Throughout the training year you are required to take personal responsibility for renewing and updating your subject knowledge, identifying areas for development, setting personal targets and addressing any areas of weakness. This process commences now, before the course starts, and will continue throughout.

RAG Rate your confidence in each area with a grade. **RED (High) Green (Low)** Highlight the statements which you believe require development

|  |  |  |  |  |  |  |  |
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|  | **Teachers should understand:** | Pre-Interview | Pre- programme | Assessment Point 1 | Assessment Point 2 | Assessment Point 3 | Assessment Point 4 |
|  | B1.1 CELL STRUCTURES |  |  |  |  |  |  |
| 1.1a | Describe how light microscopes and staining can be used to view cells. |  |  |  |  |  |  |
| 1.1b | Explain how the main sub-cellular structures of eukaryotic cells (plants and animals) and prokaryotic cells are related to their functions. |  |  |  |  |  |  |
| 1.1c | Explain how electron microscopy has increased our understanding of sub-cellular structures. |  |  |  |  |  |  |
|  | B1.2 WHAT HAPPENS IN CELLS (& WHAT DO CELLS NEED?) |  |  |  |  |  |  |
| 1.2a | Describe DNA as a polymer. |  |  |  |  |  |  |
| 1.2b | Describe DNA as being made up of two strands forming a double helix. |  |  |  |  |  |  |
| 1.2c | Describe that DNA is made from four different nucleotides; each nucleotide consisting of a common sugar and phosphate group with one of four different bases attached to the sugar. |  |  |  |  |  |  |
| **1.2d H** | **Recall a simple description of protein synthesis.** |  |  |  |  |  |  |
| **1.2e H** | **Explain simply how the structure of DNA affects the proteins made in protein synthesis.** |  |  |  |  |  |  |
| 1.2f | Describe experiments that can be used to investigate enzymatic reactions. |  |  |  |  |  |  |
| 1.2g | Explain the mechanism of enzyme action. |  |  |  |  |  |  |
|  | B1.3 RESPIRATION |  |  |  |  |  |  |
| 1.3a | Describe cellular respiration as a universal chemical process, continuously occurring that supplies ATP in all living cells. |  |  |  |  |  |  |
| 1.3b | Describe cellular respiration as an exothermic reaction. |  |  |  |  |  |  |
| 1.3c | Compare the processes of aerobic respiration and anaerobic respiration. |  |  |  |  |  |  |
| 1.3d | Explain the importance of sugars in the synthesis and breakdown of carbohydrates. |  |  |  |  |  |  |
| 1.3e | Explain the importance of amino acids in the synthesis and breakdown of proteins. |  |  |  |  |  |  |
| 1.3f | Explain the importance of fatty acids and glycerol in the synthesis and breakdown of lipids. |  |  |  |  |  |  |
|  | B1.4 PHOTOSYNTHESIS |  |  |  |  |  |  |
| 1.4a | Describe photosynthetic organisms as the main producers of food and therefore biomass for life on Earth. |  |  |  |  |  |  |
| 1.4b | Describe the process of photosynthesis. |  |  |  |  |  |  |
| 1.4c | Describe photosynthesis as an endothermic reaction. |  |  |  |  |  |  |
| 1.4d | Describe experiments to investigate photosynthesis. |  |  |  |  |  |  |
| 1.4e | Explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis. |  |  |  |  |  |  |
| **1.4f** | **Explain the interaction of these factors in limiting the rate of photosynthesis.** |  |  |  |  |  |  |
|  | B2.1 SUPPLYING THE CELL |  |  |  |  |  |  |
| 2.1a | Explain how substances are transported into and out of cells through diffusion, osmosis and active transport. |  |  |  |  |  |  |
| 2.1b | Describe the process of mitosis in growth, including the cell cycle. |  |  |  |  |  |  |
| 2.1c | Explain the importance of cell differentiation. |  |  |  |  |  |  |
| 2.1d | Recall that stem cells are present in embryonic and adult animals and meristems in plants. |  |  |  |  |  |  |
| 2.1e | Describe the functions of stem cells. |  |  |  |  |  |  |
| 2.1f | Describe the difference between embryonic and adult stem cells in animals. |  |  |  |  |  |  |
|  | B2.2 THE CHALLENGES OF SIZE |  |  |  |  |  |  |
| 2.2a | Explain the need for exchange surfaces and a transport system in multicellular organisms in terms of surface area : volume ratio. |  |  |  |  |  |  |
