## 1 Statistical Analysis - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1.1 State that error bars are a graphical representation of the variability of data.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.2 Calculate the mean and standard deviation of a set of values.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.3 State that the term standard deviation is used to summarize the spread of values around the mean, and that 68% of the values fall within one standard deviation of the mean.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.4 Explain how the standard deviation is useful for comparing the means and the spread of data between two or more samples.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.5 Deduce the significance of the difference between two sets of data using calculated values for t and the appropriate tables.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.1.6 Explain that the existence of a correlation does not establish that there is a causal relationship between two variables.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 2.1 Cell Theory - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1.1 Outline the cell theory.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.2 Discuss the evidence for the cell theory.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.3 State that unicellular organisms carry out all the functions of life.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.4 Compare the relative sizes of molecules, cell membrane thickness, viruses,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>bacteria, organelles and cells, using the appropriate SI unit.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.5 Calculate the linear magnification of drawings and the actual size of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>specimens in images of known magnification.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.6 Explain the importance of the surface area to volume ratio as a factor limiting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cell size.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.7 State that multicellular organisms show emergent properties.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.8 Explain that cells in multicellular organisms differentiate to carry out</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>specialized functions by expressing some of their genes but not others.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.9 State that stem cells retain the capacity to divide and have the ability to</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>differentiate along different pathways.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1.10 Outline one therapeutic use of stem cells. See 2.1.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.2 Prokaryotic Cells - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.1 Draw and label a diagram of the ultrastructure of Escherichia coli (E. Coli) as an example of a prokaryote.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.2 Annotate the diagram from 2.2.1 with the functions of each named structure.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.3 Identify structures from 2.2.1 in electron micrographs of E. coli.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2.4 State that prokaryotic cells divide by binary fission.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Topic 2 Cells: Knowledge Audit

Name:

## 2.3 Eukaryotic Cells - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2.3.1</strong> Draw and label a diagram of the ultrastructure of a liver cell as an example of an animal cell.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.3.2</strong> Annotate the diagram from 2.3.1 with the functions of each named structure.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.3.3</strong> Identify structures from 2.3.1 in electron micrographs of liver cells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.3.4</strong> Compare prokaryotic and eukaryotic cells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.3.3</strong> State three differences between plant and animal cells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>2.3.4</strong> Outline two roles of extracellular components.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 2.4 Membranes - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4.1 Draw and label a diagram of the ultrastructure of a liver cell as an example of an animal cell.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.2 Explain how the hydrophobic and hydrophilic properties of phospholipids help to maintain the structure of cell membranes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.3 List the functions of membrane proteins.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.4 Define diffusion and osmosis.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.5 Explain passive transport across membranes by simple diffusion and facilitated diffusion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.6 Explain the role of protein pumps and ATP in active transport across membranes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.7 Explain how vesicles are used to transport materials within a cell between the rough endoplasmic reticulum, Golgi apparatus and plasma membrane.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.4.8 Describe how the fluidity of the membrane allows it to change shape, break and reform during endocytosis and exocytosis.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 2.5 Cell Division - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5.1 Outline the stages in the cell cycle, including interphase (G1, S, G2), mitosis and cytokinesis.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2.5.2 State that tumours (cancers) are the result of uncontrolled cell division and that these can occur in any organ or tissue.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2.5.3 State that interphase is an active period in the life of a cell when many metabolic reactions occur, including protein synthesis, DNA replication and an increase in the number of mitochondria and/or chloroplasts.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2.5.4 Describe the events that occur in the four phases of mitosis (prophase, metaphase, anaphase and telophase).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2.5.5 Explain how mitosis produces two genetically identical nuclei.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>2.5.6 State that growth, embryonic development, tissue repair and asexual reproduction involve mitosis.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
### 3.1 Chemicals, Elements and Water - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.1 State that the most frequently occurring chemical elements in living things are carbon, hydrogen, oxygen and nitrogen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.2 State that a variety of other elements are needed by living organisms, including sulfur, calcium, phosphorus, iron and sodium.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.3 State one role for each of the elements mentioned in 3.1.2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.4 Draw and label a diagram showing the structure of water molecules to show their polarity and hydrogen bond formation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.5 Outline the thermal, cohesive and solvent properties of water.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.1.6 Explain the relationship between the properties of water and its uses in living organisms as a coolant, medium for metabolic reactions and transport medium. See 3.1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.2 Carbohydrates, Lipids, and Proteins - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2.1 Distinguish between organic and inorganic compounds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.2 Identify amino acids, glucose, ribose and fatty acids from diagrams showing their structure.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.3 List three examples each of monosaccharides, disaccharides and polysaccharides..</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.4 State one function of glucose, lactose and glycogen in animals, and of fructose, sucrose and cellulose in plants.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.5 Outline the role of condensation and hydrolysis in the relationships between monosaccharides, disaccharides and polysaccharides; between fatty acids, glycerol and triglycerides; and between amino acids and polypeptides.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.6 State three functions of lipids.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.2.7 Compare the use of carbohydrates and lipids in energy storage.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3.3 DNA Structure - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.3.1 Outline DNA nucleotide structure in terms of sugar (deoxyribose), base and phosphate.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.2 State the names of the four bases in DNA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.3 Outline how DNA nucleotides are linked together by covalent bonds into a single strand.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.4 Explain how a DNA double helix is formed using complementary base pairing and hydrogen bonds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3.5 Draw and label a simple diagram of the molecular structure of DNA.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# 3.4 DNA Replication - Core

