For Supervisor's use only

2

90284

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

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

Level 2 Mathematics, 2004

90284 Manipulate algebraic expressions and solve equations

Credits: Four
2.00 pm Tuesday 23 November 2004

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 pages 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.

Achievement Criteria	*For Assessor's use only*	
Achievement	**Achievement with Merit**	**Achievement with Excellence**
Manipulate algebraic expressions. ☐		
Solve equations. ☐	Solve problems involving equations. ☐	Choose algebraic techniques and strategies to solve problems. ☐
Overall Level of Performance (all criteria within a column are met) ☐		

You are advised to spend 35 minutes answering the questions in this booklet.

Assessor's use only

FUN AND GAMES WITH ALGEBRA

Show working.

QUESTION ONE

Simplify: $\dfrac{x^2-4x+4}{x-2}$

QUESTION TWO

Simplify fully: $\left(16x^6\right)^{\frac{1}{2}}$

QUESTION THREE

Write as the log of a single number: log 144 – log 24

Assessor's use only

QUESTION FOUR

Solve the following equations

(a) $2x(2x+1)(x-4)=0$

(b) $\log_x 64 = 3$

(c) $2x^2 + x = 6$

QUESTION FIVE

A doctor prescribes a drug called Paracetamol® to help reduce pain.

The formula $P = A(0.75)^t$ gives the amount of the Paracetamol P mg in the blood t hours after the drug has been released in the blood stream.
A is the initial amount of Paracetamol released in the blood stream.

If the initial amount released in the blood stream is 500 mg (ie A = 500), how long does it take for the amount of Paracetamol to reduce to 250 mg?

QUESTION SIX

Assessor's use only

The perimeter of a circular garden is represented by the equation $x^2 + y^2 = 16$.

A gardener wants to put a drain through the garden.

The path of the drain is represented by the equation $y = 3x + 4$.

Find the x-coordinates of the points where the drain meets the perimeter of the garden.

QUESTION SEVEN

Assessor's use only

A Ball Committee looks at two options when deciding on the ticket price for the School Ball.

Option A:
The fixed costs are \$1600 and it costs \$18 for food for each person.
Twenty people get free tickets.

The ticket price T_A for this option can be calculated using the formula $T_A = \dfrac{1600 + 18x}{x - 20}$

where x is the number of tickets sold.

Option B:
The fixed costs are \$1200 and it costs \$22 for food for each person.
Fifteen people get free tickets.

The ticket price T_B for this option can be calculated using the formula $T_B = \dfrac{1200 + 22x}{x - 15}$

where x is the number of tickets sold.

By solving $\dfrac{1600 + 18x}{x - 20} = \dfrac{1200 + 22x}{x - 15}$

find the minimum number of tickets that need to be sold so that the price of tickets for option A is less than the price of the tickets for option B.

QUESTION EIGHT

Assessor's use only

Find the values of m for which one root of the equation $4x^2 = mx - 5$ is three times the other root.

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