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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 1 Mathematics, 2007

90799 Demonstrate an understanding of straightforward algebraic methods

Credits: Four
9.30 am Tuesday 20 November 2007

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.

Note that the questions in this booklet are not necessarily in increasing order of difficulty. Answers to some questions could provide evidence for more than one level of achievement.

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 25 minutes answering the questions in this booklet.

Assessor's use only

QUESTION ONE

Write two algebraic terms that, when multiplied together, have an answer of $24x^6$.

QUESTION TWO

Maya records the lap times at a local go-kart track.
The times improve at a constant rate.
Each lap is 0.381 seconds faster than the previous lap.
The 7th lap takes 83.243 seconds.

Give the rule for the lap time after n laps.
The table below may be helpful.

Lap (n)	Lap Time (t, seconds)
5	
6	
7	83.243
8	
9	
10	

QUESTION THREE

Assessor's use only

Sally solved the equation $-3(2x - 4) = 40$ incorrectly.
Her working is below:

$$\begin{aligned} -3(2x - 4) &= 40 \\ -6x - 12 &= 40 \\ -6x &= 52 \\ x &= \frac{-52}{6} \end{aligned}$$

Explain where Sally went wrong. Then show the correct working.

QUESTION FOUR

Is $(x + 8)^2 - 4$ equivalent to $(x + 7)(x + 9) - 3$ for all values of x?

You must show mathematical statements to support your answer.

QUESTION FIVE

Assessor's use only

I am thinking of a number that is greater than zero.
If I
- add 2 to the number, and then
- multiply this by 3 more than my original number

then the answer is 5550.

Form an equation and use it to find the number I first thought of.

QUESTION SIX

A mathematics class is investigating rectangles that each have perimeter 150 cm.

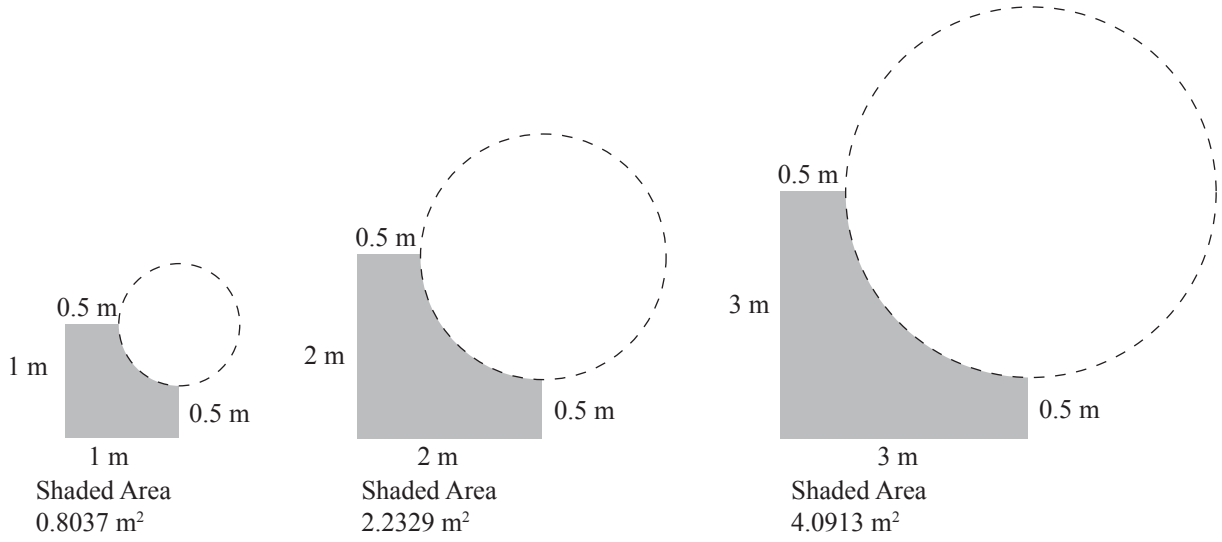
If the perimeter of a rectangle is 150 cm, give the rule for the area, A, in terms of the width, w.

QUESTION SEVEN

Assessor's use only

Eli is building a skateboard ramp.
Part of the ramp (called the rib) is shown by the shaded areas in the diagrams below. It is made by cutting a quarter circle out of a square.

Hint: the area of a circle = πr^2.



Find a rule that describes the relationship between the base length of the square, b, and the area of the rib, A.

Use the rule to find the area of the rib if he uses a 7 m square.

Note that Question Eight starts on the next page.

QUESTION EIGHT

Assessor's use only

John notices that the solution for both of these pairs of simultaneous equations is the same.

$$\begin{cases} x + 2y = 3 \\ 3x + 2y = 1 \end{cases} \quad \text{and} \quad \begin{cases} 10x + 11y = 12 \\ 4x + 3y = 2 \end{cases}$$

(a) Find the answer to both pairs of equations to show that John is correct.

John also notices that:

- the first equation has consecutive increasing coefficients, and
- the second equation has consecutive decreasing coefficients.

He wonders if other pairs of equations with coefficients like these also have the same solution.

(b) Form and solve another pair of simultaneous equations that fit this pattern, and see if he is correct.
You must give the pair of simultaneous equations that you use.

(c) John wants to know if this is true for all cases.

Write a generalised pair of equations that fit the pattern and use them to solve John's problem. You must show mathematical statements to support your answer.

Assessor's use only

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

Assessor's use only

Question number