

National Certificate of Educational Achievement

2011 Assessment Report

Biology Level 2

- 90459 Describe genetic variation and change**
- 90461 Describe concepts and processes relating to ecology**
- 90462 Describe diversity in the structure and function of animals**
- 90463 Describe diversity in the structure and function of plants**
- 90464 Describe cell structure and function**

COMMENTARY

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

Successful candidates wrote clear, concise, and accurate answers, using appropriate biological language. They did not spend time rewriting resource material already provided in the questions. Most importantly, they attempted to answer all of the questions in each standard.

Candidates gaining Achievement, Merit, or Excellence correctly responded to the key words (in bold) in the questions. Most candidates demonstrated a clear understanding of the terms “describe”, “explain”, and “discuss” as defined in the achievement standards. Candidates achieving higher results seemed well prepared for the current style of questions, which all assess to Excellence level. Many candidates included examples in their answers that directly linked to the biological ideas or concepts, which helped to show their understanding. It was clear that many candidates had prepared well for the examinations by looking at previous papers and the published schedules available on the NZQA website.

Many candidates limited their level of achievement by providing responses that were not directly linked to the question. Many candidates did not attempt sufficient questions within each paper, or gave examples that were out of context and, therefore, could not be used towards any level of achievement. Many candidates did not attempt basic answers for the “discuss” questions and, therefore, missed opportunities to provide evidence that could have contributed to an Achievement grade. In multi-part questions, many candidates did not answer all of the parts, limiting their opportunity to gain credit.

Many candidates did not use simple annotated biological drawings to demonstrate knowledge or to help illustrate their response, even when space was provided.

A lack of description of key terms as listed in each standard was a major issue for a number of candidates.

In the two “diversity” papers (90462 and 90463), candidates needed to describe at least the requested number of structures (and their function) for all three animal/plant groups that have been selected.

STANDARD REPORTS

90459 Describe genetic variation and change

ACHIEVEMENT

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

- accurately described the following biological terms: independent assortment, segregation, recombination/crossing over, test cross, natural selection, migration, mutation, founder effect
- drew diagrams to show crossing over to support descriptions
- described independent assortment and crossing over using the correct terms – homologous or pairs of chromosomes
- showed understanding of the following terms: genotype, phenotype, variation
- were able to use a Punnett square to identify genotypes and to determine possible phenotypes of offspring

- carried out a dihybrid cross
- recognised recessive and dominant alleles
- understood that the organisms that adapted to their environment tended to survive AND reproduce.

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 distinguish between crossing over and segregation and independent assortment
- did not differentiate between segregation and fertilisation, genes and alleles, and chromosomes and chromatids
- left out homologous/pairs for independent assortment and crossing over
- did not recognise what a test cross was
- did not identify alleles for a Punnett square
- did not complete a dihybrid Punnett square
- confused species with individuals/organisms/populations
- showed a lack of understanding of migration and founder effect
- described natural selection as “survival of the fittest”, with no reference to the ability of organisms to pass on their superior alleles to their offspring.

ACHIEVEMENT WITH MERIT

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

- explained at least two ways in which variation is introduced during the process of meiosis
- attempted to evaluate the contribution of independent assortment and crossing over to variation in the gametes
- understood how unique chromatids were ‘created’ with crossing over
- showed clear understanding of the differences between chromatids and chromosomes and attributed these terms to correct process
- described and interpreted a test cross to distinguish between homozygous and heterozygous individuals
- showed understanding that a recessive phenotype must always be homozygous
- showed understanding that individuals of the same phenotype can have different genotypes
- showed understanding that allele frequencies in a gene pool can be changed by individuals entering and leaving a population and by subsequent breeding.

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:

- drew diagrams annotated with clear links that defined the differences and their relationship to the overall effect of each process on gamete formation and variation

- discussed the processes of independent assortment, crossing over, and segregation in order of occurrence, and evaluated the contribution of each to variation in the gametes
- showed clear understanding of the differences between chromatids and chromosomes and attributed these terms to correct process, recognising the maternal and paternal combinations in the relevant process
- discussed the need for multiple breeding in a test cross, including the idea that you can “never be certain” of a predicted outcome
- showed clear links between all processes for variation in populations and island scenarios
- showed clear links showing that processes that lead to variation are related to distances between the islands in the given context.

OTHER COMMENTS

Candidates aiming for an Excellence grade should give detailed explanations or reasons rather than only a concluding statement.

90461 Describe concepts and processes relating to ecology

ACHIEVEMENT

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

- defined commonly used terms
- provided good examples of adaptations and succession
- constructed responses that were free of ambiguity.

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:

- misread the questions, providing inappropriate answers
- repeated the terms used in the question without demonstrating their understanding
- confused interspecific and intraspecific as well as horizontal and vertical
- did not provide examples when required.

ACHIEVEMENT WITH MERIT

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

- supported their answers with accurate examples
- explained how the adaptations of an organism allowed it to tolerate certain conditions
- explained how specific nutrient cycles function and why they are important
- explained how energy is lost in food chains/webs
- understood the difference between adaptations and evolution.

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:

- succinctly expressed their points of view
- wrote well developed responses
- supported answers with relevant examples
- used biological language accurately
- answered the question accurately without fragmenting ideas that were linked
- justified their points with good biological detail and logic
- compared and contrasted biological ideas.

