NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 1, 2002

Mathematics: Use straightforward algebraic methods and solve equations (90147)

National Statistics

Assessment Report

Assessment Schedule

Mathematics: Use straightforward algebraic methods and solve equations (90147)

National Statistics

Number of Results	Percentage achieved			
	Not Achieved	**Achieved**	**Merit**	**Excellence**
38,254	36%	30%	29%	5%

Assessment Report

General Comments

A large number of candidates had little understanding of the most basic algebra skills.

Too many candidates used 'guess and check' as their method for solving equations.

It was disappointing that so many did not even attempt the more difficult Question Eight, even if they had completed all of the seven previous questions correctly.

Many errors resulted from a poor understanding of integers.

Comments on Specific Questions

Question One

This question was not done well. Many candidates had difficulty in manipulating integers.
A common mistake was +12 or –1 instead of –12 for the constant term.
There were many transfer errors from line 1 to line 2 of the working.
If candidates used x instead of j, this was considered a minor error and ignored.
Some candidates added the coefficients instead of multiplying.

Question Two

This question was also not done well.
The signs were often reversed, giving $(c + 8)(c – 3)$ as a common response.
c^2 often appeared in the brackets.
Another common error was to add in some extra 'c's, eg $(c – 8c)(c + 3c)$.
A common incorrect solution was $c(c – 5) – 24$.

Question Three

This was by far the best-done question in the paper. It was often the only A1 that students achieved.
Occasionally $132.50 was given as an answer.

Question Four

(a) Many candidates arrived at $x = 4$ and $–9$ but too many then chose positive 4 as their answer or hashed their solution by adding the two figures to arrive at one solution of $x = 5$.

There were still some candidates who expanded first and then tried to solve the equation by making x the subject, resulting in all sorts of problems.

(b) Some candidates did not add 4.4 and 8.1 together but divided and got into a mess. The decimal point seemed to be off-putting for some candidates. Some candidates multiplied the terms instead of adding them to arrive at $12.5x^2 = 100$.

(c) The most common answer for this question was 11.

Candidates struggled to find the appropriate order of operations to solve the problem or multiplied some terms by 3 but not all of them.

Question Five

This question was not done well. Many candidates left out the brackets in their response.
A common incorrect response was p – 2h   2.

Another common incorrect solution was $b = \dfrac{2h - p}{2}$ instead of $b = \dfrac{2h - p}{-2}$.

Some candidates hashed their answer by writing $\dfrac{p - 2h}{2} = p - h$.

Question Six

Surprisingly few candidates solved this equation by factorising.

b = 10 was simple to 'guess and check' and many candidates got this question correct.

Candidates who solved the problem by factorising often forgot to reject the negative solution.

Candidates demonstrated many imaginative ways of solving a quadratic equation, the most popular being to use the sort of backtracking appropriate in Question Four (c). Other candidates tried to begin solving the equation by taking the square root of both sides of the equation.

Too many candidates who got Questions One and Two wrong, got Question Three correct and then correctly solved Question Six by 'guess and check', so did not achieve the standard because the only algebraic method that they could demonstrate correctly was substitution.

Question Seven

This question was done well by candidates who attempted it. Too often, however, this question was left blank.

Most candidates managed this question by solving incorrectly to find the first solution and then carrying on to correctly substitute this wrong solution to solve correctly for the second solution.

A common problem was to add the equations instead of subtracting them to eliminate the variable, eg 14p = 198.90 instead of 10p = $119.50.

The numbers $39.70 and $39.80 used in the two equations were too similar and caused a lot of careless transfer errors that assessors were asked to ignore as minor errors.

Question Eight

Most candidates left this question blank.

From those candidates who did attempt this question, the most common solution was thickness equals 21 cm. Candidates had not understood the definition of the size of the parcel.

l = 2w, w = 3t, so l + w + t = 210   (instead of l + 2w + 2t = 210)
6t + 3t + t = 210
10t = 210
t = 21, w = 63 and l = 126

Assessment Schedule

Mathematics: Use straightforward algebraic methods and solve equations (90147)

	Achievement Criteria	No.	Evidence	Code	Judgement	Sufficiency
Evidence contributing to Achievement	Use straight-forward algebraic methods and solve equations.	One	$5j^2 + 11j - 12$	**A1**	No alternative.	**Achievement**
		Two	$(c - 8)(c + 3)$	**A1**	No alternative.	Two of Code **A1**
		Three	42.50	**A1**	Allow 42.5	**and**
		Four (a)	$x = -4$ or $x = 9$	**A2**	Both solutions needed.	Two of Code **A2**
		(b)	$12.5\,x = 100$ $x = 8$	**A2**	Accept answer only.	Question Seven may only provide **one** piece of replacement evidence for each of A1 or A2
		(c)	$2x = 30$ $x = 15$	**A2**	Accept answer only.	
Evidence contributing to Achievement with Merit	Use algebraic methods and solve equations in context.	Five	$2b = P - 2h$ $b = \dfrac{P - 2h}{2}$	**M A1**	Or $b = \dfrac{p}{2} - h$ Or equivalent. Accept answer only.	**Achievement with Merit** **Achievement** **plus**
		Six	$b^2 + 16b - 260 = 0$ $(b + 26)(b - 10) = 0$ $b = -26$ or $b = 10$ $b = 10$ (Length of box must be 10 cm)	**A1** Factorising **A2** Solving ✓c **M**	If guess and check is used in 6 or 7 the answer must be supported by substitution in all equations. Final answer must only have $b = 10$	Two of Code **M** **OR** Three Code **M**s
		Seven	$2p + 4m = 39.70$ $12p + 4m = 159.20$ $10p = 119.5$ $p = 11.95$ $2(11.95) + 4m = 39.70$ $m = 3.95$ $m = 3.95$	**A1 or A2** **A1 or A2** ✓c **M**	For Six and Seven, candidates must logically set out working showing at least one mathematically correct statement.	

	Achievement Criteria	No.	Evidence	Code	Judgement	Sufficiency
Evidence contributing to Achievement with Excellence	Use algebraic strategies to investigate and solve problems.	Eight	Let L = length of parcel Let W = width of parcel Let T = thickness of parcel Restriction: $L + 2W + 2T \le 210$ Accept $L + 2W + 2T = 210$ Method 1 Parcel being investigated: $L = 2W, W = 3T$ $6T + 6T + 2T \le 210$ $\qquad 14T \le 210$ $\qquad\quad T \le 15$ One correct dimension Method 2 Parcel being investigated: $L = 2W, T = \left(\dfrac{W}{3}\right)$ $2W + 2W + 2\left(\dfrac{W}{3}\right) \le 210$ $\qquad 14\left(\dfrac{W}{3}\right) \le 210$ $\qquad\qquad W \le 45$ One correct dimension Therefore the maximum dimensions are: Thickness = 15 Width = 45 Length = 90	 **A1 Setting up equation** **A2 Solving equation** ✓c **M** **OR** **A1 Setting up equation** **A2 Solving equation** ✓c **M** **E**	Variables do not need to be defined. Candidate must form and solve their own equation or inequation for the given situation. Candidates are expected to set their work out in a logical order and use correct mathematical statements. One incorrect mathematical statement can be ignored. Solutions must be interpreted in context. All three maximum dimensions must be stated.	**Achievement with Excellence** Merit **plus** Code **E**