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NZQA

NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

For Supervisor's use only

Level 1 Mathematics, 2009

90147 Use straightforward algebraic methods and solve equations

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 2–7 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**
Use straightforward algebraic methods. ☐	Use algebraic methods and solve equations in context. ☐	Use algebraic strategies to investigate and solve problems. ☐
Solve equations. ☐		
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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QUESTION ONE

(a) Solve the equations:

(i) $\frac{w}{3} - 4 = 5$

(ii) $3m + 5 = 3 - 5m$

(iii) $(1 - 2x)(x + 3) = 0$

(b) Steven sets Jan a mathematics problem about a mystery number:

"Three minus twice the mystery number is greater than 7."

Form an inequality and use it to find all possible values of the mystery number.

(c)

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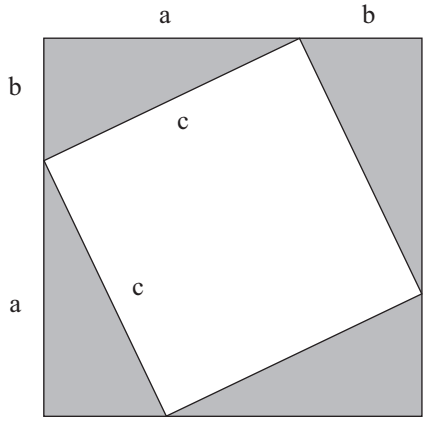

The diagram shows a square of side length c inside another square of side length $a + b$.

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

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

QUESTION TWO

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(a) Factorise $x^2 + 7x - 60$.

(b) Jonathon found this equation in a text book:

$$4(y^2)^n \times 3y^4 = 12y^{16}$$

Find the value of n.

(c) The surface area of a ball is given by $A = 4\pi r^2$, where r is the radius of the ball.

Give the formula for the radius of a ball.
(Make r the subject.)

$r =$ _____

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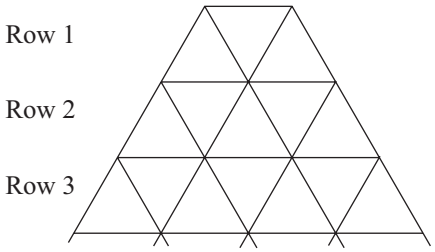
(d) Peg makes a patchwork rug by sewing small equilateral triangles together to form a pattern. Her pattern uses rows of equilateral triangles, as shown in the diagram.



There are n rows of equilateral triangle patches to make up the pattern.

(i) Give the formula to find the number of triangles, T, in row n of the pattern.

(ii) Write an expression to find P, the total number of equilateral triangles used to make the pattern in terms of n, the number of rows.

Question Two continues on the following page.

(iii) Use the expression from part (ii) to calculate the number of rows in Peg's pattern when she has used a total of 323 equilateral triangles.

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

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Question number

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