| 2.2b | Describe some of the substances transported into and out of a range of organisms in terms of the requirements of those organisms. |  |  |  |  |  |  |
| 2.2c | Describe the human circulatory system. |  |  |  |  |  |  |
| 2.2d | Explain how the structure of the heart and the blood vessels are adapted to their functions. |  |  |  |  |  |  |
| 2.2e | Explain how red blood cells and plasma are adapted to their transport functions in the blood. |  |  |  |  |  |  |
| 2.2f | Explain how water and mineral ions are taken up by plants, relating the structure of the root hair cells to their function. |  |  |  |  |  |  |
| 2.2g | Describe the processes of transpiration and translocation. |  |  |  |  |  |  |
| 2.2h | Explain how the structure of the xylem and phloem are adapted to their functions in the plant. |  |  |  |  |  |  |
| 2.2i | Explain the effect of a variety of environmental factors on the rate of water uptake by a plant. |  |  |  |  |  |  |
| 2.2j | Describe how a simple potometer can be used to investigate factors that affect the rate of water uptake. |  |  |  |  |  |  |
|  | B3.1 CO-ORDINATION & CONTROL – THE NERVOUS SYSTEM |  |  |  |  |  |  |
| 3.1a | Describe the structure of the nervous system. |  |  |  |  |  |  |
| 3.1b | Explain how the components of the nervous system can produce a coordinated response. |  |  |  |  |  |  |
| 3.1c | Explain how the structure of a reflex arc is related to its function. |  |  |  |  |  |  |
| 3.1d | Explain how the main structures of the eye are related to their functions. |  |  |  |  |  |  |
| 3.1e | Describe common defects of the eye and explain how some of these problems may be overcome. |  |  |  |  |  |  |
| 3.1f | Describe the structure and function of the brain. |  |  |  |  |  |  |
| 3.1g | **Explain some of the difficulties of investigating brain function.** |  |  |  |  |  |  |
| **3.1h** | **Explain some of the limitations in treating damage and disease in the brain and other parts of the nervous system.** |  |  |  |  |  |  |
|  | B3.2 CO-ORDINATION & CONTROL – THE ENDOCRINE SYSTEM |  |  |  |  |  |  |
| 3.2a | Describe the principles of hormonal coordination and control by the human endocrine system. |  |  |  |  |  |  |
| **3.2b** | **Explain the roles of thyroxine and adrenaline in the body.** |  |  |  |  |  |  |
| 3.2c | Describe the role of hormones in human reproduction including the control of the menstrual cycle. |  |  |  |  |  |  |
| **3.2d** | **Explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle.** |  |  |  |  |  |  |
| 3.2e | Explain the use of hormones in contraception and evaluate hormonal and non-hormonal methods of contraception. |  |  |  |  |  |  |
| **3.2f** | **Explain the use of hormones in modern reproductive technologies to treat infertility.** |  |  |  |  |  |  |
| 3.2g | Explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropisms and gravitropisms. |  |  |  |  |  |  |
| 3.2h | Describe some of the variety of effects of plant hormones, relating to auxins, **gibberellins and ethane.** |  |  |  |  |  |  |
| **3.2i** | **Describe some of the different ways in which people use plant hormones to control plant growth.** |  |  |  |  |  |  |
|  | B3.3 MAINTAINING INTERNAL ENVIRONMENTS |  |  |  |  |  |  |
| 3.3a | Explain the importance of maintaining a constant internal environment in response to internal and external change. |  |  |  |  |  |  |
| 3.3b | Describe the function of the skin in the control of body temperature. |  |  |  |  |  |  |
| 3.3c | Explain how insulin controls blood sugar levels in the body. |  |  |  |  |  |  |
| **3.3d** | **Explain how glucagon interacts with insulin to control blood sugar levels in the body.** |  |  |  |  |  |  |
| 3.3e | Compare type 1 and type 2 diabetes and explain how they can be treated. |  |  |  |  |  |  |
| 3.3f | Explain the effect on cells of osmotic changes in body fluids. |  |  |  |  |  |  |
| 3.3g | Describe the function of the kidneys in maintaining the water balance of the body. |  |  |  |  |  |  |
| 3.3h | Describe the gross structure of the kidney and the structure of the kidney tubule. |  |  |  |  |  |  |