<table>
<thead>
<tr>
<th></th>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.4.1</td>
<td>Explain DNA replication in terms of unwinding the double helix and separation of the strands by helicase, followed by formation of the new complementary strands by DNA polymerase.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.4.2</td>
<td>Explain the significance of complementary base pairing in the conservation of the base sequence of DNA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.4.3</td>
<td>State that DNA replication is semiconservative.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.5 Transcription and Translation - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.5.1</strong> Compare the structure of RNA and DNA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.5.2</strong> Outline DNA transcription in terms of the formation of an RNA strand complementary to the DNA strand by RNA polymerase.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.5.3</strong> Describe the genetic code in terms of codons composed of triplets of bases.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.5.4</strong> Explain the process of translation, leading to polypeptide formation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.5.5</strong> Discuss the relationship between one gene and one polypeptide.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.6 Enzymes - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.6.1 Define enzyme and active site.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.6.2 Explain enzyme–substrate specificity. See 3.6.1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.6.3 Explain the effects of temperature, pH and substrate concentration on enzyme activity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.6.4 Define denaturation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.6.5 Explain the use of lactase in the production of lactose-free milk.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 3.7 Cell Respiration - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.7.1 Define cell respiration.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.7.2 State that, in cell respiration, glucose in the cytoplasm is broken down by glycolysis into pyruvate, with a small yield of ATP.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.7.3 Explain that, during anaerobic cell respiration, pyruvate can be converted in the cytoplasm into lactate, or ethanol and carbon dioxide, with no further yield of ATP.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.7.4 Explain that, during aerobic cell respiration, pyruvate can be broken down in the mitochondrion into carbon dioxide and water with a large yield of ATP.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 3.8 Photosynthesis - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>3.8.1</strong> State that photosynthesis involves the conversion of light energy into chemical energy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.8.2</strong> State that light from the Sun is composed of a range of wavelengths (colours).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.8.3</strong> State that chlorophyll is the main photosynthetic pigment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.8.4</strong> Outline the differences in absorption of red, blue and green light by chlorophyll.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.8.5</strong> State that light energy is used to produce ATP, and to split water molecules (photolysis) to form oxygen and hydrogen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.8.6</strong> State that ATP and hydrogen (derived from the photolysis of water) are used to fix carbon dioxide to make organic molecules.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.8.7</strong> Explain that the rate of photosynthesis can be measured directly by the production of oxygen or the uptake of carbon dioxide, or indirectly by an increase in biomass.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>3.8.8</strong> Outline the effects of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Topic 4 Genetics: Knowledge Audit

Name:

#### 4.1 Chromosomes, Genes, Alleles, and Mutations - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.1 State that eukaryote chromosomes are made of DNA and proteins.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.2 Define gene, allele and genome.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.3 Define gene mutation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1.4 Explain the consequence of a base substitution mutation in relation to the processes of transcription and translation, using the example of sickle-cell anemia.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# 4.2 Meiosis - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.1 State that meiosis is a reduction division of a diploid nucleus to form haploid nuclei.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.2.2 Define homologous chromosomes.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.2.3 Outline the process of meiosis, including pairing of homologous chromosomes and crossing over, followed by two divisions, which results in four haploid cells.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.2.4 Explain that non-disjunction can lead to changes in chromosome number, illustrated by reference to Down syndrome (trisomy 21).</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.2.5 State that, in karyotyping, chromosomes are arranged in pairs according to their size and structure.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.2.6 State that karyotyping is performed using cells collected by chorionic villus sampling or amniocentesis, for pre-natal diagnosis of chromosome abnormalities.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>4.2.7 Analyse a human karyotype to determine gender and whether nondisjunction has occurred.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
# 4.3 Theoretical Genetics - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>4.3.1</strong> Define genotype, phenotype, dominant allele, recessive allele, codominant alleles, locus, homozygous, heterozygous, carrier and test cross.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.2</strong> Determine the genotypes and phenotypes of the offspring of a monohybrid cross using a Punnett grid.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.3</strong> State that some genes have more than two alleles (multiple alleles).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.4</strong> Describe ABO blood groups as an example of codominance and multiple alleles.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.5</strong> Explain how the sex chromosomes control gender by referring to the inheritance of X and Y chromosomes in humans.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.6</strong> State that some genes are present on the X chromosome and absent from the shorter Y chromosome in humans.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.7</strong> Define sex linkage.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.8</strong> Describe the inheritance of colour blindness and hemophilia as examples of sex linkage.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.9</strong> State that a human female can be homozygous or heterozygous with respect to sex-linked genes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.10</strong> Explain that female carriers are heterozygous for X-linked recessive alleles.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.11</strong> Predict the genotypic and phenotypic ratios of offspring of monohybrid crosses involving any of the above patterns of inheritance.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>4.3.12</strong> Deduce the genotypes and phenotypes of individuals in pedigree charts.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Assessment Statement

