

National Certificate of Educational Achievement

2014 Assessment Report

Biology Level 2

- 91156 Demonstrate an understanding of life processes at the cellular level**
- 91157 Demonstrate understanding of genetic variation and change**
- 91159 Demonstrate understanding of gene expression**

COMMENTARY

Successful candidates wrote clear, concise and accurate answers, using appropriate biological language and attempted to answer all of the questions in each booklet. They did not rewrite resource material already provided in the question.

Candidates gaining Achievement, Merit, or Excellence correctly responded to the key words in the questions and addressed all bullet points, where provided with the question.

Candidates achieving higher grades seemed well prepared for the questions. Many candidates made links between the biological ideas or concepts that related to the question. This helped demonstrate their understanding by adding depth and detail to their responses. They also referred to the tables and graphs (resource material) in their answers to further illustrate their understanding. It was clear that many candidates were well prepared for the examination by looking at the exemplar papers, previous exams, scripts, assessment specification and published schedules available on the NZQA website.

Many candidates limited their level of achievement by providing responses that were not linked to the question. Their responses were below Level 7 of the New Zealand Curriculum. These candidates did not attempt all of the questions within each paper and failed to complete diagrams or tables.

STANDARD REPORTS

91156 Demonstrate an understanding of life processes at the cellular level

ACHIEVEMENT

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

- defined the terms mitosis, photosynthesis and respiration accurately
- provided word equations for both photosynthesis and respiration
- provided some evidence for each of the bullet points in the question
- supported responses with annotated diagrams of DNA replication and mitosis
- used the material within the question to support their responses.

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 commonly:

- provided descriptions that were below Level 7 of the NZ Curriculum
- provided confusing or incorrect definitions for most of the key processes (mitosis, respiration and photosynthesis)
- showed no understanding of the purpose of one or more of the three key processes
- focused their response on one bullet point of the question whilst not addressing the others
- were unable to distinguish between mitosis and meiosis.

ACHIEVEMENT WITH MERIT

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

- provided clear definitions and/or descriptions of the three key processes
- linked aspects of wider cell biology to the three main processes, (such as active transport, diffusion and enzyme action)
- explained why factors affected the rate of photosynthesis in terms of reactants or energy required
- utilised the bullet points in the question to support their planning whilst still answering the main stem question
- showed an understanding of the difference between 'when and why' a process occurs and the factors that affect the rate of that process.

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 commonly:

- provided a comprehensive insight into when and why cells divide by mitosis
- showed a detailed understanding of the way in which factors that affect photosynthesis interact to determine its rate
- gave a clear and concise comparison of why different cell types have different numbers of mitochondria by comparing the number of mitochondria to the energy demands of the cell
- showed clear understanding of the cell processes that rely on ATP produced by respiration and linked these processes to different cell types
- compared and contrasted the energy demands of these processes, (e.g. diffusion, active transport, cell division and muscle contraction).

91157 Demonstrate understanding of genetic variation and change

ACHIEVEMENT

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

- defined or described some terms correctly, or used diagrams to show understanding (terms: crossing over, linked genes, gametic mutation, natural selection, genetic drift, migration and gene pool)
- recognised a dihybrid cross, correctly completing Punnett square with expected outcomes of offspring
- clearly showed phenotypes and ratios of offspring
- showed an understanding of mutation and where gametic mutations occur
- recognised the differences between migration and genetic drift
- recognised that migration could potentially add new alleles to a gene pool or remove rare alleles
- recognised that genetic drift was a result of random/chance events.

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 commonly:

- failed to complete the Punnett square for a dihybrid cross
- confused a dihybrid with a monohybrid cross
- were unfamiliar with terms F1 and F2 generations
- confused terms genotype with phenotype: allele with gene; species with organisms
- thought that crossing over created new alleles
- did not show understanding that favourable phenotypes must survive and reproduce
- used descriptors such as 'number of' or 'amount of' to describe allele frequency
- did not show an understanding of the terms genetic drift or migration.

ACHIEVEMENT WITH MERIT

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

- explained how or why biological processes occur (often with the use of annotated diagrams)
- showed an understanding of linked genes and the role of crossing over in breaking linkage
- explained how different allele combinations resulted in various gametes as a result of crossing over with both linked and unlinked genes
- explained that gametic mutations could be inherited
- explained natural selection and its impact on allele frequency correctly
- explained natural selection with regard to 'increased/decreased chance of survival' rather than stating that favourable phenotypes will be inherited
- clearly linked the effects of genetic drift and migration to small populations
- showed an understanding that allele frequencies would only be changed long term through successful reproduction and continued generations carrying that particular allele.

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 commonly:

- discussed the impact on genetic variation between the parents and the offspring in relation to whether the genes were linked or not linked
- clearly demonstrated the link between reduced and increased genetic variation in gametes to the processes of linkage and crossing over
- discussed the interaction between natural selection pressures and allele frequencies in a gene pool
- showed clear understanding of the requirement for seeds to germinate, grow and then reproduce to be able to justify how some alleles cannot become more frequent in gene pools (inheritance for further generations)
- justified explanations for migration and genetic drift back to the example used in the question

- clearly showed recognition of importance of ratio or 'buffer' effect in terms of why genetic drift and migration have little impact on the allele frequency in a large population
- clearly linked population size to the probability of alleles becoming fixed/lost, by comparing and contrasting the effects of migration and genetic drift on small and large populations.

OTHER COMMENTS

Many candidates thought linked genes were two alleles on the same chromosome (e.g. A and a on the same chromosome).

A number of candidates did not know about seeds being the offspring, some talked about the seed going on to be fertilised.

Diagrams often helped students as they may be weak in their explanations but their annotated diagrams showed understanding.

Many candidates defined natural selection simply as 'survival of the fittest'
Common mistakes: in reference to natural selection failed to include passing on/ reproduction and when talking about chromosomes in meiosis failed to include homologous/pairs.

91159 Demonstrate understanding of gene expression

ACHIEVEMENT

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

- showed some understanding about the processes given in the questions
- used some scientific vocabulary correctly
- completed tables and diagrams accurately
- showed understanding of sequenced events in biological processes correctly
- described the purposes or outcomes of these processes.

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 commonly:

- failed to complete tables and diagrams
- did not show understanding of processes at Level 7
- confused key processes
- gave answers that were insufficiently detailed
- misread the question and gave examples that were not relevant.

ACHIEVEMENT WITH MERIT

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

- explained how different processes worked to affect the organism

- considered why mutations can harm an organism
- gave reasons for the purpose of different processes
- linked biological processes relating to gene expression
- used some specialist vocabulary in context.

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 commonly:

- compared and contrasted different processes in detail
- discussed reasons for similarities and differences between processes
- linked ideas together to form detailed conclusions
- used specialist vocabulary correctly and in context
- discussed how and why mutations affect the overall organism
- compared different mutations and their severity.