

Secondary Curriculum Information Pro-Forma

Subject:

Biology

Subject Leader:

Mr V Patel

Examinat

Edexcel GCSE Science

Recommended reading/preparation:

EDEXCEL GCSE Core Science

EDEXCEL GCSE Additional Science

EDEXCEL GCSE Extension Science

CGP GCSE Biology Revision Guide

CGP GCSE Biology Workbook

YEAR 10	Theme Title	Key Areas of Knowledge Acquisition	Key Skills and Processes Learned
Term 1 (September – October)	Classification, variation and inheritance	<p>Demonstrate an understanding of how biologists classify organisms according to how closely they are related</p> <p>Discuss why the definition of a species as organisms that produce fertile offspring may have limitations: some organisms do not always reproduce sexually and some hybrids are fertile</p> <p>Explain how organisms are adapted to their environment and how some organisms have characteristics that enable them to survive in extreme environments, including deep-sea hydrothermal vents and polar regions</p>	Investigate the variations within a species to illustrate continuous variation and discontinuous variation
Term 2 (November – December)	Responses to a changing environment	<p>Demonstrate an understanding of the homeostatic mechanisms</p> <p>Explain how thermoregulation takes place</p> <p>Recall that hormones are produced in endocrine glands and are transported by the blood to their target organs</p>	Investigate human responses to external stimuli

		<p>Explain how blood glucose levels are regulated by insulin and excess blood glucose is converted to glycogen in the liver</p> <p>Recall that the central nervous system consists of the brain and spinal cord and is linked to sense organs by nerves</p>	
<p>Term 3 (January – February)</p>	<p>Problems of, and solutions to a changing environment</p>	<p>Define a drug as a chemical substance, such as a narcotic or hallucinogen, that affects the central nervous system, causing changes in psychological behaviour and possible addiction</p> <p>Explain the effects of some chemicals in cigarette smoke</p> <p>Discuss the ethics of organ transplants</p> <p>Recall that infectious diseases are caused by pathogens Describe how pathogens are spread Explain how the human body can be effective against attack from pathogens</p> <p>Demonstrate an understanding that plants produce chemicals that have antibacterial effects in order to defend themselves, some of which are used by humans</p> <p>Describe how antiseptics can be used to prevent the spread of infection and explain the use of antibiotics to control infection</p> <p>Demonstrate an understanding of how some energy is transferred to less useful forms at each trophic level and this limits the length of a food chain</p> <p>Explain how the survival of some organisms may depend on the presence of another species and its environment</p> <p>Demonstrate an understanding of how recycling can reduce the demand for resources and the problem of waste disposal, including paper, plastics and metals</p>	<p>Investigate reaction times</p> <p>Investigate the effects of antiseptics or antibiotics on microbial cultures</p> <p>Investigate the effect of pollutants on plant germination and plant growth</p>

		Demonstrate an understanding of how carbon is recycled	
Term 4 (March – April)	The building blocks of cells	<p>Describe the function of the components of a bacterial cell</p> <p>Describe how plant and animal cells can be studied in greater detail with a light microscope</p> <p>Recall that a gene is a section of a molecule of DNA and that it codes for a specific protein</p> <p>Describe a DNA molecule</p> <p>Explain how the structure of DNA was discovered, including the roles of the scientists Watson, Crick, Franklin and Wilkins and discuss the implications of sequencing the human genome (Human Genome Project) and of the collaboration that took place within this project</p> <p>Demonstrate an understanding of the process of genetic engineering</p> <p>Discuss the advantages and disadvantages of genetic engineering to produce GM organisms</p> <p>Describe the division of a cell by mitosis as the production of two daughter cells</p> <p>Recall that mitosis occurs during growth, repair and asexual reproduction</p> <p>Recall that, at fertilisation, haploid gametes combine to form a diploid zygote</p> <p>Recall that cloning is an example of asexual reproduction that produces genetically identical copies</p> <p>Demonstrate an understanding of the stages in the production of cloned mammals and the advantages, disadvantages and risks of cloning mammals</p> <p>Recall that stem cells in the embryo can differentiate into all other types of cells, but that cells lose this ability as the animal matures</p> <p>Demonstrate an understanding of the advantages, disadvantages and risks arising from adult and embryonic stem cell research</p> <p>Describe how the order of bases in a section of DNA decides the order of amino acids in the protein</p> <p>Demonstrate an understanding of the stages of protein synthesis, including transcription and translation</p>	Investigate how to extract DNA from cells