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4.1 Outline the use of polymerase chain reaction (PCR) to copy and amplify minute quantities of DNA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.2 State that, in gel electrophoresis, fragments of DNA move in an electric field and are separated according to their size.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.3 State that gel electrophoresis of DNA is used in DNA profiling.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.4 Describe the application of DNA profiling to determine paternity and also in forensic investigations. See 4.4.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.5 Analyse DNA profiles to draw conclusions about paternity or forensic investigations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.6 Outline three outcomes of the sequencing of the complete human genome.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.7 State that, when genes are transferred between species, the amino acid sequence of polypeptides translated from them is unchanged because the genetic code is universal.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.8 Outline a basic technique used for gene transfer involving plasmids, a host cell (bacterium, yeast or other cell), restriction enzymes (endonucleases) and DNA ligase.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.9 State two examples of the current uses of genetically modified crops or animals.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.10 Discuss the potential benefits and possible harmful effects of one example of genetic modification.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.11 Define clone.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.12 Outline a technique for cloning using differentiated animal cells. See 4.4.11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.4.13 Discuss the ethical issues of therapeutic cloning in humans.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 5.1 Communities and Ecosystems – Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.1 Define species, habitat, population, community, ecosystem and ecology.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.2 Distinguish between autotroph and heterotroph.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.3 Distinguish between consumers, detritivores and saprotrophs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.4 Describe what is meant by a food chain, giving three examples, each with at least three linkages (four organisms).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.5 Describe what is meant by a food web.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.6 Define trophic level.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.7 Deduce the trophic level of organisms in a food chain and a food web.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.8 Construct a food web containing up to 10 organisms, using appropriate information.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.9 State that light is the initial energy source for almost all communities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.10 Explain the energy flow in a food chain.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.11 State that energy transformations are never 100% efficient.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.12 Explain reasons for the shape of pyramids of energy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.13 Explain that energy enters and leaves ecosystems, but nutrients must be recycled.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1.14 State that saprotrophic bacteria and fungi (decomposers) recycle nutrients.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 5.2 The Greenhouse Effect - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.2.1 Draw and label a diagram of the carbon cycle to show the processes involved.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.2 Analyse the changes in concentration of atmospheric CO\textsubscript{2} using historical records.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.3 Explain the relationship between rises in concentrations of atmospheric CO\textsubscript{2}, methane and oxides of nitrogen and the enhanced greenhouse effect.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.4 Outline the precautionary principle.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.5 Evaluate the precautionary principle as a justification for strong action in response to the threats posed by the enhanced greenhouse effect.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.2.6 Outline the consequences of a global temperature rise on arctic ecosystems.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
5.3 Populations - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.3.1 Outline how population size is affected by natality, immigration, mortality and emigration.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3.2 Draw and label a graph showing a sigmoid (S-shaped) population growth curve.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3.3 Explain the reasons for the exponential growth phase, the plateau phase and the transitional phase between these two phases.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.3.4 List three factors that set limits to population increase.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 5.4 Evolution - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.4.1 Define evolution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4.2 Outline the evidence for evolution provided by the fossil record, selective breeding of domesticated animals and homologous structures.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4.3 State that populations tend to produce more offspring than the environment can support.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4.4 Explain that the consequence of the potential overproduction of offspring is a struggle for survival.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4.5 State that the members of a species show variation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4.6 Explain how sexual reproduction promotes variation in a species.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4.7 Explain how natural selection leads to evolution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.4.8 Explain two examples of evolution in response to environmental change; one must be antibiotic resistance in bacteria.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 5.5 Classification - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.5.1 Outline the binomial system of nomenclature.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5.2 List seven levels in the hierarchy of taxa—kingdom, phylum, class, order, family, genus and species—using an example from two different kingdoms for each level.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5.3 Distinguish between the following phyla of plants, using simple external recognition features: bryophyta, filicinophyta, coniferophyta and angiospermophyta.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5.4 Distinguish between the following phyla of animals, using simple external recognition features: porifera, cnidaria, platyhelminthes, annelida, mollusca and arthropoda.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.5.5 Apply and design a key for a group of up to eight organisms.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 6.1 Digestion - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1.1 Explain why digestion of large food molecules is essential.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1.2 Explain the need for enzymes in digestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1.3 State the source, substrate, products and optimum pH conditions for one amylase, one protease and one lipase.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1.4 Draw and label a diagram of the digestive system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1.5 Outline the function of the stomach, small intestine and large intestine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1.6 Distinguish between absorption and assimilation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.1.7 Explain how the structure of the villus is related to its role in absorption and transport of the products of digestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 6.2 The Transport System - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.2.1 Draw and label a diagram of the heart showing the four chambers, associated</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>blood vessels, valves and the route of blood through the heart.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2.2 State that the coronary arteries supply heart muscle with oxygen and nutrients.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2.3 Explain the action of the heart in terms of collecting blood, pumping blood,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and opening and closing of valves.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2.4 Outline the control of the heartbeat in terms of myogenic muscle contraction,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the role of the pacemaker, nerves, the medulla of the brain and epinephrine (adrenaline).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2.5 Explain the relationship between the structure and function of arteries,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>capillaries and veins.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2.6 State that blood is composed of plasma, erythrocytes, leucocytes (phagocytes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and lymphocytes) and platelets.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.2.7 State that the following are transported by the blood: nutrients, oxygen,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>carbon dioxide, hormones, antibodies, urea and heat.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 6.3 Defence against Infectious Disease - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.3.1 Define pathogen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3.2 Explain why antibiotics are effective against bacteria but not against viruses.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3.3 Outline the role of skin and mucous membranes in defence against pathogens.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3.4 Outline how phagocytic leucocytes ingest pathogens in the blood and in body tissues.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3.5 Distinguish between antigens and antibodies.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3.6 Explain antibody production.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3.7 Outline the effects of HIV on the immune system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.3.8 Discuss the cause, transmission and social implications of AIDS.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 6.4 Gas Exchange - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4.1 Distinguish between ventilation, gas exchange and cell respiration.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4.2 Explain the need for a ventilation system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4.3 Describe the features of alveoli that adapt them to gas exchange.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4.4 Draw and label a diagram of the ventilation system, including trachea, lungs, bronchi, bronchioles and alveoli.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.4.5 Explain the mechanism of ventilation of the lungs in terms of volume and pressure changes caused by the internal and external intercostal muscles, the diaphragm and abdominal muscles.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 6.5 Nerves, Hormones, and Homeostasis - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6.5.1</strong> State that the nervous system consists of the central nervous system (CNS) and peripheral nerves, and is composed of cells called neurons that can carry rapid electrical impulses.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.2</strong> Draw and label a diagram of the structure of a motor neuron.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.3</strong> State that nerve impulses are conducted from receptors to the CNS by sensory neurons, within the CNS by relay neurons, and from the CNS to effectors by motor neurons.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.4</strong> Define resting potential and action potential (depolarization and repolarization).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.5</strong> Explain how a nerve impulse passes along a non-myelinated neuron.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.6</strong> Explain the principles of synaptic transmission.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.7</strong> State that the endocrine system consists of glands that release hormones that are transported in the blood.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.8</strong> State that homeostasis involves maintaining the internal environment between limits, including blood pH, carbon dioxide concentration, blood glucose concentration, body temperature and water balance.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment statement</td>
<td>OK</td>
<td>Review</td>
<td>Get help</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------</td>
<td>----</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td><strong>6.5.9</strong> Explain that homeostasis involves monitoring levels of variables and correcting changes in levels by negative feedback mechanisms.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.10</strong> Explain the control of body temperature, including the transfer of heat in blood, and the roles of the hypothalamus, sweat glands, skin arterioles and shivering.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.11</strong> Explain the control of blood glucose concentration, including the roles of glucagon, insulin and α and β cells in the pancreatic islets.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.5.12</strong> Distinguish between type I and type II diabetes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Topic 6 Human Health and Physiology: Knowledge Audit