| **3.3i** | **Describe the effect of ADH on the permeability of the kidney tubules.** |  |  |  |  |  |  |
| **3.3j** | **Explain the response of the body to different temperature and osmotic challenges.** |  |  |  |  |  |  |
|  | B4.1 ECOSYSTEMS |  |  |  |  |  |  |
| 4.1a | Recall that many different materials cycle through the abiotic and biotic components of an ecosystem. |  |  |  |  |  |  |
| 4.1b | Explain the role of microorganisms in the cycling of materials through an ecosystem. |  |  |  |  |  |  |
| 4.1c | Explain the importance of the carbon cycle and the water cycle to living organisms. |  |  |  |  |  |  |
| 4.1d | Explain the effect of factors such as temperature, water content, and oxygen availability on rate of decomposition. |  |  |  |  |  |  |
| 4.1e | Describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem. |  |  |  |  |  |  |
| 4.1f | Explain how abiotic and biotic factors can affect communities. |  |  |  |  |  |  |
| 4.1g | Describe the importance of interdependence and competition in a community. |  |  |  |  |  |  |
| 4.1h | Describe the differences between the trophic levels of organisms within an ecosystem. |  |  |  |  |  |  |
| 4.1i | Describe pyramids of biomass and explain, with examples, how biomass is lost between the different trophic levels. |  |  |  |  |  |  |
| 4.1j | Calculate the efficiency of biomass transfers between trophic levels and explain how this affects the number of trophic levels in a food chain. |  |  |  |  |  |  |
|  | B5.1 INHERITANCE |  |  |  |  |  |  |
| 5.1a | Explain the following terms: gamete, chromosome, gene, allele/variant, dominant, recessive, homozygous, heterozygous, genotype and phenotype. |  |  |  |  |  |  |
| 5.1b | Describe the genome as the entire genetic material of an organism. |  |  |  |  |  |  |
| 5.1c | Describe that the genome, and its interaction with the environment, influence the development of the phenotype of an organism. |  |  |  |  |  |  |
| 5.1d | Recall that all variants arise from mutations, and that most have no effect on the phenotype, some influence phenotype and a very few determine phenotype. |  |  |  |  |  |  |
| **5.1e** | **Describe how genetic variants may influence phenotype: • in coding DNA by altering the activity of a protein • in non-coding DNA by altering how genes are expressed** |  |  |  |  |  |  |
| 5.1f | Explain some of the advantages and disadvantages of asexual and sexual reproduction in a range of organisms. |  |  |  |  |  |  |
| 5.1g | Explain the terms haploid and diploid. |  |  |  |  |  |  |
| 5.1h | Explain the role of meiotic cell division in halving the chromosome number to form gametes. |  |  |  |  |  |  |
| 5.1i | Explain single gene inheritance. |  |  |  |  |  |  |
| 5.1j | Predict the results of single gene crosses. |  |  |  |  |  |  |
| 5.1k | Describe sex determination in humans using a genetic cross. |  |  |  |  |  |  |
| 5.1l | Recall that most phenotypic features are the result of multiple genes rather than single gene inheritance. |  |  |  |  |  |  |
| 5.1m | Describe the development of our understanding of genetics. |  |  |  |  |  |  |
|  | B5.2 NATURAL SELECTION |  |  |  |  |  |  |
| 5.2a | State that there is usually extensive genetic variation within a population of a species. |  |  |  |  |  |  |
| 5.2b | Describe the impact of developments in biology on classification systems. |  |  |  |  |  |  |
| 5.2c | Explain how evolution occurs through the natural selection of variants that have given rise to phenotypes best suited to their environment. |  |  |  |  |  |  |
| 5.2d | Describe evolution as a change in the inherited characteristics of a population over time, through a process of natural selection, which may result in the formation of new species. |  |  |  |  |  |  |
| 5.2e | Describe the evidence for evolution. |  |  |  |  |  |  |
| 5.2f | Describe the work of Darwin and Wallace in the development of the theory of evolution by natural selection and explain the impact of these ideas on modern biology. |  |  |  |  |  |  |
|  | B6.1 MONITORING & MAINTAINING THE ENVIRONMENT |  |  |  |  |  |  |