OTHER COMMENTS

One of the main areas of confusion arose from some candidates' lack of understanding of evolution. They wrote about organisms adapting to changing conditions in a Lamarckian fashion and showed no understanding of the difference between acclimation and evolution.

90462 Describe diversity in the structure and function of animals

ACHIEVEMENT

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

- described the features and functions of three or more structures from three diverse groups of organisms that help them to carry out a particular life process
- drew accurate and clearly-annotated diagrams of structures and described relevant functions
- selected appropriate animal groups to illustrate diversity
- demonstrated a thorough understanding of the life process and the special features of the organ systems that enable organisms to carry out this process effectively
- selected three different animal groups that have special adaptations to carry out a particular life process because of the different environment in which they live.

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 describe the functions of three structures from each of three different animal groups that carry out a particular life process
- did not select appropriate life process or animal groups to demonstrate their knowledge of diversity
- did not provide labelled diagrams to describe structures that carry out life processes.

ACHIEVEMENT WITH MERIT

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

- explained three or more structural features of three different animal groups in relation to a life process and linked those adaptations to their special functions
- demonstrated a good understanding of the life process in three diverse animal groups by describing the special features of the structures and explaining how these function to enable the animals' survival in the environment in which they live
- illustrated their report with accurate and clearly annotated diagrams that show structural features and explained the role of three or more for each animal group in performing a particular life process to enable survival in the environment
- explained diversity rather than similarities that exist among three different animal groups in relation to a life 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 typically:

- discussed diversity in relation to a life process, to enable two or more animal groups to live and survive in their environment
- provided a report that clearly compared and contrasted the diversity in structures of three taxonomically or functionally diverse animals or animal groups and linked this diversity to their survival value in their environment.

OTHER COMMENTS

Some candidates ignored the subtle differences that occur from year to year in this paper, instead attempting a 'prepared' response that was not what the answer required.

90463 Describe diversity in the structure and function of plants

ACHIEVEMENT

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

- described three plant groups that carried out their named process differently
- described three structures and their functions for each plant group
- showed the diversity in the structures across the three groups
- showed a clear understanding of what the process was and described each plant group accordingly.

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 describe three structures and functions for each of the three groups
- wrote about the same structures for at least two groups – this does not show diversity

- drew diagrams but did not annotate them or provide a description of how the plant carries out the process
- named a specific plant as their group and then described structural features that did not belong to the group
- named one process but then wrote about the structures associated with another process.

ACHIEVEMENT WITH MERIT

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

- gave reasons why structural adaptations allowed a plant group to carry out process effectively for at least two of the three groups
- explained how the structures allowed the process to be carried out in a specific habitat
- identified the limiting factors of a specific process and provide reasons as to why this affected the plant group.

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:

- linked the adaptations of a plant to the particular habitat it had
- clearly compared and contrasted at least two of the three groups for the process talked about
- showed a clear understanding of the importance of the process to plant groups named and that different habitats placed different limiting factors on the process involved
- incorporated broader concepts such as evolution and interspecific relationships into their answers.

OTHER COMMENTS

Some candidates ignored the subtle differences that occur from year to year in this paper, instead attempting a 'prepared' response that was not what the answer required.

90464 Describe cell structure and function

ACHIEVEMENT

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

- accurately described the following biological terms: photosynthesis, biological catalyst, substrate, active site, denatured
- described functions of cell organelles such as chloroplast, mitochondrion, lysosome, golgi body
- described cell processes such as photosynthesis, respiration, enzyme activity (lock and key model; induced fit model; factors affecting enzyme activity), and DNA replication
- demonstrated understanding of enzyme models, and factors that affected enzyme action

- described the effect of factors on the activity rate of biological processes such as enzyme activity or DNA replication.

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:

- listed rather than describing ideas
- provided inaccurate or simplistic descriptions such as:
- enzyme poisons “kill” the enzymes, DNA replication makes proteins, chloroplasts carry out respiration/made ATP, mitochondria made glucose, co-enzymes inhibit enzymes’ rate of activity
- confused the processes of DNA replication with mitosis, meiosis, or protein synthesis.

ACHIEVEMENT WITH MERIT

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

- explained how the structure of a cell organelle (mitochondrion/chloroplast) relates to its function
- explained the function of mitochondria and chloroplasts and linked the function to some structural features of the organelles or their location in cells
- explained clearly how enzymes are specific and how chemical/physical conditions can affect them
- explained how or why factors affect enzyme activity by referring to their effects on the rate of activity in cells
- explained how or why rates of DNA replication can vary over the lifetime of an organism.

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:

- provided logical, coherent, succinct, and pertinent information that demonstrated understanding of cell structure and function
- provided responses that fully addressed all aspects of the question
- made clear links when explaining the biological ideas or concepts.

OTHER COMMENTS

Many candidates included the typical graphs showing the effect of temperature, pH, substrate concentration, and/or enzyme concentration on rate of reaction for an enzyme. Although the graph lines were drawn correctly, labels on the axes were frequently incorrect or missing.

Some candidates went into the details of the process of photosynthesis and respiration that are NOT required by the standard e.g. glycolysis/ light and dark phase. In doing so, many did not fully answer the question that had been asked, and may have disadvantaged themselves by not having the time for other questions.