**Name:**

## 6.6  Reproduction - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>6.6.1</strong>  Draw and label diagrams of the adult male and female reproductive systems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.6.2</strong>  Outline the role of hormones in the menstrual cycle, including FSH (follicle stimulating hormone), LH (luteinizing hormone), estrogen and progesterone.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.6.3</strong>  Annotate a graph showing hormone levels in the menstrual cycle, illustrating the relationship between changes in hormone levels and ovulation, menstruation and thickening of the endometrium.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.6.4</strong>  List three roles of testosterone in males.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.6.5</strong>  Outline the process of in vitro fertilization (IVF).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>6.6.6</strong>  Discuss the ethical issues associated with IVF.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 7.1 DNA Structure - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>7.1.1</strong> Describe the structure of DNA, including the antiparallel strands, 3’–5’ linkages and hydrogen bonding between purines and pyrimidines.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7.1.2</strong> Outline the structure of nucleosomes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7.1.3</strong> State that nucleosomes help to supercoil chromosomes and help to regulate transcription.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7.1.4</strong> Distinguish between unique or single-copy genes and highly repetitive sequences in nuclear DNA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>7.1.5</strong> State that eukaryotic genes can contain exons and introns.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 7.2 DNA Replication - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.2.1 State that DNA replication occurs in a 5' - 3' direction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.2.2 Explain the process of DNA replication in prokaryotes, including the role of enzymes (helicase, DNA polymerase, RNA primase and DNA ligase), Okazaki fragments and deoxynucleoside triphosphates.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.2.3 State that DNA replication is initiated at many points in eukaryotic chromosomes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 7.3 Transcription - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.3.1 State that transcription is carried out in a 5’ - 3’ direction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.3.2 Distinguish between the sense and antisense strands of DNA.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.3.3 Explain the process of transcription in prokaryotes, including the role of the promoter region, RNA polymerase, nucleoside triphosphates and the terminator.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.3.4 State that eukaryotic RNA needs the removal of introns to form mature mRNA.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 7.4 Translation - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.4.1 Explain that each tRNA molecule is recognized by a tRNA-activating enzyme that</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>binds a specific amino acid to the tRNA, using ATP for energy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4.2 Outline the structure of ribosomes, including protein and RNA composition,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>large and small subunits, three tRNA binding sites and mRNA binding sites.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4.3 State that translation consists of initiation, elongation, translocation and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>termination.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4.4 State that translation occurs in a 5’ - 3’ direction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4.5 Draw and label a diagram showing the structure of a peptide bond between two</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>amino acids.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4.6 Explain the process of translation, including ribosomes, polysomes, start</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>codons and stop codons.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.4.7 State that free ribosomes synthesize proteins for use primarily within the cell,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and that bound ribosomes synthesize proteins primarily for secretion or for lysosomes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 7.5 Proteins - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.5.1 Explain the four levels of protein structure, indicating the significance of each level.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5.2 Outline the difference between fibrous and globular proteins, with reference to two examples of each protein type.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5.3 Explain the significance of polar and non-polar amino acids.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.5.4 State four functions of proteins, giving a named example of each.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Topic 7 Nucleic Acids and Proteins: Knowledge Audit

