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| **Year 10 and Year 11 Biology** | |
| **Unit B3 – Infection and Response** | **Unit B4 –Bioenergetics** |
| Students will learn about the different types of pathogens and how they harm the body including some specific examples. Students will learn about the different immune responses made by the body to different types of pathogens. Students will consider treatment for different pathogens. Students will learn about vaccinations, how they were discovered and their importance. Students will also consider antibiotics, how they work and their advantages and disadvantages. Discovery and testing of drugs will also be covered with the procedure and an explanation, as well as related ethics. The risks of developing new drugs will also be discussed.  Biology students will also learn about antiseptics and their effect on bacterial growth, as well as monoclonal antibiotics, their production and ethical issues as well as plant disease.  **Keywords for this Unit**  **Pathogen –** disease causing microorganism  **Specific –** relates directly to something else  **Antibiotic –** medicine to kill bacteria  **Antiseptic –** substance which kills a range of different pathogens  **Phagocytes –** white blood cells which engulf, digest and destroy pathogens  **Lymphocytes –** white blood cells which produce specific antibodies to attack pathogens  **Immune –** the state of having antibodies ready to fight an infection, preventing the symptoms from forming  **Antigen –** specific markers on a cell or pathogen surface to which antibodies can attach  **Antibody –** specific chemicals which attach to antigens as part of the immune response | Students will learn about photosynthesis, where it happens and why it takes place. Students will investigate and consider the factors that affect photosynthesis and explain why. Students will consider the products of photosynthesis and how to test for their presence, as well as the fate of these substance. Students will learn about aerobic and anaerobic respiration, why they are used and the reactants and products. Students will compare these processes and analyse when they will be used. Students will also consider how the body responds to exercise and why this affect takes place.  **Keywords for this Unit**  **Photosynthesis –** chemical reaction converting water and carbon dioxide into glucose and oxygen (requiring light)  **Respiration –** process of releasing energy from a food source  **Aerobic –** requiring oxygen  **Anaerobic –** not requiring oxygen  **Ventilation –** the process of breathing to get air in and out of the lungs  **Mitochondria –** organelle in the cell where aerobic respiration occurs  **Oxygen debt –** the oxygen needed to remove the products of anaerobic respiration after exercise  **Fermentation –** chemical reaction (anaerobic respiration) taking place in yeast and some plant cells |
| **Unit B5 – Homeostasis and Response** | **Unit B6 – Inheritance, Variation and Evolution** |
| Cells in the body can only survive within narrow physical and chemical limits. They require a constant temperature and pH as well as a constant supply of dissolved food and water. In order to do this the body requires control systems that constantly monitor and adjust the composition of the blood and tissues. These control systems include receptors which sense changes and effectors that bring about changes. In this section we will explore the structure and function of the nervous system and how it can bring about fast responses. We will also explore the hormonal system which usually brings about much slower changes. Hormonal coordination is particularly important in reproduction since it controls the menstrual cycle. An understanding of the role of hormones in reproduction has allowed scientists to develop not only contraceptive drugs but also drugs which can increase fertility.  **Keywords for this Unit**  **Stimulus –** a change in the environment which triggers a response  **Effector –** muscle or gland which actions a response to a stimulus  **Response –** what the body does as a response to a stimulus  **Reflex –** fast and involuntary response to a stimulu  **Gland –** tissue which releases hormones  **Hormone –** a chemical messenger which brings about slow acting changes / responses in the organism  **Target organ –** the organ which a hormone acts upon  **Germination (bio only) –** the biological process of a seed beginning to grow into a new organism. | In this section we will discover how the number of chromosomes are halved during meiosis and then combined with new genes from the sexual partner to produce unique offspring. Gene mutations occur continuously and on rare occasions can affect the functioning of the animal or plant. These mutations may be damaging and lead to a number of genetic disorders or death. Very rarely a new mutation can be beneficial and consequently, lead to increased fitness in the individual. Variation generated by mutations and sexual reproduction is the basis for natural selection; this is how species evolve.  An understanding of these processes has allowed scientists to intervene through selective breeding to produce livestock with favoured characteristics. Once new varieties of plants or animals have been produced it is possible to clone individuals to produce larger numbers of identical individuals all carrying the favourable characteristic.  Scientists have now discovered how to take genes from one species and introduce them in to the genome of another by a process called genetic engineering. In spite of the huge potential benefits that this technology can offer, genetic modification still remains highly controversial.  **Keywords for this Unit**  **Gametes –** sex cells  **Mitosis –** cell division for growth and repair  **Meiosis –** cell division for the production of gametes  **Embryo –** first stage of development after an egg cell has been fertilised  **Chromosomes –** strands of DNA found in the nucleus. In body cells are found in pairs.  **Genome –** all of the genetic material in an organism  Alleles – Inherited versions of the same gene – may be the same or different.  **Ribosome –** organelle which produces proteins in the cell  Mutation – a change  **Genotype –** the combination of alleles for a characteristic  **Phenotype –** how the combination of alleles for a characteristic is “appears”  **Dominant –** an allele whose instructions override a recessive allele  **Recessive –** an allele whose instructions are hidden by a dominant allele  **Homozygous –** both the alleles for a characteristic are the same  **Heterozygous -** the alleles for a characteristic are different  **Evolution –** the change of a species over time due to environmental pressures  **Species –** a group of organisms that can reproduce with each other and create fertile offspring |
| **Unit B7 – Ecology** | |
| The Sun is a source of energy that passes through ecosystems. Materials including carbon and water are continually recycled by the living world, being released through respiration of animals, plants and decomposing microorganisms and taken up by plants in photosynthesis. All species live in ecosystems composed of complex communities of animals and plants dependent on each other and that are adapted to particular conditions, both abiotic and biotic. These ecosystems provide essential services that support human life and continued development. In order to continue to benefit from these services humans need to engage with the environment in a sustainable way. In this section we will explore how humans are threatening biodiversity as well as the natural systems that support it. We will also consider some actions we need to take to ensure our future health, prosperity and well-being.  **Keywords for this Unit**  **Interdependence –** the dependence living things have on each other for survival  **Biome –** very large scale ecosystems  **Ecosystem –** a natural environment of plants and animals which live and interact with each other  **Abiotic –** non-living part of an ecosystem  **Biotic –** living part of an ecosystem  **Quadrat –** fixed area frame used in sampling populations  **Transect –** a line across part of a habitat, using a quadrat to show the distribution of species  **Biodiversity –** the range of living things in a habitat | |