Assessment Report

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Level 2 Mathematics and Statistics 2019

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Part A: Commentary

Candidates who were well prepared over the breadth of the curriculum were rewarded for their efforts and diligence. On the other hand, candidates whose curriculum knowledge was limited to certain domains, or who gave only minimalistic answers, found it difficult to achieve all standards.

Markers also noted that:

- some candidates had learned how to answer particular question types but lacked the overall understanding of the standard's coverage necessary to succeed

- candidates who had a graphics calculator generally used it effectively – those without one are at a disadvantage.

Part B: Report on standards

91261: Apply algebraic methods in solving problems

Candidates who were awarded **Achievement** commonly:

- rearranged a quadratic equation, set it to 0, and then solved it correctly, giving both answers

- simplified a rational expression involving roots and powers

- manipulated expressions involving logs correctly

- could add and subtract fractions.

Candidates whose work was assessed as **Not Achieved** commonly:

- could not manipulate logarithms

- could not rearrange expressions without errors

- could not simplify expressions with fractional and negative powers

- could not add or subtract algebraic fractions

- could not solve a quadratic equation.

Candidates who were awarded **Achievement with Merit** commonly:

- factorised an expression with multiple unknowns

- set up and solved exponential equations

- used the properties of the discriminant to form a quadratic equation

- could add or subtract algebraic fractions and simplify the final answer

- applied context to a question

- factorised and expanded effectively, especially when negatives were involved.

Candidates who were awarded **Achievement with Excellence** commonly:

- understood the properties of the discriminant, created an appropriate equation and then solved it correctly

- found the stretch factor for a parabola and used the resultant equation to find a horizontal distance

- communicated a series of statements in a logical manner

- formed, rearranged and solved equations with surds

- formed and solved exponential equations.

Standard-specific comments

It is apparent that many candidates continue to tackle this standard without a graphic calculator. Educational institutions who insist on candidates learning algebra without this tool must understand that their students will be disadvantaged.

The manipulation of logarithms was clarified in the latest version of the Teaching and Learning Guide. Many candidates showed weakness in this area and were not able to successfully apply the basic laws of logarithms.

Where questions were 'different' from past papers (e.g. Q3(c)), candidates generally struggled to apply appropriate algebraic techniques. Candidates would be better prepared if they were exposed to a wider range of questions than just those commonly found in past papers. In this way students can develop the ability to apply algebraic skills in a wide variety of contexts.

91262: Apply calculus methods in solving problems

Candidates who were awarded **Achievement** commonly:

- differentiated correctly and substituted correct values into the new function

- integrated a given function and substituted in given values

- formed appropriate equations for a contextual situation and took the derivative

- differentiated a polynomial to form a derived equation with an inequality to represent when a function is increasing

- sketched the gradient function of a cubic graph, accurately showing some key features

- sketched the function from a gradient function showing key features

- found the rate of change for a given equation

- differentiated and anti-differentiated kinematics equations.

Candidates whose work was assessed as **Not Achieved** commonly:

- did not attempt sufficient questions

- did not differentiate or integrate correctly, particularly when dealing with polynomials which included non-numeric coefficients

- were unable to form a suitable equation to model the contextual situation from which calculus was then to be applied

- forgot to include the constant of integration

- did not know the differences between the graph of a function and the graph of a gradient function or did not precisely show all the relevant features when drawing graphs

- did not use calculus to solve the kinematics questions.

Candidates who were awarded **Achievement with Merit** commonly:

- showed relational thinking in order to correctly solve a problem using calculus techniques by interpreting the given information and used multiple steps

- clearly communicated their answers in context

- differentiated to determine the rate of change for a situation presented and solved the problem

- were able to use anti-differentiation to solve kinematic problems

- drew accurate graphs for a given function accurately showing all the key features.

Candidates who were awarded **Achievement with Excellence** commonly:

- showed clear and concise working with sound justification when applying calculus methods to answer a question

- applied coordinate geometry and algebra skills together with calculus knowledge and skills to solve a complex problem

- formed a model for a given situation and methodically applied calculus techniques to solve the problem with justification

- clearly communicated the answer in context.

Standard-specific comments

Many candidates demonstrated a high level of competence in calculus and communicated their answers clearly, with well set-out working.

Candidates who had a graphics calculator used it effectively – those without one are at a disadvantage.

Many students tried to do questions using co-ordinate geometry or physics skills ONLY and did not employ calculus techniques – candidates must apply calculus in solving problems for this standard.

Sufficient working needs to be shown if candidates wish to obtain more than an achieved grade.

Some careless numerical errors were ignored if this resulted in a minor error that did not affect the level of difficulty of the problem, but this often limited further progress towards an answer.

Candidates need to use correct notation and/or mathematical conventions to ensure their knowledge and understanding can be clearly identified and rewarded. They must also be prepared to justify their answers using calculus techniques.

91267: Apply probability methods in solving problems

Candidates who were awarded **Achievement** commonly:

- evaluated simple probabilities from a table of data

- evaluated simple probabilities using the normal distribution

- evaluated simple probabilities of combined events, having set up an appropriate tree diagram.

Candidates whose work was assessed as **Not Achieved** commonly:

- were not able to collate appropriate figures for probabilities from the table provided.

- were not able to interpret the correct values, from normal distribution tables, to calculate probabilities.

- were not able to set up and use a probability tree to provide simple probabilities of combined events

- were unable to calculate simple probabilities

- were able to use neither a graphics calculator nor tables to find probabilities for the normal distribution.

- did not understand that probability must be less than or equal to 1

- were unable to answer the achieved questions in all three areas of the standard, answering questions from two out of three areas only.

Candidates who were awarded **Achievement with Merit** commonly:

- were able to calculate appropriate relative risk probabilities

- were able to describe the shape of a distribution and compare it with a normal distribution

- were able to calculate and interpret the standard deviation for a normal distribution

- could relate the key ideas of normal distributions, e.g. shape and standard deviation, to the context

- could correctly calculate relative risk in context

- could use probabilities to critically analyse a claim.

Candidates who were awarded **Achievement with Excellence** commonly:

- used the standard normal distribution to solve problems

- drew more complex probability trees and used them successfully to find a probability

- were able to link key descriptors of a normal distribution to a context with consideration of the subtle features of that context

- generalised probabilities in a given context

- correctly calculated and interpreted relative risk and evaluated a claim, showing insight and perception and considering wider issues connected with the data.

Standard-specific comments

There are many candidates who are still using normal distribution probability tables. This makes many aspects of this examination more challenging. On the other hand, written responses to questions were often completed well, with clear expression of the ideas that the candidate wanted to convey.

Mathematics and Statistics subject page

Previous years' reports