Name:

### 7.6 Enzymes - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.6.1 State that metabolic pathways consist of chains and cycles of enzyme catalysed reactions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.6.2 Describe the induced-fit model.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.6.3 Explain that enzymes lower the activation energy of the chemical reactions that they catalyse.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.6.4 Explain the difference between competitive and non-competitive inhibition, with reference to one example of each.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.6.5 Explain the control of metabolic pathways by end-product inhibition, including the role of allosteric sites.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 8.1 Cell Respiration - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8.1.1</strong> State that oxidation involves the loss of electrons from an element, whereas reduction involves a gain of electrons; and that oxidation frequently involves gaining O₂ or losing H, whereas reduction frequently involves losing O₂ or gaining hydrogen.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>8.1.2</strong> Outline the process of glycolysis, including phosphorylation, lysis, oxidation and ATP formation.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>8.1.3</strong> Draw and label a diagram showing the structure of a mitochondrion as seen in electron micrographs.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>8.1.4</strong> Explain aerobic respiration, including the link reaction, the Krebs cycle, the role of NADH + H⁺, the electron transport chain and the role of O₂.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>8.1.5</strong> Explain oxidative phosphorylation in terms of chemiosmosis.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td><strong>8.1.6</strong> Explain the relationship between the structure of the mitochondrion and its function.</td>
<td>☐</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
### 8.2 Photosynthesis - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.2.1 Draw and label a diagram showing the structure of a chloroplast as seen in electron micrographs.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2.2 State that photosynthesis consists of light-dependent and light-independent reactions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2.3 Explain the light-dependent reactions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2.4 Explain photophosphorylation in terms of chemiosmosis.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2.5 Explain the light-independent reactions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2.6 Explain the relationship between the structure of the chloroplast and its function.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2.7 Explain the relationship between the action spectrum and the absorption spectrum of photosynthetic pigments in green plants.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.2.8 Explain the concept of limiting factors in photosynthesis, with reference to light intensity, temperature and concentration of CO₂.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 9.1 Plant Structure and Growth - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>9.1.1 Draw and label diagrams to show the distribution of tissues in the stem and leaf of a dicotyledonous plant.</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>9.1.2 Outline three differences between the structures of dicotyledonous and monocotyledonous plants.</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>9.1.3 Explain the relationship between the distribution of tissues in the leaf and the functions of these tissues.</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>9.1.4 Identify modifications of roots, stems and leaves for different functions: bulbs, stem tubers, storage roots and tendrils.</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>9.1.5 State that dicotyledonous plants have apical and lateral meristems.</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>9.1.6 Compare growth due to apical and lateral meristems in dicotyledonous plants.</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
<tr>
<td>9.1.7 Explain the role of auxin in phototropism as an example of the control of plant growth.</td>
<td>☑️</td>
<td>☑️</td>
<td>☑️</td>
</tr>
</tbody>
</table>
### 9.2 Transport in Angiospermophytes - HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>9.2.1</strong> Outline how the root system provides a large surface area for mineral ion and water uptake by means of branching and root hairs.</td>
</tr>
<tr>
<td><strong>9.2.2</strong> List ways in which mineral ions in the soil move to the root.</td>
</tr>
<tr>
<td><strong>9.2.3</strong> Explain the process of mineral ion absorption from the soil into roots by active transport.</td>
</tr>
<tr>
<td><strong>9.2.4</strong> State that terrestrial plants support themselves by means of thickened cellulose, cell turgor and lignified xylem.</td>
</tr>
<tr>
<td><strong>9.2.5</strong> Define transpiration.</td>
</tr>
<tr>
<td><strong>9.2.6</strong> Explain how water is carried by the transpiration stream, including the structure of xylem vessels, transpiration pull, cohesion, adhesion and evaporation.</td>
</tr>
<tr>
<td><strong>9.2.7</strong> State that guard cells can regulate transpiration by opening and closing stomata.</td>
</tr>
<tr>
<td><strong>9.2.8</strong> State that the plant hormone abscisic acid causes the closing of stomata.</td>
</tr>
<tr>
<td><strong>9.2.9</strong> Explain how the abiotic factors light, temperature, wind and humidity, affect the rate of transpiration in a typical terrestrial plant.</td>
</tr>
<tr>
<td><strong>9.2.10</strong> Outline four adaptations of xerophytes that help to reduce transpiration.</td>
</tr>
<tr>
<td><strong>9.2.11</strong> Outline the role of phloem in active translocation of sugars (sucrose) and amino acids from source (photosynthetic tissue and storage organs) to sink (fruits, seeds, roots).</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>9.3.1</td>
</tr>
<tr>
<td>9.3.2</td>
</tr>
<tr>
<td>9.3.3</td>
</tr>
<tr>
<td>9.3.4</td>
</tr>
<tr>
<td>9.3.5</td>
</tr>
<tr>
<td>9.3.6</td>
</tr>
</tbody>
</table>
### 10.1 Meiosis – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10.1.1</strong> Describe the behaviour of the chromosomes in the phases of meiosis.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10.1.2</strong> Outline the formation of chiasmata in the process of crossing over.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10.1.3</strong> Explain how meiosis results in an effectively infinite genetic variety in gametes through crossing over in prophase I and random orientation in metaphase I.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10.1.4</strong> State Mendel’s law of independent assortment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>10.1.5</strong> Explain the relationship between Mendel’s law of independent assortment and meiosis.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 10.2 Dihybrid Crosses and Gene Linkage – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.2.1 Calculate and predict the genotypic and phenotypic ratio of offspring of dihybrid crosses involving unlinked autosomal genes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.2.2 Distinguish between autosomes and sex chromosomes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.2.3 Explain how crossing over between non-sister chromatids of a homologous pair in prophase I can result in an exchange of alleles.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.2.4 Define linkage group.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.2.5 Explain an example of a cross between two linked genes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.2.6 Identify which of the offspring are recombinants in a dihybrid cross involving linked genes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 10.3 Polygenic Inheritance – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.3.1 Define polygenic inheritance.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.3.2 Explain that polygenic inheritance can contribute to continuous variation using two examples, one of which must be human skin colour.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Topic 11: Human Health and Physiology: Knowledge Audit