| 6.1a | Explain how to carry out a field investigation into the distribution and abundance of organisms in a habitat and how to determine their numbers in a given area. |  |  |  |  |  |  |
| 6.1b | Describe both positive and negative human interactions within ecosystems and explain their impact on biodiversity. |  |  |  |  |  |  |
| 6.1c | Explain some of the benefits and challenges of maintaining local and global biodiversity. |  |  |  |  |  |  |
| **6.1d** | **Evaluate the evidence for the impact of environmental changes on the distribution of organisms, with reference to water and atmospheric gases.** |  |  |  |  |  |  |
|  | B6.2 FEEDING THE HUMAN RACE |  |  |  |  |  |  |
| 6.2a | Describe some of the biological factors affecting levels of food security. |  |  |  |  |  |  |
| 6.2b | Describe and explain some possible agricultural solutions to the demands of the growing human population. |  |  |  |  |  |  |
| 6.2c | Explain the impact of the selective breeding of food plants and domesticated animals. |  |  |  |  |  |  |
| 6.2d | Describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics. |  |  |  |  |  |  |
| **6.2e** | **Describe the main steps in the process of genetic engineering.** |  |  |  |  |  |  |
| 6.2f | Explain some of the possible benefits and risks of using gene technology in modern agriculture. |  |  |  |  |  |  |
| 6.2g | Describe and explain some possible biotechnological solutions to the demands of the growing human population. |  |  |  |  |  |  |
|  | B6.3 MONITORING & MAINTAINING HEALTH |  |  |  |  |  |  |
| 6.3a | Describe the relationship between health and disease. |  |  |  |  |  |  |
| 6.3b | Describe different types of diseases. |  |  |  |  |  |  |
| 6.3c | Describe the interactions between different types of disease. |  |  |  |  |  |  |
| 6.3d | Explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants. |  |  |  |  |  |  |
| 6.3e | Explain how the spread of communicable diseases may be reduced or prevented in animals and plants. |  |  |  |  |  |  |
| 6.3f | Describe a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS. |  |  |  |  |  |  |
| 6.3g | Describe physical plant defence responses to disease. |  |  |  |  |  |  |
| 6.3h | Describe chemical plant defence responses. |  |  |  |  |  |  |
| **6.3i** | **Describe different ways plant diseases can be detected and identified, in the lab and in the field.** |  |  |  |  |  |  |
| 6.3j | Explain how white blood cells and platelets are adapted to their defence functions in the blood. |  |  |  |  |  |  |
| 6.3k | Describe the non-specific defence systems of the human body against pathogens. |  |  |  |  |  |  |
| 6.3l | Explain the role of the immune system of the human body in defence against disease. |  |  |  |  |  |  |
| **6.3m** | **Describe how monoclonal antibodies are produced.** |  |  |  |  |  |  |
| **6.3n** | **Describe some of the ways in which monoclonal antibodies can be used.** |  |  |  |  |  |  |
| 6.3o | Explain the use of vaccines and medicines in the prevention and treatment of disease. |  |  |  |  |  |  |
| 6.3p | Explain the aseptic techniques used in culturing organisms. |  |  |  |  |  |  |
| 6.3q | Describe the processes of discovery and development of potential new medicines. |  |  |  |  |  |  |
| 6.3r | Recall that many non-communicable human diseases are caused by the interaction of a number of factors. |  |  |  |  |  |  |
| 6.3s | Evaluate some different treatments for cardiovascular disease. |  |  |  |  |  |  |
| 6.3t | Analyse the effect of lifestyle factors on the incidence of non-communicable diseases at local, national and global levels. |  |  |  |  |  |  |
| 6.3u | Describe cancer as the result of changes in cells that lead to uncontrolled growth and division. |  |  |  |  |  |  |
| 6.3v | Discuss potential benefits and risks associated with the use of stem cells in medicine. |  |  |  |  |  |  |
| 6.3w | Explain some of the possible benefits and risks of using gene technology in medicine. |  |  |  |  |  |  |
| 6.3x | Discuss the potential importance for medicine of our increasing understanding of the human genome. |  |  |  |  |  |  |