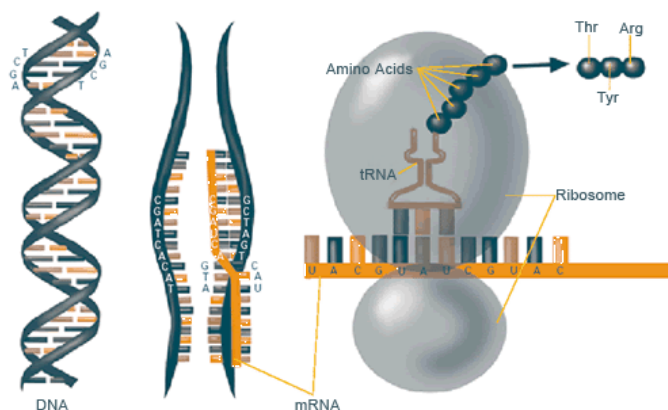


AS91159 Demonstrate understanding of gene expression

4 Credits External

This achievement standard involves demonstrating understanding of gene expression.



Achievement	Achievement with Merit	Achievement with Excellence
Demonstrate understanding of gene expression.	Demonstrate in-depth understanding of gene expression.	Demonstrate comprehensive understanding of gene expression.

Demonstrate understanding involves defining, using annotated diagrams or models to explain, and giving characteristics of, or an account of, gene expression.

Demonstrate in-depth understanding involves providing a reason as to how or why biological ideas and processes affect gene expression.

Demonstrate comprehensive understanding involves linking biological ideas and processes about gene expression. The explanation may involve justifying, relating, evaluating, comparing and contrasting, or analysing.

Gene expression involves a selection from the following biological ideas and processes:

- nucleic acid structure and nature of the genetic code
- significance of proteins
- protein synthesis
- the determination of phenotype via metabolic pathways
- effect of environment on genotype through mutations
- effect of environment on expression of phenotype.

Biological ideas and processes relating to nucleic acid structure and nature of the genetic code are selected from:

- molecular components and their role in carrying the genetic code: nucleotide monomers, deoxyribose and/or ribose sugar, phosphate, nitrogenous bases, complementary base pairing resulting in coding and template strand
- nature of the genetic code including triplets, codons and anticodons
- redundancy due to degeneracy within the code.

Biological ideas and processes relating to the significance of proteins are selected from:

- proteins as the products of gene expression: DNA → mRNA → polypeptide or protein
- identification of one gene → one polypeptide relationship
- significance of proteins is limited to their structural and catalytic role in living things.

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Biological ideas and processes relating to protein synthesis are selected from:

- the role of DNA sequence in determining the structure of a protein and how that protein is produced (transcription and translation)
- the role of enzymes in controlling the process (specific names of enzymes are not required).

Biological ideas and processes relating to the determination of phenotype via metabolic pathways are selected from:

- biochemical reactions are catalysed by specific enzymes and every enzyme is coded for by a specific gene(s)
- biochemical reactions do not occur in isolation but form part of a chain reaction so that the product of one becomes the substrate of another step in metabolism
- phenotype is determined by the presence, absence, or amount of specific metabolic products.

Biological ideas and processes relating to the effect of the environment on genotype through mutations are selected from:

- mutagens (specific mutagens are recognised but their effect at molecular level is not required)
- the potential effect on genotype and phenotype of gene mutations at the gene level.

Biological ideas and processes relating to the effect of environment on expression of phenotype involve ways that environmental factors may change phenotype without changing genotype.

Key words: These are the words that you are expected to understand when used in questions and be able to use in your answers.

- | | |
|--|---|
| <input type="checkbox"/> Adenine | <input type="checkbox"/> Amino acids |
| <input type="checkbox"/> Anticodon | <input type="checkbox"/> Codon |
| <input type="checkbox"/> Cytosine | <input type="checkbox"/> DNA |
| <input type="checkbox"/> DNA polymerase | <input type="checkbox"/> Double helix |
| <input type="checkbox"/> Degeneration | <input type="checkbox"/> Enzymes |
| <input type="checkbox"/> Frame shift | <input type="checkbox"/> Genetic code |
| <input type="checkbox"/> Genotype | <input type="checkbox"/> Golgi body |
| <input type="checkbox"/> Hydrogen bond | <input type="checkbox"/> Lagging strand |
| <input type="checkbox"/> Leading strand | <input type="checkbox"/> Metabolic pathway |
| <input type="checkbox"/> mRNA | <input type="checkbox"/> Mutation |
| <input type="checkbox"/> Mutagen | <input type="checkbox"/> Mis-sense mutation |
| <input type="checkbox"/> Non-sense mutation | <input type="checkbox"/> Nuclear envelope |
| <input type="checkbox"/> Okazaki fragment | <input type="checkbox"/> Nucleotide |
| <input type="checkbox"/> Peptide bond | <input type="checkbox"/> Polypeptide chain |
| <input type="checkbox"/> Polynucleotide | <input type="checkbox"/> Phenotype |
| <input type="checkbox"/> Protein | <input type="checkbox"/> Primer |
| <input type="checkbox"/> Ribosome | <input type="checkbox"/> Purine |
| <input type="checkbox"/> Endoplasmic reticulum | <input type="checkbox"/> RNA polymerase |
| <input type="checkbox"/> Template strand | <input type="checkbox"/> rRNA |
| <input type="checkbox"/> Start codon | <input type="checkbox"/> Stop codon |
| <input type="checkbox"/> tRNA | <input type="checkbox"/> Thymine |