#### 11.1 Defence against Infectious Disease – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.1.1 Describe the process of blood clotting.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1.2 Outline the principle of challenge and response, clonal selection and memory cells as the basis of immunity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1.3 Define active and passive immunity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1.4 Explain antibody production.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1.5 Describe the production of monoclonal antibodies and their use in diagnosis and in treatment.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1.6 Explain the principle of vaccination.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.1.7 Discuss the benefits and dangers of vaccination.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## 11.2 Muscles and Movement – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.2.1 State the roles of bones, ligaments, muscles, tendons and nerves in human movement.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.2.2 Label a diagram of the human elbow joint, including cartilage, synovial fluid, joint capsule, named bones and antagonistic muscles (biceps and triceps).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.2.3 Outline the functions of the structures in the human elbow joint named in 11.2.2.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.2.4 Compare the movements of the hip joint and the knee joint.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.2.5 Describe the structure of striated muscle fibres, including the myofibrils with light and dark bands, mitochondria, the sarcoplasmic reticulum, nuclei and the sarclemma.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.2.6 Draw and label a diagram to show the structure of a sarcomere, including Z lines, actin filaments, myosin filaments with heads, and the resultant light and dark bands.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.2.7 Explain how skeletal muscle contracts, including the release of calcium ions from the sarcoplasmic reticulum, the formation of cross-bridges, the sliding of actin and myosin filaments, and the use of ATP to break cross-bridges and re-set myosin heads.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.2.8 Analyse electron micrographs to find the state of contraction of muscle fibres.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 11.3 The Kidney – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.3.1 Define excretion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3.2 Draw and label a diagram of the kidney.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3.3 Annotate a diagram of a glomerulus and associated nephron to show the function of each part.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3.4 Explain the process of ultrafiltration, including blood pressure, fenestrated blood capillaries and basement membrane.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3.5 Define osmoregulation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3.6 Explain the reabsorption of glucose, water and salts in the proximal convoluted tubule, including the roles of microvilli, osmosis and active transport.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3.7 Explain the roles of the loop of Henle, medulla, collecting duct and ADH (vasopressin) in maintaining the water balance of the blood.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3.8 Explain the differences in the concentration of proteins, glucose and urea between blood plasma, glomerular filtrate and urine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.3.9 Explain the presence of glucose in the urine of untreated diabetic patients.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 11.4 Reproduction – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>11.4.1</strong> Annotate a light micrograph of testis tissue to show the location and function of interstitial cells (leydig cells), germinal epithelium cells, developing spermatozoa and Sertoli cells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11.4.2</strong> Outline the processes involved in spermatogenesis within the testis, including mitosis, cell growth, the two divisions of meiosis and cell differentiation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11.4.3</strong> State the role of LH, testosterone and FSH in spermatogenesis.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11.4.4</strong> Annotate a diagram of the ovary to show the location and function of germinal epithelium, primary follicles, mature follicle and secondary oocyte.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11.4.5</strong> Outline the processes involved in oogenesis within the ovary, including mitosis, cell growth, the two divisions of meiosis, the unequal division of cytoplasm and the degeneration of polar body.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11.4.6</strong> Draw and label a diagram of a mature sperm and egg.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>11.4.7</strong> Outline the role of the epididymis, seminal vesicle and prostate gland in the production of semen.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assessment statement</td>
<td>OK</td>
<td>Review</td>
<td>Get help</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------------</td>
<td>----</td>
<td>--------</td>
<td>----------</td>
</tr>
<tr>
<td>11.4.8 Compare the processes of spermatogenesis and oogenesis, including the number</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>of gametes and the timing of the formation and release of gametes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.9 Describe the process of fertilization, including the acrosome reaction,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>penetration of the egg membrane by a sperm and the cortical reaction.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.10 Outline the role of HCG in early pregnancy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.11 Outline early embryo development up to the implantation of the blastocyst.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.12 Explain how the structure and functions of the placenta, including its</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>hormonal role in secretion of estrogen and progesterone, maintain pregnancy.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.13 State that the fetus is supported and protected by the amniotic sac and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>amniotic fluid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.14 State that materials are exchanged between the maternal and fetal blood in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>the placenta.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.4.15 Outline the process of birth and its hormonal control, including the changes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>in progesterone and oxytocin levels and positive feedback.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Option D Evolution: Knowledge Audit

