Assessment Report

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Level 2 Mathematics and Statistics 2020

Standards 91261 91262 91267

Part A: Commentary

In general terms, students who were well prepared over the breadth of the examinable curriculum gained reward for their efforts and diligence. On the other hand, students who had gaps in their curriculum knowledge, or who gave only minimalistic answers, found it difficult to achieve each standard.

Part B: Report on standards

91261: Apply algebraic methods in solving problems

Candidates who were awarded **Achievement** commonly:

- could interpret the required information from a graph
- applied basic log and index rules

- made a connection between the context of a question and an algebraic expression
- factorised quadratics with a coefficient > 1
- put an expression into completed square form
- substituted values into an equation
- solved simple exponential equations
- solved a power equation involving fractional indices.

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

- did not know how to use log properties
- showed very little working
- could not substitute into an algebraic expression
- could not factorise a quadratic
- were unable write a simple quadratic in completed square form
- used logarithm relationships incorrectly
- were unable to manipulate two fractions with different denominators

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

- were able to give an answer with multiple lines of correct working
- used the quadratic formula with variables
- understood the nature of whole number/integer solutions
- communicated working effectively
- could solve exponential and log equations
- rearranged an algebraic expression to make one variable the subject
- solved equations with decimal or fractional indices
- manipulated and solved logarithmic equations
- solved exponential equations using logarithms
- could manipulate algebraic fractions
- formed and solved a quadratic equation given in context.

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

- interpreted an extended abstract problem involving a less familiar situation
- used their mathematical knowledge to solve unfamiliar problems
- demonstrated knowledge of features of logarithms i.e. base and argument are both positive
- solved simultaneous equations involving quadratics with unknown constants and determined the restrictions placed on the constants
- formed and solved quadratic equations, used the discriminant and justified their solution within the given context
- understood the implication of particular solutions – for example, where on a graph they might be, which values could not be determined, the importance of inequalities
- understood the nature, and number, of solutions – particularly in working with integer and whole number solutions
- communicated their working clearly.

Standard-specific comments

Candidates who had a good understanding of the concepts fared better than those who just knew the methods. This highlights the need for students to be exposed to a wide range of problems that extend their mathematical thinking.

The use of unknown constants, and consideration of conditions placed on them, was important at the higher level in this examination. Candidates who could use knowledge from other level 2 standards, such as Graphical Models and Systems of Equations, were at an advantage, as were those with a graphics calculator.

91262: Apply calculus methods in solving problems

Candidates who were awarded **Achievement** commonly:

- found the gradient of a function at a given point
- could find the x co-ordinate of a function that gives a specified gradient
- understood the link between the derivative and the gradient function

- remembered to find the “constant” value when integrating an expression
- correctly drew the derivative function
- understood that turning points of a function occurred when f’(x) = 0
- understood the basic links in kinematics between distance, velocity and acceleration
- understood basic rates of change
- could find the equation of a tangent or turning points.

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

- simply substituted into the given function incorrectly or simplified the problem
- had limited knowledge of calculus and could not determine when to differentiate or when to integrate
- attempted to use non-calculus methods to solve problems
- did not recognise the graphical representations of the derivative and its function and vice-versa.

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

- accurately performed multiple steps towards the solution of a problem
- found a correct expression for distance given acceleration
- justified the nature of turning points
- understood the link between the graph of a gradient function and the graph of a function
- could identify the gradient from a linear equation and use this to solve a problem related to the tangent of a curve.

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

- accessed complex situations and accurately applied the multiple steps required, with very few errors, to find a solution to a problem
- applied calculus to form and solve quadratic equations and simultaneous equations involving non-numerical constants
- devised a strategy to investigate an optimisation situation

- could apply calculus methods appropriately to kinematic problems.

Standard-specific comments

Candidates must apply calculus in solving problems for this standard.

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

Candidates need to use correct notation and / or mathematical conventions to ensure their knowledge and understanding can be clearly identified and rewarded.

A common area of weakness appears to be interpreting rate of change questions and an inability to provide an answer to the actual question.

Candidates who did not use a graphics calculator were disadvantaged. When graphics calculators are used to solve equations, care should be taken to ensure the answer to the question is explicit, with all detail given. Decisions around the candidate's chosen solution need to be clearly stated. Some candidates failed to recognise that when a solution to a quadratic equation gives complex roots, a mistake or misinterpretation has occurred.

Some careless errors when calculating may be ignored (MEI) if this results in a minor error that does not affect the level of difficulty of the problem, however this often limits further progress in the answer. When an impossible or unlikely solution is obtained, this should be seen as a message to recheck prior working and attempt to ascertain where this careless mistake may have occurred.

91267: Apply probability methods in solving problems

Candidates who were awarded **Achievement** commonly:

- were able to use and manipulate probability trees and proportions to solve a problem
- were able to use a graphical calculator, diagrams and / or tables to solve simple problems involving the normal distribution
- had a basic knowledge of the characteristics of a normal distribution
- were able to read correctly from a two-way table
- could use basic numerical skills such as converting fractions to decimals

- could make comments on basic features of a graph
- were confident in interpreting answers in standard form.

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

- did not have sufficient understanding of all three major concepts examined in this standard
- were confused by which total to use for their probability calculations
- could not interpret probability information to form or use a probability tree or two-way table
- were unable to calculate probabilities from a normal distribution
- appeared to think that a probability could be more than 1.

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

- could solve problems involving inverse normal distributions and give working or a diagram
- combined probability outcomes correctly
- could calculate and interpret relative risk
- understood the concept of expected value and could interpret the answer statistically in context
- used a graphical calculator effectively
- avoided merely commenting that a sample size could have been made bigger to improve accuracy (this is always true so not worthy of comment)
- were able to clearly pick out key points in comparing data with a normal distribution, for example referring to "mean" or "median" rather than just "centre"..

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

- had an in-depth knowledge of the characteristics of a normal distribution and could relate them to the context of the question
- could use the standard normal distribution to solve problems
- were able to find relative risks and write correct conclusions based on them

- could evaluate the quality of evidence given or the validity of conclusions drawn
- were careful to answer the question completely and look “behind” the data to consider the relevance of any conclusion made
- could accurately compare elements of a given distribution to those of a normal distribution and used their comments to evaluate a claim
- understood what a relative risk of 1.33 means
- justified their claims showing a detailed understanding of probability concepts
- were able to interpret more complicated probability problems that involved using some algebraic skills.

Standard-specific comments

Combined probabilities and probability comparisons were understood much better than normal distributions.

Candidates are expected to have access to a graphical calculator at this level but need to be reminded that a correct answer only, with neither working nor diagram, will generally be rewarded with only a ‘U grade’ on that question part.

Candidates need to understand that converting the form of a probability (fraction, decimal, percentage) helps to compare two or more probabilities with each other. Being able to round appropriately is also essential. For example, rounding to 1dp is not appropriate when you are dealing with very small probabilities..

Mathematics and Statistics subject page

Previous years' reports

2019 (PDF, 259KB)

2018 (PDF, 135KB)

2017 (PDF, 50KB)

2016 (PDF, 240KB)