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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 2 Mathematics, 2008

90284 Manipulate algebraic expressions and solve equations

Credits: Four
2.00 pm 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.

Make sure you have the Formulae Sheet L2-MATHF.

You should answer ALL the questions in this booklet.

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 2–7 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**
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.

Assessor's use only

AT THE THEME PARK

QUESTION ONE

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

QUESTION TWO

Simplify fully: $\dfrac{6m^5}{\sqrt{9m^{16}}}$

QUESTION THREE

Simplify fully: $\dfrac{(x+2)(x+3)}{x^2-9}$

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QUESTION FOUR

Solve for x: $2(3x - 1) > 1 - 2x$

QUESTION FIVE

Solve for x: $\log_2 x = 3$

QUESTION SIX

A group is to visit Happy Valley Theme Park by bus.
The bus will hold 50 people.
Adults are charged $8 each for the trip and children $2.50 each.
The bus is full and $196.50 is collected in total from the passengers.

Find the number of children on the bus.

You must show any equations that you use in solving the problem.

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QUESTION SEVEN

The theme park has a rectangular playground, which is 30 metres long and 15 metres wide.

It is surrounded by a border, which has a constant width x metres.

The area of the border is twice the area of the playground.

Find the value of x.

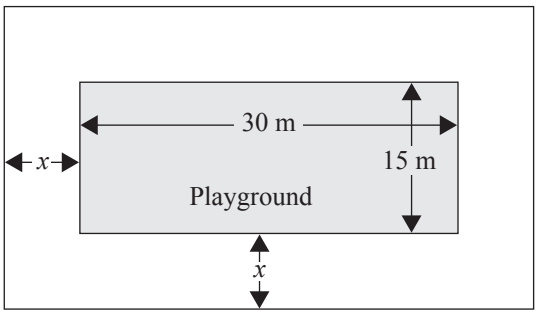

Diagram is NOT to scale

You must show any equations that you use in solving the problem.

QUESTION EIGHT

The theme park will need to close if the number of people entering the park in any month falls below 30 000.

A model for the number entering is

$$P = 45\,000 \times 0.96^{n+2}$$

where:
P is the number of people entering the park in a month
and n is the number of months since the start of the year.

Assuming this model continues to hold, after how many months will the park close?

QUESTION NINE

Assessor's use only

Find the solution(s) to the simultaneous equations:

$y = x + 7$ and $y = \frac{-12}{x}$.

Question Ten follows on the following page.

QUESTION TEN

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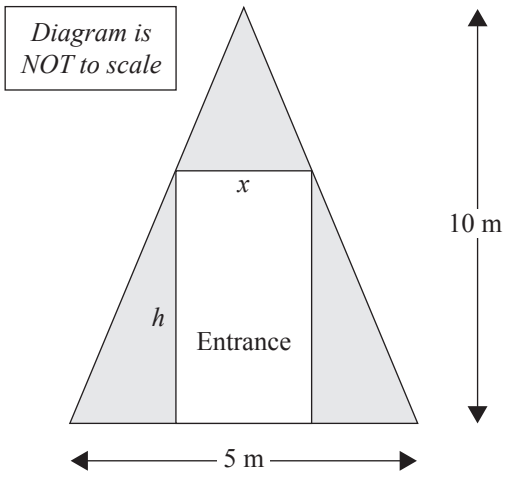
The train station at the theme park is housed in an A-frame building that has a large entrance.

The front of the building is the shape of an isosceles triangle with base 5 metres and height 10 metres.

The entrance is rectangular and touches the sides of the building.

Let the width of the entrance be x metres, and the height h metres.

Find an expression for x in terms of h.



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

Assessor's use only

Question number