

# Assessment Report

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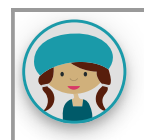
## Level 2 Mathematics and Statistics 2021

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Standards [91261](#) [91262](#) [91267](#)

### Part A: Commentary

Candidates need to be conscious of the fact that each paper is giving them an opportunity to demonstrate how well they think within the content area of the standard being assessed. Therefore, using skills relevant to that standard in solving problems is a vital part of being successful – for example, in the Calculus standard, use calculus, not physics, to answer questions. Candidates need to be aware that a given question will not necessarily have parts that get progressively more difficult. Sometimes later parts are in fact at a lower level of achievement. In addition, some questions may have only one opportunity to gain excellence, but more credit is given for a higher quality answer, so answer as completely, as elegantly and as thoughtfully as you can. The papers are designed to test a student's understanding of concepts. The questions are designed to put the candidate into an unfamiliar situation where they need to creatively use skills and concepts they have learned to solve a problem. Candidates will do better if they focus more on what they have learned rather on methods to solve standard problems.



# Part B: Report on standards

## 91261: Apply algebraic methods in solving problems

### Examinations

The questions assessed a student's understanding of Algebra and their ability to apply skills and concepts to unfamiliar and familiar situations. There were some parts that required a straightforward application of a basic skill and accurate computation. As the specifications detail, answers should be given in their simplest form and algebraic techniques must be shown (not just a correct answer given). Other parts asked candidates to prove an algebraic relationship using variables and, in this case, thorough and complete working was required. When a mathematical model is used to describe a context and solve a problem, it is important to check that any mathematical solutions obtained do actually fit with the context.

### Observations

Confidence in applying skills in a context is an absolute necessity – for example, if something is the same as something else, use an equals sign to express this idea. Wider knowledge is also required from earlier years of Mathematics – examples in this paper are area/volume, growth rate, whole numbers. The use of quadratic expressions is very important in this standard - how the properties of the quadratic formula relate to roots, the graph and limitations on a contextual problem. Aiming beyond mastering mechanical processes and connecting algebra with mathematical thinking will help candidates to perform at higher levels.

### Grade awarding

Candidates who were awarded **Achievement** commonly:

- demonstrated a sound grasp of a range of the skills assessed by this standard, including indices, log rules, algebraic substitution, quadratic expansion, algebraic fractions
- candidates attempted merit and excellence questions gathering replacement evidence.

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

- demonstrated low levels of skill in a range of algebraic methods despite multiple opportunities to show their proficiency.

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

- worked confidently with logs, could factorise and solve algebraic equations and could correctly manipulate algebraic expressions.

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

- communicated their mathematical thinking effectively
  - knew how to begin (and end) a proof
  - applied insight in order to use their skills appropriately (and accurately) in a given unfamiliar context.
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## 91262: Apply calculus methods in solving problems

### Examinations

The questions assessed a student's understanding of Calculus and their ability to apply skills and concepts to unfamiliar and familiar situations. There were some parts that required drawing a graph and many candidates would have done better if they had sketched more accurately. It was possible to answer some of the kinematics questions using the laws of motion from Physics but doing so will not give a student any credit for this standard, even though the answer may be correct.

### Grade awarding

Candidates who were awarded **Achievement** commonly:

- differentiated or integrated correctly and applied the skill to solve a simple problem, such as finding the slope at a point, finding a constant of integration, finding a tangent equation or maximising a function
- sketched graphs, but key features were not accurate enough.

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

- did not complete enough of the paper or answer questions fully
  - could not differentiate or integrate expressions correctly and if they could do these skills, they could not apply them correctly
  - sketched gradient functions and graphs of functions accurately
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- demonstrated an inadequate understanding of rate of change and kinematics.

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

- found the equation of a tangent to a curve, differentiated a negative function, rearranged, substituted and interpreted the solution in context
- understood concepts such as kinematics and the relationship between distance, velocity and acceleration
- interpreted a rate of change scenario
- drew derivative and anti-derivative function graphs.

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

- justified their answers, such as the turning points for an equation
- formed and solved a model and linked Calculus to an algebraic problem
- differentiated and integrated accurately using contextual information
- applied calculus and algebra knowledge to solve a complex problem
- read the question correctly and ensured all aspects of the problem were addressed.

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## 91267: Apply probability methods in solving problems

### Examinations

The questions assessed a student's understanding of Probability and their ability to apply skills and concepts to unfamiliar and familiar situations. Probability is intimately connected with Statistics, so candidates should have a good understanding of statistical graphs and measures from Level 1 at least, as indicated by the Specifications. In order to achieve this standard in this assessment, candidates will need to demonstrate an understanding of all three major areas of the curriculum: 2-way tables, probability trees and the normal distribution. Working is required for each question in order to gain the highest grades, and always give an answer that relates to the context, for example, an expected number of people must be a whole number.

### Observations

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Candidates should understand that converting probabilities to/from fraction, decimal and percentage forms will help in comparing two or more probabilities. Sensible and appropriate rounding is important. For example, using z-values to 1 decimal place, or rounding small probabilities to 1 decimal place is not appropriate. It is also worth remembering that a probability is always between 0 and 1, and that “proportion” and “probability” are very similar ideas.

### Grade awarding

Candidates who were awarded **Achievement** commonly:

- read, formed and used a probability tree
- used a two-way table to solve a problem, or a graphing calculator, diagram and/or table to solve a normal distribution problem
- manipulated and convert between probabilities given as fractions, decimals and percentages

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

- did not demonstrate knowledge of all three major concepts examined in this standard
- did not calculate probabilities from a table, a tree or for a normal distribution.

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

- used a probability to determine an expected value, find conditional probabilities or relative risks
- carried out calculations involving the inverse Normal distribution and could comment on the shape of a normal distribution
- provided working to explain their solutions.

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

- interpreted relative risk, evaluated evidence, solved complicated problems, related the shape of a normal distribution to a context, understood what standard deviation is and showed high levels of mathematical communication.

[Mathematics and Statistics subject page](#)

## Previous years' reports

[2020 \(PDF, 207KB\)](#)

[2019 \(PDF, 259KB\)](#)

[2018 \(PDF, 135KB\)](#)

[2017 \(PDF, 50KB\)](#)

[2016 \(PDF, 240KB\)](#)