NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 2, 2003

Mathematics: Manipulate algebraic expressions and solve equations (90284)

National Statistics

Assessment Report

Assessment Schedule

Mathematics: Manipulate algebraic expressions and solve equations (90284)

National Statistics

Number of Results	Percentage achieved			
	Not Achieved	Achieved	Merit	Excellence
20,855	48.2%	33.7%	15.0%	3.1%

Assessment Report

Every candidate for a National Certificate of Educational Achievement examination paper is expected to:

- read the question and do what the question asks
- allow adequate time to complete answers
- be accurate: check and/or proofread
- use appropriate technical terms
- bring the correct equipment
- write and/or draw clearly
- use pen if work is to be eligible for reconsideration.

General Comments

The standard for achievement requires that candidates can manipulate and solve equations. The difficulty that many candidates experienced with the solving-equations requirement resulted in a large proportion of them not meeting the standard. In particular failure to provide two solutions to $x^2 - 64$ was a very common error. Expansion of $(2x - 1)^2$ was also poorly done.

To solve problems using equations, candidates need to develop greater confidence in the use of variables. Candidates were confused by choosing variables used to solve for the price of cream cakes in Question Five, and also the path width in Question Seven.

Candidates should be proficient and accurate with the use of the quadratic formula in order to solve problems. They should also be able to deal with the two solutions obtained even if one of them is not negative, and select and use the correct solution.

Additional Notes (optional).

(i) Care needs to be taken with use of $\sqrt{\ }$ so that it refers to whole fraction.

(ii) Too much guess and check used. The standard requires candidates to manipulate algebraic expressions.

(iii) Candidates should be encouraged to show all working as credit can sometimes be given when the error is minor or incorrectly transferred.

(iv) Candidates should be encouraged to answer all questions as it is common to use evidence from higher level questions when awarding achievement.

(iv) Logarithms were generally not well understood.

Assessment Schedule – 2003

Mathematics: Manipulate algebraic expressions and solve equations (90284)

	Achievement Criteria	No.	Evidence	Code	Judgement	Sufficiency
Achievement	Manipulate and simplify algebraic expressions and solve equations.	One	$5x^3 + 11x^2 - 2x - 8$	**A1**	CAO is acceptable for Achievement. Any order.	**Achievement:** ***two of Code*** *A1* **AND** two of Code **A2.** No repeated skills.
		Two	$r = \sqrt{\frac{V}{\pi h}}$	**A1**	Accept ±. Accept other variations. Sign must extend below fraction line.	
		Three	log 24 (log 24 = 1.38, not 1.38 only)	**A1**	Or equivalent.	
		Four (a)	$x = 1\frac{1}{3}, \pm 8$	**A2**	All 3 answers required.	
		(b)	$x = 2$	**A2**	No alternative.	
		Five	\$2.20 (\$ not required)	**A2**	No alternative.	
Achievement with Merit	Solve problems involving equations.	Six	$x^2 + (2x - 1)^2 - 4x - 5 = 0$ $5x^2 - 8x - 4 = 0$ $(5x + 2)(x - 2) = 0$ $x = -0.4$ or 2	**A1** **A2 M**	CAO is acceptable for Merit.	**Merit** Achievement **plus** two of Code **M** OR all three of Code **M**.
		Seven	$(8 + 2x)(11 + 2x) - 88 = 100$ or $4x^2 + 22x + 16x = 100$ (many variations) $4x^2 + 38x - 100 = 0$ $x = 2.15$	**A1** **A2 M**	Or equivalent. Or equivalent. Negative answer must not be in final answer.	
		Eight	$250(0.55)^n = 50$ $(0.55)^n = 0.2$ $n \log 0.55 = \log 0.2$ $n = 2.69$ (= 2h 42 min = 162 min)	**A1** **A2 M**	Or equivalent. Accept 2.7 or 3 if from rounding with evidence of solving other than guess and check.	

	Achievement Criteria	No.	Evidence	Code	Judgement	Sufficiency
Achievement with Excellence	Use a combination of algebraic techniques and strategies to solve problems.	Nine	$t_1 + t_2 = 1.9$ $t_2 = 1.9 - t_1$ $d = 4.9t_1^2$ $d = 335t_2$ $4.9t_1^2 = 335(1.9 - t_1)$ $4.9t_1^2 + 335t_1 - 636.5 = 0$ $t_1 = 1.85$ or -70.21 $t_1 = 1.85$ Depth = $4.9 \times (1.850)^2$ m The well is 16.77 m deep.	**A1** **A2** **M** E	Allow one minor error, as long as it leads to reasonable answer. Ignore incorrect mathematical statements. Any correct rounding accepted. Accept answer with premature rounding.	**Excellence:** merit **plus** Code **E**.

Judgement Statement

Judgement statements (formerly referred to as sufficiency statements) help students understand how their overall results for each standard were arrived at.

Achievement	Achievement with Merit	Achievement with Excellence
Manipulate and simplify algebraic expressions **(A1)** *and solve equations* **(A2)** 2 × **A1** ***and*** 2 × **A2**	*Solve problems involving equations* **(M)** Achievement ***plus*** 2 × **M** ***or*** 3 × **M**	*Use a combination of algebraic techniques and strategies to solve problems* **(E)** Merit ***plus*** **E**

Note: Insufficient evidence to support a judgement above **(X)**