

Standard number	Title	Internal/external	Credit value
AS90714	Research a contemporary biological issue	Int	3C
AS90715	Describe the role of DNA in relation to gene expression	Ext	4C
AS90716	Describe animal behaviour and plant responses in relation to environmental factors	Ext	4C
AS90717	Describe processes and patterns of evolution	Ext	3C
AS90718	Describe applications of biotechnological techniques	Int	3C
AS90719	Describe trends in human evolution	Ext	3C

To be prepared for assessment to the standard students will need to be able to:

#### **AS90715**

**Describe/Explain/Discuss** DNA structure and replication, the control of gene expression, protein synthesis, and the determination of phenotype.

- ▶ 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.
- ▶ Control of gene expression is limited to factors that operate at transcription level:
  - feedback in prokaryotes (repressors, inducers)
  - enhancers and transcription factors in eukaryotes.
- ▶ Protein synthesis includes the role of DNA in determining the structure of a protein and how that protein is produced (transcription and translation).
- ▶ 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.

#### **AS90716**

**Describe/Explain/Discuss** animal behaviour or plant responses in relation to environmental factors.

- ▶ selected from those relating to
  - orientation (tropisms, nastic responses, taxes, kineses, homing, migration)
  - timing (annual, daily, lunar, tidal)
  - interspecific relationships (predation, parasitism, mutualism, commensalism, competition for resources)
  - intraspecific relationships (territoriality, cooperative interactions, reproductive behaviours, hierarchical behaviour, competition for resources).
- ▶ The relationship of environmental factors to behaviour/response may be in terms of the process involved or the adaptive significance.

#### **AS90717**

**Describe** processes and **discuss** patterns of evolution.

- ▶ *Processes of evolution* are limited to
  - ways in which speciation occurs (sympatric, allopatric)
  - reproductive isolating mechanisms that contribute to speciation (geographical, temporal, ecological, behavioural, structural barriers, polyploidy)
  - the role of natural selection.
- ▶ *Patterns of evolution* will be selected from: convergent evolution, divergent evolution (including adaptive radiation), co-evolution, punctuated equilibrium, gradualism.

### AS90719

**Describe/Explain/Discuss** trends in human evolution.

▶ *Trends* refers to progressive change over a period of time in relation to:

- human biological evolution
- human cultural evolution
- patterns of dispersal of hominins. The term *hominins* refers to living and fossil species belonging to the human lineage. This is a subgroup of hominids which includes both humans and the great apes.

▶ Trends in human biological evolution begin with early bipedal hominins and may require comparison with living hominids (apes). Trends are limited to:

- skeletal changes linked to bipedalism
- changes in skull and endocranial features
- changes in the manipulative ability of the hand.

▶ Trends in human cultural evolution will be limited to evidence relating to:

use of tools (stone, wood, bone), fire, shelter, clothing, abstract thought (communication, language, art), food-gathering, and domestication of plants and animals.

▶ Interpretations on the origins and trends of human evolution will be based on current evidence and may change as a result of recent developments.

### AS90718

**Describe/Explain/Discuss** applications of biotechnological techniques to meet human needs and demands.

▶ *Techniques* must be relevant to the application and may include: PCR, ligation, use of restriction enzymes, gel electrophoresis, DNA sequencing, DNA chips, tissue culture.

Techniques will be considered in the context of a relevant application.

▶ *Applications* will be selected from: gene cloning, transgenesis, DNA profiling, genome analysis, stem cell research, xenotransplantation. Applications are to be considered in the context of meeting human needs or demands.

### AS90714

Integrate and evaluate researched information to **Describe/Explain/Discuss** a contemporary biological issue.

▶ In *research*, the student collects and interprets information from mainly secondary sources. Use of primary sources is acceptable. The research will be conducted with teacher guidance. This means the teacher is supporting the student throughout the research but the whole process will be student driven.

▶ An *issue* (*Establishing or expanding Marine Reserves*) is one for which people hold different opinions or viewpoints.

▶ For achievement, students are expected to describe:

- biological concepts and processes relating to the issue
- implications of the issue, which can be biological, social, ethical, economic or environmental
- differing opinions or viewpoints.

▶ Students are required to support their description, explanation or discussion with referenced information. This means that references to information sources are included within the text of the report, with full details given in a reference list.