NZQA
NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

National Certificate of Educational Achievement

2011 Assessment Report

Mathematics and Statistics Level 2

90284 Manipulate algebraic expressions and solve equations

90285 Draw straightforward non-linear graphs

90286 Find and use straightforward derivatives and integrals

90287 Use coordinate geometry methods

90290 Solve straightforward problems involving arithmetic and geometric sequences

90292 Solve straightforward trigonometric equations

COMMENTARY

This was the final year for examinations to assess these achievement standards.

The students who had access to graphing calculators and who knew how to use them to support mathematical understanding had a considerable advantage.

Candidates who drew diagrams to assist their visualisation of more complex problems generally performed at a higher level.

Candidates who demonstrated accurate number skills performed at a higher level.

Careful reading of questions was required in order to identify exactly what was being sought in the question and avoid giving irrelevant answers.

STANDARD REPORTS

90284 Manipulate algebraic expressions and solve equations

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- demonstrated understanding of algebraic and logarithmic expressions
- solved inequations and quadratic equations correctly.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- did notrecognise the difference between linear and quadratic equations
- did not apply properties of indices and logarithms.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- solved simultaneous equations accurately
- explained their reasoning using a combination of algebra and statements
- attempted most questions.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- sustained algebraic accuracy over a number of steps
- demonstrated thorough knowledge of complex logarithmic rules and manipulation
- understood the requirements of a proof.

90285 Draw straightforward non-linear graphs

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- displayed appropriate key features e.g. intercepts, vertices, asymptotes and used these when drawing the graph
- drew graphs accurately.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- drew insufficient complete graphs
- showed a lack of understanding of the general shapes of functions
- showed insufficient features
- were careless in drawing graphs by crossing asymptotes, using straight line segments, and drew several attempts on one set of axes
- relied on a graphics calculator without understanding the features of the graph.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- drew more complex graphs displaying the features correctly
- derived the equation for graphs from key features
- used correct mathematical language
- used graphing techniques to answer questions set in context
- provided solutions with an appropriate degree of accuracy
- answered a range of questions.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- read and interpreted questions set in context
- established models
- presented a solution to the problem using either graphic or algebraic techniques
- displayed perseverance and accuracy
- made correct inferences from their findings
- communicated their method and findings clearly
- used skills and knowledge from other standards in context.

90286 Find and use straightforward derivatives and integrals

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- differentiated a simple polynomial and used the derivative
- integrated a polynomial and used the integral
- sketched a gradient function accurately.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- did not differentiate or integrate correctly
- did not determine when it was appropriate to differentiate or integrate
- showed a lack of understanding of the constant of integration
- used coordinate geometry incorrectly to find the equations
- did not substitute numerical values into simple algebraic functions and obtain the correct value, particularly negative numbers
- demonstrated little understanding of the relationship between gradients and differentiation, as evidenced in their inability to draw a gradient function.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- solved a kinematic problem
- linked differentiation and gradients of tangents
- used definite integrals involving variables rather than numerical values.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- showed a high level of understanding of optimisation and could apply this to a problem in context
- applied higher level algebraic skills to find the solution to problems in mathematical context
- succinctly explained a solution.

OTHER COMMENTS

Candidates were required to show sufficient working, especially with the processes of differentiation and integration, to demonstrate understanding.

90287 Use coordinate geometry methods

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- remembered, chose, and then used formulas correctly
- understood geometry concepts.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- did not correctly calculate with integers, especially squaring negative values correctly in a calculator to form a positive answer
- made algebraic errors when rearranging or simplifying an expression, particularly in expanding a single bracket, or moving a constant term from one side of the "=" symbol to the other side.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- established that three points are collinear
- established the equation of a perpendicular bisector of two points.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- formed an overall picture of a problem presented in words (usually with the aid of a sketched diagram)
- correctly formed appropriate relationships with algebraic expressions and solved equations
- solved problems by geometric or translation methods.

90290 Solve straightforward problems involving arithmetic and geometric sequences

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- identified the type of sequence.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- calculated incorrectly
- chose to use the wrong type of sequence

- did not complete sufficient questions.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- interpreted each question correctly in context
- showed understanding of the difference between term and sum questions
- displayed confidence with algebra or carefully listed terms to find a solution.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- displayed confidence with algebra including quadratics and logarithms
- demonstrated a high level of interpreting a question in context.

90292 Solve straightforward trigonometric equations

ACHIEVEMENT

Candidates who were awarded Achievement for this standard demonstrated the required skills and knowledge. They typically:

- demonstrated knowledge of how to enter equations into the graphing function on their graphical calculator correctly and read off the appropriate intersection solutions as values of *x*
- showed awareness that there was more than one solution within the specified range
- worked in both degrees and radians.

NOT ACHIEVED

Candidates who were assessed as Not Achieved for this standard lacked some or all of the skills and knowledge required for the award of Achievement. They typically:

- found one solution within the required range
- included incorrect solutions such as an asymptote
- did not use the quadrant method accurately
- did not input information accurately into their graphical calculator
- did not deal with fractional or negative coefficients of the trig function.

ACHIEVEMENT WITH MERIT

In addition to the skills and knowledge required for the award of Achievement, candidates who were awarded Achievement with Merit typically:

- found solutions on a calculator and interpreted them in the context of the question
- used the radians mode for the application / context questions
- used pi in order to find the solutions
- showed understanding of the shape of trig graphs and their symmetry
- used algebra skills that supported rearrangement of equations.

ACHIEVEMENT WITH EXCELLENCE

In addition to the skills and knowledge required for the award of Achievement with Merit, candidates who were awarded Achievement with Excellence typically:

- found the parameters of a trig equation
- showed understanding of how the parameters transformed a graph and the impact of this on the equation of that graph
- factorised and solved algebraically
- seemed to have ignored impossible solutions
- demonstrated evidence of having thought logically through contextual questions to find appropriate solutions.