NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 1, 2003

Mathematics: Solve right-angled triangle problems (90152)

National Statistics

Assessment Report

Assessment Schedule

Mathematics: Solve right-angled triangle problems (90152)

National Statistics

Number of Results	Percentage achieved			
	Not Achieved	Achieved	Merit	Excellence
40,447	35.8%	30.7%	33.3%	0.2%

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 states that '*evidence of method*' is required. The assessment specifications further state that 'candidates are required to provide at least one correct mathematical statement to support their answers'. Some working should be shown for every question.

The standard requires candidates to '*find unknowns*' in right-angled triangles. Candidates who drew simple right-angled triangles were much more successful than those who did not, particularly in Questions Two, Three and Four.

To improve their level of achievement candidates are advised to:
- (i) avoid the use of premature rounding, as it affects the accuracy of their answers
- (ii) ensure that their calculators are set in DEG mode rather than RAD or GRA
- (iii) think about whether their answers make sense in the context of the question. If not, then they should check their working and their methods
- (iv) correctly use their calculator,
  eg Question One (b) $\tan^{-1} 2.4 \div 6.4 = 10.5$ was quite common.

Candidates often gained Achievement by the evidence they provided in answering the Merit questions.

Specific Comments by Level of Achievement (optional)

Achievement with Merit may require students to use '*interpretation of bearings*' to solve problems. Knowledge of bearings was considerably improved over 2002, but many candidates merely put 303° in a right-angled triangle.

Achievement with Excellence requires candidates to use appropriate rounding, correct units and correct mathematical statements.

Assessment Schedule – 2003

Mathematics: Solve right-angled triangle problems (90152)

<table>
<tr><th></th><th>Criteria</th><th>No.</th><th>Code</th><th>Evidence</th><th>Judgement</th><th>Sufficiency</th></tr>
<tr>
<td rowspan="3">Achievement</td>
<td rowspan="3">Find unknowns in right-angled triangles.</td>
<td>One
(a)</td>
<td>A1</td>
<td>$AC = \sqrt{(6.4)^2 + (2.4)^2}$
$= 6.8$ m (6.835 m)</td>
<td>Or equivalent.</td>
<td rowspan="3">Achievement:

two A
including at least one A2.</td>
</tr>
<tr>
<td>(b)</td>
<td>A2</td>
<td>$\tan A = \frac{2.4}{6.4}$
$A = 20.6°$</td>
<td>Accept any rounding.</td>
</tr>
<tr>
<td>(c)</td>
<td>A2</td>
<td>$LN = 3 \sin 63°$
$= 2.67$ m</td>
<td>Units not required.</td>
</tr>
<tr>
<td rowspan="5">Achievement with Merit</td>
<td rowspan="5">Find unknowns in practical situations involving right-angled triangles.</td>
<td>Two
(a)</td>
<td>A2</td>
<td>$\sin A = \frac{17}{168}$
$A = 5.48°$</td>
<td>Correct solutions for Merit and decision statements when required.</td>
<td rowspan="5">Merit:
Achievement plus **two** M

OR

three M</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>No, the angle is too large.</td>
<td>Accept any rounding.</td>
</tr>
<tr>
<td>(b)</td>
<td>A1
or
A2
M</td>
<td>$EF = \sqrt{(178)^2 - (17)^2}$
[or use of trig. from Q Two (a)]
$= 177$ cm</td>
<td>Units not required.</td>
</tr>
<tr>
<td>Three</td>
<td>A2</td>
<td>$\tan 33° = \frac{x}{4}$
$x = 2.6$ m</td>
<td></td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>Yes</td>
<td></td>
</tr>
</table>

	Criteria	No.	Code	Evidence	Judgement	Sufficiency
Achievement with Excellence	Find unknowns in word or 3D problems.	Four		$AD^2 = (0.6)^2 + (0.6)^2$ $AD = 0.8485$ m	Solution found. The solution needs to: • be logically presented • communicate the answer clearly • be appropriately rounded • give units. Accept answers with one minor error or omission.	**Merit plus E.**
			A 1 or **M**			
			A 2 or **M**	$\angle ABD = 20°$ $\angle CBD = 144°$ $\angle CBE = 54°$ $BD = 0.8485 \times \tan 70°$ $BD = 2.331$ m $CE = 0.84855 \times \tan 54°$ $\quad = 1.168$ m		
			E	Total height = 1.168 + 2.331 = 3.5 m		

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
Find unknowns in right-angled triangles (A)	*Find unknowns in practical situations involving right-angled triangles* **(M)**	*Find unknowns in word or 3D problems* **(E)**
2 × **A** (including at least 1 × A2 – trigonometry)	Achievement **plus** 2 × **M** *or* 3 × **M**	Merit **plus** E

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