NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 1, 2003

Mathematics: Calculate relative frequencies and theoretical probabilities (90194)

National Statistics

Assessment Report

Assessment Schedule

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Mathematics: Calculate relative frequencies and theoretical probabilities (90194)

National Statistics

Number of Results	Percentage achieved			
	Not Achieved	Achieved	Merit	Excellence
38,653	39.0%	32.9%	25.6%	2.6%

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

There was a marked improvement in the achievement level, especially at the merit level, by candidates. Candidates with a sound knowledge of how to find the number of outcomes in the sample space were able to present valid evidence that they could determine probabilities.

An improvement in the achievement level for many candidates would occur if the following aspects were addressed.

1. Candidates minimising the following:
   (i) giving answers that are greater than 1 for probabilities
   (ii) writing answers as incorrect ratios; this often cost candidates achievement. Probabilities correctly expressed as ratios were rare
   (iii) incorrectly converting between fractions, percentages, and decimals. Candidates should be encouraged to leave their answers as fractions
   (iv) writing decimals within fractions.

2. The evidence shown by candidates of having completed probability experiments through examples such as calculating the probability of throwing two sixes, a double, or writing up a probability experiment was poor. Candidates should be familiar with outcomes based on common items such as dice, coins, and playing cards, and have a range of techniques for listing the sample space.

3. Candidates should be encouraged to answer all questions as it is common to use evidence from higher level questions in awarding achievement.

4. Candidates should be encouraged to show all working as evidence can be gained from this, although credit will not be withheld for not providing evidence.

5. Candidates must read questions carefully and ensure they are answering what is asked. This will include linking questions to headings in tables. Candidates need a clear understanding of the meaning of ‘and’, ‘or’, ‘given’, and ‘if’ as they relate to probability.

   There is a need to emphasise the use of language in probability and the implications of this on the question. For example, ‘given’, ‘or’, and ‘probable’.

Assessment Schedule

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	Criteria	No.	Code	Evidence	Judgement	Sufficiency
Achievement	Determine probabilities.	One (a)	A	$\frac{3}{14} = 0.2142857$	Or equivalents with any rounding.	**Achievement:** 3 A.
		(b)	A	$\frac{4}{9} = 0.4444444$	Accept %.	
		Two (a)	A	$\frac{1}{36} = 0.027777$	Accept ratio if correct 3:11, 4:5, 1:35, 1:5 or equivalent	
		(b)	A	$\frac{1}{6} = 0.16666$	6/36	
Achievement with Merit	Solve theoretical probability problems.	Three (a)(i)	M or A	$0.6 \times 0.55 = 0.33$	Or equivalents.	**Merit:** Achievement PLUS 2 M all or 3M.
		(a)(ii)	M or A	$0.4 \times 0.2 + 0.6 \times 0.45 = 0.35$		
		(b)	M or A	$0.45 \times 0.7 = 0.315$		
Achievement with Excellence	Devise strategies to explore probability situations.	Four (a)	E	An example: use the first digit of a 3-digit random number; for the first digit: 0 or 1 represents 'has not done homework', 2 to 9 represents 'has done homework'. Digits 2 and 3: 00 to 24 represents 'teacher checks homework'. 25 – 99 represents 'teacher doesn't check homework'. Record results: – homework not done and teacher checked – number of trials conducted. Repeat the experiment 20 or more times. Calculate the probability = no. of times homework is not done and it is checked ÷ number of trials. $\frac{1}{4} \times \frac{x}{40} = 0.175$	Tool defined. Could be random number generator, cards, spinner, dice. Definition of trial stated. Completion of homework must be linked to homework being checked. A straightforward interpretation of the situation is acceptable, ie checked $\frac{1}{4}$ not necessary to exactly model teacher checking only once in 4 lessons. Definition of results recorded. Definition of calculation of probability. Accept with 1 minor error in 4(a).	**Excellence:** Merit PLUS 2 E.
	Solve theoretical probability problems.	(b)	E	28 nights.	Correct solution. Units not needed. Reaching 0.7 by division gives replacement for merit.	

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
Determine probabilities ***(A)***	*Solve theoretical probability problems* **(M)**	*Devise strategies to explore probability situations* **(E)** *Solve theoretical probability problems* **(E)**
3 × **A**	Achievement ***plus*** 2 × **M** ***or*** 3 × **M**	Merit ***plus*** 2 × **E**

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