NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Level 1, 2002

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
39,985	29%	39%	19%	13%

Assessment Report

General Comments

Candidates should be aware that 'evidence of method' is required for this achievement standard, ie some working is essential for all questions.

All candidates should be aware of the different settings on their calculator when using trigonometry (DEG, RAD and GRAD). Several did not use the correct setting and were penalised as they could not achieve the correct answer, or even a sensible answer.

Attempting the first three questions only was a relatively common, but sometimes risky, strategy as silly errors were made. In these cases, assessors did not have enough evidence to make a judgement that the candidate had achieved the standard.

Candidates should be encouraged to set out work logically and put this working down the page in a series of logical clear steps. For instance, in Question Three, this type of answer was unfortunately quite common.

$$\sin^{-1} = \frac{1.85}{6.65} = 16.2$$

In a mathematics assessment, the word 'justify' can mean a mathematical justification. It does not necessarily mean 'write a paragraph'. Candidates need to clearly understand this.

Candidates are asked in this assessment to choose from Pythagoras's theorem or trigonometry. A scaled diagram uses neither and is not appropriate.

Candidates should know that premature rounding of their answers is undesirable and may lead to great variations in the accuracy of their answer.

Most candidates were not aware of what a bearing was, although this is clearly mentioned in the achievement standard.

Candidates should be reminded to read the question carefully. It is a good examination technique to reread the question after attempting the question to check that the question has in fact been answered.

Candidates should be using pen for their answers. If they use pencil, they should be reminded of the consequences of asking for a reconsideration.

Excellence requires candidates to use 'appropriate rounding, units and mathematical statements' in their answers, and class work for these students should reflect this.

Candidates should be encouraged to draw simple, clear right-angled triangles to help them solve problems. Those who did this for Questions Four to Six were much more successful than those who did not.

Neither the sine rule nor the cosine rule are required for this achievement standard. It is fine to use them, but of those candidates who did use either, a number had no idea of how or when to apply it.

Candidates need to learn how to manage their time in an examination. It appeared that several left answering this standard until the last few minutes.

Candidates in this achievement standard have to show that they can find unknowns before they can achieve the standard. Changing the problem, making transfer errors, or only putting down the correct process, does not enable them to find the unknowns.

A calculator is required for this achievement standard. A surprising number of candidates did not have one.

Comments on Specific Questions

Question One

Well done. The most common error was *addition* of terms rather than *subtraction* as required. Incorrect statements such as $\text{HI} = 5.65^2 - 2.15^2 = 27.3 = 5.22$ were unfortunately very common, but not penalised.

Question Two

Well done. The most common error was using the incorrect trig ratio.

Question Three

Usually quite well done. However several candidates got to $\sin A = \frac{1.85}{6.65}$ or even $\sin^{-1}\frac{1.85}{6.65}$ in their working and seemed unsure how to complete the question.

Question Four

(a) Many candidates found this question difficult. They commonly used cos 65° with 2.2 to find the length of the slide without making an attempt to draw a picture of what actually was required to be found. Many candidates were unsure of what to do with the length 0.5 and subtracted it from the above result or ignored it completely. Several good candidates correctly solved the problem by the longer method of finding the projection of the slide on the ground using tan ratio and then used Pythagoras' theorem to find the correct answer. In this context, 'justify' means to use mathematics to justify the answer – not necessarily by writing a paragraph.

(b) Generally well attempted by using two separate Pythagoras statements. Few of these candidates realised that they did not have to take the square root of their first answer, as it was immediately squared. Some found the length BD but then failed to answer the question. Logical mathematical solutions were often not presented. Weaker candidates commonly changed and simplified the problem by incorrectly assuming that BC was also 5.1 m.

Question Five

Most candidates did not seem to know what a bearing was, although it is clearly stated in the explanatory notes to the achievement standard as one of the possible applications. Candidates who did attempt this question often used Pythagoras to find the length of the third side of the triangle and then stopped. Those who drew the correct diagram usually correctly found one of the angles in the triangle, although they were often unsure how to proceed. Several candidates had 180° or 270° as one of the internal angles of the triangle. A scale diagram was not accepted as a solution method.

Question Six

A satisfactory standard was reached by many of the candidates who attempted this question seriously, with many excellent, logical and clearly presented answers. Some candidates correctly solved the problem by finding the hypotenuse of a triangle and drawing in extra triangles (or using the sin rule). Weaker candidates had trouble drawing a correct diagram with the angles in the correct position or proceeding very far with correct mathematical statements.

The equals sign was commonly misused as in ‘length to the post $= \tan 69^\circ = \dfrac{60}{x}$

More able candidates understood the correct use of variables in a problem and made clear, logical statements.

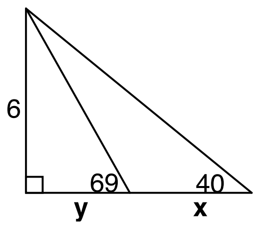
Prior rounding caused some problems and too many candidates did not answer to 1 DP as required.

Several candidates wrote down the correct equation $\tan 69^\circ = \dfrac{60}{x}$ which then became $x = 60 \square \tan 69^\circ$.

Assessment Schedule

Mathematics: Mathematics: Solve right-angled triangle problems (90152)

	Achievement Criteria	No.	Evidence	Code	Judgement	Sufficiency
Evidence contributing to Achievement	Find unknowns in right-angled triangles.	One Two Three	$HI^2 + 2.15^2 = 5.65^2$ HI = 5.22 m $\cos 38° = \frac{FG}{110}$ FG = 86.7 m $\sin \angle KLM = \frac{1.85}{6.65}$ $\angle KLM = 16.2°$	A A A	Units are not required. Some evidence of method is required, but incorrect mathematical statements will not be penalised. Answers for Achievement must be given to at least two significant figures accuracy. Do not penalise inappropriate rounding.	**Achievement** Two of Code **A**
Evidence contributing to Achievement with Merit	Find unknowns in practical situations involving right-angled triangles	Four (a) Four (b) Five	$\cos 65° = \frac{1.7}{L}$ $L = 4.02254$ Length = 4.02 m to ensure that the angle is bigger than 65° BD^2 $= 2.8^2 + 5.1^2 + 2.2^2$ = 38.69 BD = 6.22 m No, steel not long enough. $\tan \angle SWM = \frac{8}{12}$ $\angle SWM = 33.7°$ Bearing = 360° – 34° = 326°	M/A A M A M	Units are not required for Merit. Answers in Four (a) and (b) and Five must be supported by working. Accept 4.0, 4.02, 4.03 or 4.022 (rounded up). Answers for Merit must be given to at least 2 significant figures accuracy. Accept 326.3°	**Achievement with Merit** Achievement **plus** Two of Code **M** **OR** Three of Code **M** **Note:** Only one Code **M** can come from Question Six.

Evidence contributing to Achievement with Excellence	Find unknowns in word or 3D problems.	Six	 $\tan 69° = \frac{60}{y}$ $y = 23.03$ m $\tan 40° = \frac{60}{z}$ $z = 71.51$ m $x = z - y$ $= 48.5$ m She walked a further 48.5 m from the post.	**M** **M** **E**	The candidate's strategy must include at least two relevant trig calculations. The solution to Six needs to: • be logically presented • be correctly rounded • use correct mathematical statements • have correct units. Allow one use of an incorrect mathematical statement. Accept 48.47, 48.48 as a minor error.	**Achievement with Excellence** Merit **plus** Code **E**