		<p>Describe each protein as having its own specific number and sequence of amino acids, resulting in different-shaped molecules that have different functions, including enzymes</p> <p>Demonstrate an understanding of how gene mutations change the DNA base sequence and that mutations can be harmful, beneficial or neither</p> <p>Describe enzymes as biological catalysts and that enzymes catalyse chemical reactions occurring inside and outside living cells</p> <p>Describe the factors affecting enzyme action, Recall that enzymes are highly specific for their substrate</p> <p>Demonstrate an understanding of the action of enzymes in terms of the 'lock-and-key' hypothesis Describe how enzymes can be denatured due to changes in the shape of the active site</p> <p>Investigate the factors that affect enzyme activity</p>	
<p>Term 5 (April – May)</p>	<p>Organisms and energy</p>	<p>Respiration is a process used by all living organisms that releases the energy in organic molecules and how the human circulatory system facilitates respiration</p> <p>Define diffusion as the movement of particles from an area of high concentration to an area of lower concentration and demonstrate an understanding of how aerobic respiration uses oxygen to release energy</p> <p>Explain why heart rate and breathing rate increase with exercise and demonstrate an understanding of why, during vigorous exercise, muscle cells may not receive sufficient oxygen for their energy requirements and so start to respire anaerobically</p> <p>Demonstrate an understanding of how anaerobic respiration releases energy from glucose and how this process can be modelled using the word equation for anaerobic respiration</p> <p>Describe how a build-up of lactic acid requires extra oxygen to break it down. This is called excess post-exercise oxygen consumption or EPOC (formerly known as oxygen debt)</p> <p>Explain why heart rate and breathing rate remain high after exercise</p> <p>Describe how the structure of a leaf is adapted for photosynthesis</p> <p>Demonstrate an understanding of how photosynthesis uses</p>	<p>Investigate the effect of exercise on breathing rate and heart rate</p> <p>Investigate how factors, including the effect of light intensity, CO₂ concentration or temperature, affect the rate of photosynthesis</p> <p>Investigate osmosis</p> <p>Investigate the relationship between organisms and their environment using fieldwork techniques</p>

		<p>light energy to produce glucose and how this process can be modelled using the word equation for photosynthesis and how limiting factors affect the rate of photosynthesis, Explain how the loss of water vapour from leaves drives transpiration and explain how water, glucose and mineral salts are transported through a plant, including: a mineral uptake in roots by active transport b the role of the xylem and phloem vessels Describe how root hair cells are adapted to take up water by osmosis and define osmosis as the movement of water molecules from an area of higher concentration of water to an area of lower concentration of water through a partially permeable membrane</p>	
Term 6 (June – July)	Common systems	<p>Evaluate the evidence for evolution based on the fossil record and explain why there are gaps in the fossil record, Explain how the anatomy of the pentadactyl limb provides scientists with evidence for evolution Describe growth in terms of increase in size, length and mass Explain how cell division, elongation and differentiation contribute to the growth and development of a plant Explain how cell division and differentiation contribute to the growth and development of an animal # Recall the structure and function of the following parts of the blood. Describe the grouping of cells into tissues, tissues into organs, and organs into organ systems Explain how the structure of the heart is related to its function Describe how the circulatory system transports substances around the body Describe the functions of the parts of the digestive system Explain the role of digestive enzymes.</p>	Investigate the effect of different concentrations of digestive enzymes, using and evaluating models of the alimentary canal