For Supervisor's use only

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90284

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement
TAUMATA MĀTAURANGA Ā-MOTU KUA TAEA

Level 2 Mathematics, 2005

90284 Manipulate algebraic expressions and solve equations

Credits: Four
2.00 pm Thursday 24 November 2005

Check that the National Student Number (NSN) on your admission slip is the same as the number at the top of this page.

Make sure you have a copy of Formulae Sheet L2-MATHF.

You should answer ALL the questions in this booklet.

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 page(s) 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**
Manipulate algebraic expressions. ☐		
Solve equations. ☐	Solve problems involving equations. ☐	Choose algebraic techniques and strategies to solve problem(s). ☐
Overall Level of Performance (all criteria within a column are met) ☐		

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

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ALGEBRA AT THE ZOO

Show working.

QUESTION ONE

Expand and simplify: $(2x + 3)(x - 2)(x + 1)$

QUESTION TWO

Simplify and write your answer with positive indices: $(2x^2)^{-3}$

QUESTION THREE

Write as the log of a single number: $2 \log 9 - \log 3$

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QUESTION FOUR

Solve the following equations:

(a) $5 - 3(x - 2) = x$

(b) $3x^2 + 13x - 10 = 0$

QUESTION FIVE

A zookeeper spends $133.10 altogether on bananas and nuts for the monkeys.
He buys 8 kilograms more bananas than nuts.

Bananas cost $2.20 per kilogram and nuts cost $4.80 per kilogram.

How many kilograms of bananas did the zookeeper buy?
You **must** show the equations that you use to solve the problem.

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QUESTION SIX

The weight, W kg, of a giraffe over its first two years of life, is given by the equation

$$W = \frac{t^2}{4} - t + 68$$

where t is the time in months since the giraffe was born.

How long does it take the giraffe to weigh 85 kg?

QUESTION SEVEN

Find the ***x*-coordinates** of the points of intersection of the parabola $y = 2x^2 - x - 6$ and the line $y = 4x - 3$.

QUESTION EIGHT

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A newborn giraffe is 1.8 metres tall.
A formula that gives the height, H metres, of a giraffe over its first five years is

$$H = 1.8 \times 3^{0.16t}$$

where t is the time in years since the giraffe was born.

How long does it take for a giraffe to reach a height of 2.7 metres?

Note that QUESTION NINE is on Page 6.

QUESTION NINE

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Find the range of values of k for which the roots of the equation

$$y = x^2 + (k - 2)x + (k + 3)$$

are not real.

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

Assessor's use only

Question number

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

Assessor's use only

Question number	