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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 1 Mathematics, 2009

90799 Demonstrate an understanding of straightforward algebraic methods

Credits: Four
9.30 am Friday 20 November 2009

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.

The questions in this paper are NOT in order of difficulty. Attempt all questions or you may not provide enough evidence to achieve the required standard.

If you need more space for any answer, use the page(s) provided at the back of this booklet and clearly number the question.

You should show ALL working.

Check that this booklet has pages 2–6 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

(a) George thinks of a number called n.

He writes an equation to show that the difference **between** n and its reciprocal ($\frac{1}{n}$) is 5.

Give George's equation.

(b) A teacher asks her students to simplify the rational expression $\frac{x^2y^3}{xy^2}$ on their calculator.

(i) One of the students simplifies $\frac{x^2y^3}{xy^2}$ and gets xy^5.

Explain his error.

(ii) Another student simplifies the expression correctly, but her teacher warns her that "some answers may not be correct".

Explain what the teacher means, and why it could be a problem.

(c)

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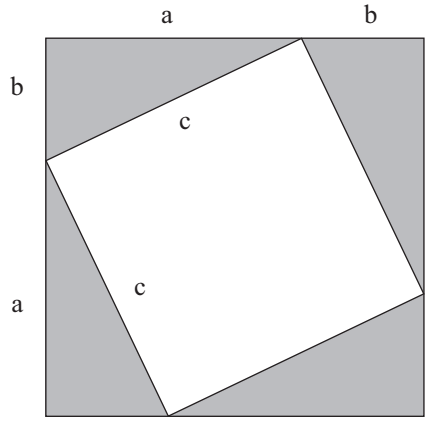

The diagram shows a square of side length c inside a square of side length $a + b$.

The area of the large square can be written either as $(a + b)^2$ or as $c^2 + 2ab$ (the area of the small square plus the four triangles).

Use this information to prove Pythagoras' theorem for a triangle.

QUESTION TWO

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(a) A gardener spends exactly \$640 on apple (A) and pear (P) trees.

An equation for the cost of trees is: $25A + 15P = 640$.

Explain the equation.

(b) The gardener wants to plant as many blackberry bushes (B) and raspberry bushes (R) as she can fit in a 300 m^2 garden. She knows that each blackberry bush needs 5 m^2 of land, and each raspberry bush needs 3 m^2 of land.

(i) Give an equation for how the gardener would use the land.

(ii) The gardener has exactly \$720 to spend on bushes, and an equation for the cost of bushes is

$$6B + 18R = 720$$

Show how many blackberry and raspberry bushes the gardener can plant so that she spends all her money, and uses all her land.

The gardener should plant _____ blackberry and _____ raspberry bushes.

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(c) Three numbers a, b and c form a harmonic sequence if their reciprocals, $\frac{1}{a}$, $\frac{1}{b}$ and $\frac{1}{c}$ increase by a constant amount.

Express b in terms of a and c, if a, b and c form a harmonic sequence.

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

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