Name:

**D.1 Origin of Life on Earth - Core**

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>D.1.1</strong> Describe four processes needed for the spontaneous origin of life on Earth.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.1.2</strong> Outline the experiments of Miller and Urey into the origin of organic compounds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.1.3</strong> State that comets may have delivered organic compounds to Earth.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.1.4</strong> Discuss possible locations where conditions would have allowed the synthesis of organic compounds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.1.5</strong> Outline two properties of RNA that would have allowed it to play a role in the origin of life.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.1.6</strong> State that living cells may have been preceded by protobionts, with an internal chemical environment different from their surroundings.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.1.7</strong> Outline the contribution of prokaryotes to the creation of an oxygen-rich atmosphere.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.1.8</strong> Discuss the endosymbiotic theory for the origin of eukaryotes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Option D Evolution: Knowledge Audit

Name:

## D.2 Species and Speciation - Core

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.2.1 Define allele frequency and gene pool.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.2 State that evolution involves a change in allele frequency in a population’s gene pool over a number of generations.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.3 Discuss the definition of the term species.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.4 Describe three examples of barriers between gene pools.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.5 Explain how polyploidy can contribute to speciation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.6 Compare allopatric and sympatric speciation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.7 Outline the process of adaptive radiation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.8 Compare convergent and divergent evolution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.9 Discuss ideas on the pace of evolution, including gradualism and punctuated equilibrium.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.10 Describe one example of transient polymorphism.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.2.11 Describe sickle-cell anemia as an example of balanced polymorphism.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Option D Evolution: Knowledge Audit

Name:

**D.3 Human Evolution - Core**

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>D.3.1</strong> Outline the method for dating rocks and fossils using radioisotopes, with reference to 14C and 40K.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.2</strong> Define half-life.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.3</strong> Deduce the approximate age of materials based on a simple decay curve for a radioisotope.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.4</strong> Describe the major anatomical features that define humans as primates.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.5</strong> Outline the trends illustrated by the fossils of Ardipithecus ramidus, Australopithecus including A. afarensis and A. africanus, and Homo including H. habilis, H. Erectus, H. neanderthalensis and H. sapiens.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.6</strong> State that, at various stages in hominid evolution, several species may have coexisted.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.7</strong> Discuss the incompleteness of the fossil record and the resulting uncertainties about human evolution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.8</strong> Discuss the correlation between the change in diet and increase in brain size during hominid evolution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.9</strong> Distinguish between genetic and cultural evolution.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.3.10</strong> Discuss the relative importance of genetic and cultural evolution in the recent evolution of humans.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### D.4 Human Evolution – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>D.4.1</strong> Explain how the Hardy–Weinberg equation is derived.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.4.2</strong> Calculate allele, genotype and phenotype frequencies for two alleles of a gene, using the Hardy–Weinberg equation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>D.4.3</strong> State the assumptions made when the Hardy–Weinberg equation is used.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### D.5 Phylogeny and Systematics – HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.5.1 Outline the value of classifying organisms.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.2 Explain the biochemical evidence provided by the universality of DNA and protein structures for the common ancestry of living organisms.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.3 Explain how variations in specific molecules can indicate phylogeny.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.4 Discuss how biochemical variations can be used as an evolutionary clock.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.5 Define clade and cladistics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.6 Distinguish, with examples, between analogous and homologous characteristics.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.7 Outline the methods used to construct cladograms and the conclusions that can be drawn from them.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.8 Construct a simple cladogram.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.9 Analyse cladograms in terms of phylogenetic relationships.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D.5.10 Discuss the relationship between cladograms and the classification of living organisms.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.1</td>
<td>Outline the factors that affect the distribution of plant species, including temperature, water, light, soil pH, salinity and mineral nutrients.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.2</td>
<td>Explain the factors that affect the distribution of animal species, including temperature, water, breeding sites, food supply and territory.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.3</td>
<td>Describe one method of random sampling, based on quadrat methods, that is used to compare the population size of two plant or two animal species.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.4</td>
<td>Outline the use of a transect to correlate the distribution of plant or animal species with an abiotic variable.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.5</td>
<td>Explain what is meant by the niche concept, including an organism’s spatial habitat, its feeding activities and its interactions with other species.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.6</td>
<td>Outline the following interactions between species, giving two examples of each: competition, herbivory, predation, parasitism and mutualism.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.7</td>
<td>Explain the principle of competitive exclusion.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.8</td>
<td>Distinguish between fundamental and realized niches.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.9</td>
<td>Define biomass.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.1.10</td>
<td>Describe one method for the measurement of biomass of different trophic levels in an ecosystem.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### G.2 Ecosystem and Biomes – Only SL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>G.2.1 Define gross production, net production and biomass.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.2 Calculate values for gross production and net production using the equation: gross production – respiration = net production.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.3 Discuss the difficulties of classifying organisms into trophic levels.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.4 Explain the small biomass and low numbers of organisms in higher trophic levels.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.5 Construct a pyramid of energy, given appropriate information.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.6 Distinguish between primary and secondary succession, using an example of each.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.7 Outline the changes in species diversity and production during primary succession.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.8 Explain the effects of living organisms on the abiotic environment, with reference to the changes occurring during primary succession.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.9 Distinguish between biome and biosphere.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.10 Explain how rainfall and temperature affect the distribution of biomes.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G.2.11 Outline the characteristics of six major biomes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### G.3  Impacts of Humans on Ecosystems – Only SL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>G.3.1</strong> Calculate the Simpson diversity index for two local communities.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.2</strong> Analyse the biodiversity of the two local communities using the Simpson index.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.3</strong> Discuss reasons for the conservation of biodiversity using rainforests as an example.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.4</strong> List three examples of the introduction of alien species that have had significant impacts on ecosystems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.5</strong> Discuss the impacts of alien species on ecosystems.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.6</strong> Outline one example of biological control of invasive species.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.7</strong> Define biomagnification.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.8</strong> Explain the cause and consequences of biomagnification, using a named example.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.9</strong> Outline the effects of ultraviolet (UV) radiation on living tissues and biological productivity.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.10</strong> Outline the effect of chlorofluorocarbons (CFCs) on the ozone layer.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>G.3.11</strong> State that ozone in the stratosphere absorbs UV radiation.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## H.1 Hormonal Control – Only HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H.1.1</strong> State that hormones are chemical messengers secreted by endocrine glands into the blood and transported to specific target cells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.1.2</strong> State that hormones can be steroids, proteins and tyrosine derivatives, with one example of each.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.1.3</strong> Distinguish between the mode of action of steroid hormones and protein hormones.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.1.4</strong> Outline the relationship between the hypothalamus and the pituitary gland.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.1.5</strong> Explain the control of ADH (vasopressin) secretion by negative feedback.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### H.2 Digestion – Only HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>H.2.1</strong> State that digestive juices are secreted into the alimentary canal by glands, including salivary glands, gastric glands in the stomach wall, the pancreas and the wall of the small intestine.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.2.2</strong> Explain the structural features of exocrine gland cells.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.2.3</strong> Compare the composition of saliva, gastric juice and pancreatic juice.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.2.4</strong> Outline the control of digestive juice secretion by nerves and hormones, using the example of secretion of gastric juice.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.2.5</strong> Outline the role of membrane bound enzymes on the surface of epithelial cells in the small intestine in digestion.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.2.6</strong> Outline the reasons for cellulose not being digested in the alimentary canal.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.2.7</strong> Explain why pepsin and trypsin are initially synthesized as inactive precursors and how they are subsequently activated.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.2.8</strong> Discuss the roles of gastric acid and Helicobacter pylori in the development of stomach ulcers and stomach cancers.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>H.2.9</strong> Explain the problem of lipid digestion in a hydrophilic medium and the role of bile in overcoming this.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### H.3  Absorption of Digested Food – Only HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.3.1  Draw and label a diagram showing a transverse section of the ileum as seen under a light microscope.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.3.2  Explain the structural features of an epithelial cell of a villus as seen in electron micrographs, including microvilli, mitochondria, pinocytotic vesicles and tight junctions.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.3.3  Explain the mechanisms used by the ileum to absorb and transport food, including facilitated diffusion, active transport and endocytosis.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**H.4 The Functions of the Liver – Only HL**

