

# 2015 NCEA Assessment Report

Mathematics and Statistics L1 91028, 91031, 91037

## Part A: Commentary

Comment on the overall response of candidates to 2015 examinations for all achievement standards covered by this report.

Knowledge of the requirements of assessment specifications would have enhanced many candidates' performance.

Candidates with graphics calculators were advantaged and those without were disadvantaged.

Candidates with sound ability in relation to the following aspects tended to reach a higher level of performance across the papers:

- good algebraic skills
- accurately reading questions
- relating their answers to the context appropriately
- selecting and using methods in solving a problem involving bearings and distances
- connecting different concepts when solving problems
- developing a chain of clear logical reasoning
- formulating a proof
- investigating relationships
- forming generalisations with correct reasoning
- understanding and using mathematical terms correctly
- defining variables that they used.

## Part B: Report on standards

### 1. Assessment Report for 91028: Investigate relationships between tables, equations and graphs

<b>Achieved</b>	<p>Candidates who were assessed as Achieved commonly:</p> <ul style="list-style-type: none"> <li>• were able to plot a graph from a table of values</li> <li>• were able to follow a pattern from a table of values to give values outside the given range</li> <li>• were able to determine a gradient on a graph and apply to the context</li> <li>• were able to write a linear equation from a word problem.</li> </ul>
<b>Not Achieved</b>	<p>Candidates who were assessed as Not Achieved commonly:</p> <ul style="list-style-type: none"> <li>• could not connect information in a table to a graph or equation</li> <li>• could not write an equation from a word problem</li> <li>• could not relate the context of the question to the algebraic processes required by the standard.</li> </ul>
<b>Achieved with Merit</b>	<p>Candidates who were assessed as Achieved with Merit commonly:</p> <ul style="list-style-type: none"> <li>• were able to explain how they arrived at their answer either in words or algebraically</li> <li>• were able to write equations for graphs</li> <li>• were able to determine from the context whether a graph should be continuous or discrete.</li> </ul>
<b>Achieved with Excellence</b>	<p>Candidates who were assessed as Achieved with Excellence commonly:</p> <ul style="list-style-type: none"> <li>• were able to use a graphics calculator effectively</li> <li>• were able find the scale factor of a parabola</li> <li>• were able to write the equation of an exponential curve</li> <li>• were able to relate a graphical representation to the context, explaining mathematical concepts and not getting lost in the context</li> <li>• were able to solve simultaneous equations.</li> </ul>

<b>Standard specific comments</b>	<p>The drawing of graphs from a presented table of values did not really meet the requirements of the standard other than to determine between discrete and continuous data.</p> <p>Being able to get an equation from a graphics calculator is not really extended abstract thinking.</p>
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## 2. Assessment Report for 91031: Apply geometric reasoning in solving problems

<b>Achieved</b>	<p>Candidates who were assessed as Achieved commonly:</p> <ul style="list-style-type: none"> <li>• did trigonometry very well</li> <li>• could find angles</li> <li>• could work with properties of symmetry or circles in one step questions</li> <li>• could work with isosceles triangles and use their properties to find angles</li> <li>• could use properties to find angles with reasons in one step questions.</li> </ul>
<b>Not Achieved</b>	<p>Candidates who were assessed as Not Achieved commonly:</p> <ul style="list-style-type: none"> <li>• did not know geometric reasons, or incorrectly stated them</li> <li>• did not write full reasons, or omitted parts of the reason which were crucial to the understanding of the problem</li> <li>• incorrectly used trigonometric ratios.</li> </ul>
<b>Achieved with Merit</b>	<p>Candidates who were assessed as Achieved with Merit commonly:</p> <ul style="list-style-type: none"> <li>• selected and used geometrical reasons to solve problems involving two or more steps</li> <li>• could select and use correct properties of trigonometry, circle geometry and symmetry in answering questions consistently, with accuracy</li> <li>• attempted proofs or generalisations but omitted key steps or reasons.</li> </ul>
<b>Achieved with Excellence</b>	<p>Candidates who were assessed as Achieved with Excellence commonly:</p> <ul style="list-style-type: none"> <li>• connected different concepts to solve problems</li> <li>• developed a chain of clear logical geometric reasoning to solve problems with more than one or two steps</li> <li>• formulated a proof and clearly defined letters with correct reasoning</li> <li>• investigated the properties of a trapezium that is also a cyclic quadrilateral</li> <li>• formed a generalisation with correct reasoning that all trapeziums in circles are isosceles trapeziums</li> <li>• selected and used methods in solving a problem involving bearings and distances.</li> </ul>

## 3. Assessment Report for 91037: Demonstrate understanding of chance and data

<b>Achieved</b>	<p>Candidates who were assessed as Achieved commonly:</p> <ul style="list-style-type: none"> <li>• attempted almost all parts of all questions</li> <li>• scored quite evenly across the three questions, showing at least a basic understanding of most of the intended “achieved” aspects.</li> </ul>
<b>Not Achieved</b>	<p>Candidates who were assessed as Not Achieved commonly:</p> <ul style="list-style-type: none"> <li>• only demonstrated a basic understanding of time series (Question One) and basic probability and summary statistics (Question Three)</li> <li>• misunderstood the context and/or did not read the labels on the axes of the graphs (Question Two). They interpreted the score groups as age groups and the frequency as a (percentage) score.</li> </ul>
<b>Achieved with Merit</b>	<p>Candidates who were assessed as Achieved with Merit commonly:</p> <ul style="list-style-type: none"> <li>• scored at least “achieve” in all three questions, showing a basic understanding of most aspects of Chance and Data plus they demonstrated the ability to make deeper statistical links/justifications in context in at least one of the questions</li> <li>• showed relational thinking by understanding the significance of statistical words in question instructions (statistical literacy) and were able to comment upon the</li> </ul>

	<p>information shown in the graph/results in a statistically literate way</p> <ul style="list-style-type: none"> <li>• analysed time series graphs in context and made valid comparisons of at least two features they had identified, as asked for in the question</li> <li>• used the information from a table of summary statistics to calculate probabilities and draw conclusions about a population.</li> </ul>
<p><b>Achieved with Excellence</b></p>	<p>Candidates who were assessed as Achieved with Excellence commonly:</p> <ul style="list-style-type: none"> <li>• showed depth of understanding of the relevance of each type of calculation/graph and relevant properties in almost all question contexts</li> <li>• understood the theory and limitations behind the ideas/calculations</li> <li>• demonstrated statistical literacy by using key words appropriately and efficiently. Hence their answers were typically short and succinct - rarely requiring all the answer space provided.</li> </ul>
<p><b>Standard specific comments</b></p>	<ol style="list-style-type: none"> <li>1. There were several opportunities to make comment on different sample sizes in this paper. That allowed for some statistical misconceptions to be revealed that subsequently proved costly for some candidates.</li> <li>2. Some knowledge of multivariate data analysis and informal inference (as done in AS91035) is needed for success in comparing subgroups from a population using graphs. Incompletely/incorrectly recalled “inference rules” highlighted attempts by some candidates to rote learn phrases without understanding in a statistical context.</li> <li>3. Some knowledge of bivariate data analysis (as done in AS91036) is needed for success in commenting on the relationship (if any) between the variables in graphs.</li> <li>4. A working knowledge of how summary statistics are obtained is needed to appreciate how and when they are affected (by additional data values, different sample sizes, extreme data values).</li> </ol>