Achievement Standard

Subject Reference	Biology 3.3				
Title	Describe the role of DNA in relation to gene expression				
Level	3	**Credits**	4	**Assessment**	External
Subfield	Science				
Domain	Biology				
Registration date	1 November 2005	**Date version published**	1 November 2005		

This achievement standard involves the description of the role DNA has in relation to gene expression and the determination of phenotype.

Achievement Criteria

Achievement	Achievement with Merit	Achievement with Excellence
• Describe the role of DNA in relation to gene expression.	• Explain the role of DNA in relation to gene expression.	• Discuss the role of DNA in relation to gene expression.

Explanatory Notes

1 This achievement standard is derived from *Biology in the New Zealand Curriculum*, Learning Media, Ministry of Education, 1994, p. 28, achievement objective 8.2 (a).

2 *The role of DNA* includes DNA structure and replication, the control of gene expression, protein synthesis, and the determination of phenotype.

3 The structure of DNA includes the molecular components and their role in carrying the genetic code. The replication of DNA includes the processes involved in replication and the role that enzymes have in producing accurate copies.

4 Control of gene expression is limited to factors that operate at transcription level:
- feedback in prokaryotes (repressors, inducers)
- enhancers and transcription factors in eukaryotes.

5 Protein synthesis includes the role of DNA in determining the structure of a protein and how that protein is produced (transcription and translation).

6 The determination of phenotype includes:
- allele interactions: dominance, incomplete dominance, co-dominance, multiple alleles, lethal alleles
- linkage and sex linkage
- gene-gene interactions: epistasis, collaboration, polygenes
- pleiotropy
- mutations: gene mutations, chromosomal mutations
- control of metabolic pathways by gene expression.

7 Terms
- *Describe* requires the student to define, use annotated diagrams, give characteristics of, or an account of.
- *Explain* requires the student to provide a reason as to how or why something occurs.
- *Discuss* requires the student to show understanding by linking biological ideas. It may involve students in justifying, relating, evaluating, comparing and contrasting, and analysing.

Quality Assurance

1 Providers and Industry Training Organisations must be accredited by the Qualifications Authority before they can register credits from assessment against achievement standards.

2 Accredited providers and Industry Training Organisations assessing against achievement standards must engage with the moderation system that applies to those achievement standards.

Accreditation and Moderation Action Plan (AMAP) reference 0226