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.4.1 List the materials that are not absorbed and are egested.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.4.2 Outline the circulation of blood through liver tissue, including the hepatic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>artery, hepatic portal vein, sinusoids and hepatic vein.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.4.3 Explain the role of the liver in regulating levels of nutrients in the blood.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.4.4 Outline the role of the liver in the storage of nutrients, including carbohydrate, iron, vitamin A and vitamin D.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.4.5 State that the liver synthesizes plasma proteins and cholesterol.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.4.6 State that the liver has a role in detoxification.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.4.7 Describe the process of erythrocyte and hemoglobin breakdown in the liver,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>including phagocytosis, digestion of globin and bile pigment formation.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.4.8 Explain the liver damage caused by excessive alcohol consumption.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
H.5 The Transport System – Only HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.5.1 Explain the events of the cardiac cycle, including atrial and ventricular systole and diastole, and heart sounds.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.5.2 Analyse data showing pressure and volume changes in the left atrium, left ventricle and the aorta, during the cardiac cycle.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.5.3 Outline the mechanisms that control the heartbeat, including the roles of the SA (sinoatrial) node, AV (atrioventricular) node and conducting fibres in the ventricular walls.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.5.4 Outline atherosclerosis and the causes of coronary thrombosis.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.5.5 Discuss factors that affect the incidence of coronary heart disease.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## H.6 Gas Exchange – Only HL

<table>
<thead>
<tr>
<th>Assessment statement</th>
<th>OK</th>
<th>Review</th>
<th>Get help</th>
</tr>
</thead>
<tbody>
<tr>
<td>H.6.1 Define partial pressure.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.6.2 Explain the oxygen dissociation curves of adult hemoglobin, fetal hemoglobin,</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>and myoglobin.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.6.3 Describe how carbon dioxide is carried by the blood, including the action of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>carbonic anhydrase, the chloride shift and buffering by plasma proteins.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.6.4 Explain the role of the Bohr shift in the supply of oxygen to respiring tissues.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.6.5 Explain how and why ventilation rate varies with exercise.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.6.6 Outline the possible causes of asthma and its effects on the gas exchange</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>system.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H.6.7 Explain the problem of gas exchange at high altitudes and the way the body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>acclimatizes.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>