

# **National Certificate of Educational Achievement**

## **2011 Assessment Report**

### **Science Level 1**

- 90940 Demonstrate understanding of mechanics**
- 90944 Demonstrate understanding of acids and bases**
- 90948 Demonstrate understanding of biological ideas relating to genetic variation**

## COMMENTARY

In general, candidates wrote more, and frequently provided answers showing a greater depth of understanding, than in previous years. Candidates demonstrated a much higher level of literacy than has been seen in the past, and appeared to attempt more questions; as a result, the number of void/blank papers decreased.

Successful candidates used resource material provided to answer questions and brought the right equipment to the examination, such as a calculator. There was clear evidence that many candidates utilised the scaffolding and bullet points when preparing answers to questions. Candidates who were able to sequence their responses to questions (rather than relying on bullet points as their answers) were more likely to gain Achievement with Merit or Excellence.

Some candidates had difficulty when attempting to convey complex ideas without adequate understanding of the basic concepts. Candidates who were unable to use specific scientific terminology to describe observations or explain what was happening were less likely to gain Achievement. Familiarity with practical work was a definite advantage for candidates.

With the introduction of Grade Score Marking, it is important that candidates attempt all questions and all parts of each question to maximise their chances of success.

## STANDARD REPORTS

### 90940 Demonstrate understanding of mechanics

#### ACHIEVEMENT

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

- drew arrows indicating correct forces on a force diagram
- recognised when forces were balanced and unbalanced
- recognised that weight was greater than air resistance in free fall
- drew correct lines to represent constant speed and acceleration on a speed-time graph
- used correct formulae to complete simple calculations
- identified gravitational potential energy
- identified the relationship between pressure and surface area.

#### 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:**

- stated that the deployment of a parachute led to upwards movement of a skydiver
- labelled weight force as going upwards on a force diagram
- misunderstood the meaning of the term 'net force'
- used incorrect formulae to carry out calculations.

## **ACHIEVEMENT WITH MERIT**

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

- recognised that air resistance was greater than weight because of increased surface area of a deployed parachute
- recognised gravitational potential energy at the top of the rope and that energy is lost as heat
- explained the relationship between surface area and pressure (with respect to studded and non-studded boots)
- linked pressure (of studded and non-studded boots) to sinking into grass.

## **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:**

- analysed the three stages of flight prior to parachute deployment
- analysed the effect of parachute deployment on air resistance
- showed understanding of the idea that work done was the same as the gravitational potential energy
- solved complex calculations
- explained that the energy difference resulted from wasted energy (in the body, or as a result of friction)
- linked pressure of studded and non-studded boots to sinking into grass and gaining better grip/traction.

## **OTHER COMMENTS**

Candidates who showed understanding of Newton's three laws of motion were able to apply their understanding to aspects of mechanics in a range of contexts. This included the effects of balanced and unbalanced forces on an object, acceleration due to a net force, the effect of changing mass on acceleration for a given force, and the concept of equilibrium.

## **90944 Demonstrate understanding of acids and bases**

### **ACHIEVEMENT**

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

- described the steps in the formation of an ion
- used the periodic table to determine electron configuration
- recognised acid-base reactions
- completed word equations
- identified a step used in the laboratory when making a salt by acid/base neutralisation
- linked the colour of an indicator to the type of solution present.

## **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:**

- confused names and symbols of ions
- did not recognise that ions have complete shells of electrons
- did not identify an element by the number of electrons in its outer shell
- confused factors involved in making a reaction go faster.

## **ACHIEVEMENT WITH MERIT**

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

- understood that neutrality in a compound involves a balancing of positive and negative ions
- identified what was occurring with reactants and/or products in a reaction
- recognised that mass decrease in a reaction was due to gas production
- showed steps used in the laboratory preparation of a salt by acid/base neutralisation
- completed symbol equations
- recognised that hydrogen and hydroxide ions form water at neutralisation
- linked pH to the amount of hydrogen and hydroxide ions.

## **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 electron arrangement of an ion by referring to the number of protons and electrons involved
- defined concentration in terms of the number of particles in a set volume
- explained reasons for high initial reactant activity
- wrote balanced symbol equations
- sequenced steps in the laboratory preparation of a salt by acid/base neutralisation
- linked colour changes in indicators to pH and the relative amounts of hydrogen and hydroxide ions.

## **OTHER COMMENTS**

Candidates need to be able to identify the names of ions and their electron configurations from the resources provided. Some candidates attempted to use the 'swap and drop' method to explain ionic formula, displaying a lack of understanding.

Some candidates thought that because gas was produced in a reaction, the total mass of the reactants and products would decrease. Candidates should be clear that the loss of gas from a reaction is not related to the change of state, evaporation, and that a gas will also have mass.

Candidates who showed experience of laboratory sessions displayed clearer understanding of chemical reactions and processes.

Some candidates seemed unfamiliar with Nitric acid and its formula, and a few still neglect the first letter upper-case, the second letter lower-case convention when writing symbols.

## **90948 Demonstrate understanding of biological ideas relating to genetic variation**

### **ACHIEVEMENT**

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

- showed familiarity with basic genetic terms
- completed Punnett squares
- interpreted pedigree charts
- identified and stated genotypes from given information
- recognised the difference between dominant and recessive alleles, and genotype and phenotype
- showed understanding of the basics of X and Y sex determination.

### **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:**

- confused key terms such as gene with allele, and genotype and phenotype
- showed misunderstanding of basic ideas relating to heredity
- identified genetic variation as a means of providing immunity/resistance to disease rather than leading to individual differences.

### **ACHIEVEMENT WITH MERIT**

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

- linked genetic variation with well-defined examples of species success/benefits
- explained links between concepts such as why genotype combinations produce particular phenotypes
- understood that genetic variation/mutation leads to phenotypic differences
- understood sex determination and the role of the Y chromosome
- explained how genetic changes could only be passed on in the gametes via sexual reproduction.

### **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:**

- demonstrated understanding of how mutations lead to the formation of new alleles, new genotypes and phenotypes, leading to variation
- integrated biological concepts to explain gametic inheritance and environmental factors

- explained the role of dominant alleles in the expression of phenotypes and the effects of allele combinations.

### **OTHER COMMENTS**

The difference between gene and allele is still not understood by many candidates. A number of candidates referred to X and Y chromosomes as alleles, describing them as being dominant and recessive.

Mutations were described by many candidates as a change or mistake in the DNA, but the concept that mutation leads to variation was rarely developed, even by the most able candidates. The idea that a mutation in the DNA leads to the production of different proteins was commonly explained, but mutations were rarely linked to phenotypic changes.