heights of the bounces that Tanya measured.

(b) Describe the domain for which Tanya's linear model is valid.

(c) Tanya measured the height of the 5th bounce to be 68 cm.

Does this value agree with the model's prediction?
You must justify your answer.

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QUESTION TWO

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A family of rectangles is produced, where the width of each rectangle is half its length.

(a) Write an equation that models the areas of the rectangles in terms of their widths, w.

(b) The first rectangle has a width of 7 cm.
Each rectangle in the family is 2 cm wider than the previous one.
The rectangles are numbered in order.

Write an equation relating the number of any rectangle in the family to the width of that rectangle.

Another family of rectangles is described in the table below.

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Number of the Rectangle in the Family (n)	**Width of Rectangle** (w)
1	a
2	$a + 2$
3	$a + 4$
4	$a + 6$
5	$a + 8$
6	$a + 10$

(c) Write an equation that describes the pattern shown in the table.

QUESTION THREE

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Many artists and mathematicians believe that a perfect rectangle is one where the ratio r of the length to the width is the Golden Ratio.
If you square the Golden Ratio you get the same answer as you get by adding one to it.

Write and solve an equation for this relationship and find the value of r.

QUESTION FOUR

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A family of stackable boxes is being produced.
The smallest box in the family is numbered one.
Each box in the family is made so that the width is half the length, and the length is half the height.

(a) Write an equation that could be used to find the volume of any box in the family in terms of the width of that box.

(b) The width of the first box is a cm. Each box is 2 cm wider than the last.

Write an equation for the volume of the box in terms of the number of the box in the family and a.

Extra paper for continuation of answers if required.
Clearly number the question.

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Question number	

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