BIOLOGY 'HEAD' - THE KNOWLEDGE YOU WILL COVER FROM YEAR 7-11

8		Organisms 	**Movement** identify bones of the human skeleton and explain how the properties of bones contribute to skeleton functions. - identify different joints and describe the roles of tendons, ligaments and muscles in movement. - state the roles of antagonistic muscles in movement. - recall how some medical problems affect the skeleton and how they can be treated.	**Cells** - define the terms tissues, organs and organ systems and describe the consequences of recreational drug use and organ damage on body systems. - list scientific terminology relating to plant and animal cells and use it to describe and explain cell structure. - identify specialised cells and explain how their structures relate to their functions. - follow instructions to compare cells under a microscope. - recognise unicellular organisms and describe their adaptations.	**Breathing** - describe how pressure changes arise in the mechanism of breathing. - identify simple methods to measure lung volume. - state the features of the human gas exchange system and explain how these features and breathing facilitate respiration.	**Digestion** use developments in our understanding of smoking to describe and explain the effects of disease and lifestyle on the human breathing system. - examine the roles of components of a healthy diet and compare the energy requirements of different groups of people. - describe the physical effects of eating an unbalanced diet in terms of over and under eating as well as dietary deficiencies. - use models to describe the process of digestion. - describe and explain the roles of organs and enzymes in the human digestive system.	**Adaptations, Interdependence and Competition** - differentiate between and describe the interactions of different levels of organisation in a community - explain the consequences of changes in abiotic factors within a community - explain the consequences of changes in biotic factors within a community - give examples of structural, behavioural and functional adaptations to explain how some organisms can live in certain environments.	**Classification of living organisms** - use evolutionary trees to classify organisms or fossils using the Linnaean system. - describe the binomial naming system.	**Cell Structure** - compare the different features of eukaryotic and prokaryotic cells, using standard form to perform order of magnitude size calculations. - relate the sizes and features of sub-cellular structures to their functions. - analyse features of specialised cells to explain their functions. - link cell differentiation to the growth, development and maintenance of an organism. - compare different types of microscopy and carry out magnification calculations for cells viewed under a light microscope. - use aseptic technique to culture microorganisms safely and use data to explain the effect of disinfectants and antibiotics on the size of their populations.	**Disease** - explain how infections caused by pathogens can be promoted, prevented or reduced - discuss the transmission and effect of the viral diseases measles, HIV and TMV - discuss the transmission and effect of the bacterial diseases Salmonella and gonorrhoea - discuss the transmission and effects of the fungal disease rose black spot - discuss malaria as a protist disease - describe and explain specific and non-specific infection defence systems of the human body - explain how vaccination prevents illness and the spread of pathogens - discuss the use of antibiotics and painkillers - discuss the timeline of drug development and discovery - Monoclonal antibodies (biology only) (HT only) - use technical language to describe monoclonal antibody production - use examples to explain the uses of monoclonal antibodies - Plant disease (biology only) - identify and describe plant diseases and their cause through visual observation of plants - describe physical, chemical and mechanical plant defense systems.	**Organisation and the digestive system** - differentiate between the features of cells, tissues and organs to explain the organisation of multicellular organisms. - link organs and enzyme activity together to describe and explain the process of digestion	**Organising Animals** - describe gaseous exchange in humans and calulate flow rate through the blood vessels of the circulatory system - describe blood as a tissue and link adaptations of blood cells to their functions - describe coronary heart disease and evaluate treatments	**Non-Communicable Diseases** - apply the relationship between health and disease to explain the cause of some health issues - identify lifestyle risk factors as causal mechanisms for some non-communicable diseases and discuss their impact on society - give examples of changes in cells that lead to cancer and differentiate between types of tumours.	**Organising Plants** - relate the structures of plant tissues to their functions - explain how the adaptations of plant organ systems give rise to their functions.	**Photosynthesis** - describe photosynthesis as a chemical reaction - discuss the factors that affect the rate of photosynthesis - explain the importance of photosynthesis	**Respiration** - compare the chemical differences between aerobic and anaerobic respiration - explain the effect of exercise on respiration - discuss some of the processes that occur in metabolism	**The Human Nervous System** - explain how the structures in the nervous system are adapted to coordinate responses to stimuli - discuss structures in the brain and evaluate methods of investigating brain function (bio only) - explain how structures within the eye facilitate vision and explain how sight defects can be resolved (bio only) - describe and explain the process of thermoregulation	**Hormonal Coordination** - explain how glands coordinate and control the human endocrine system - discuss the role of the pancreas in control of blood glucose concentration and explain the effect of diabetes treatments - describe and explain the interactions of hormones in the control of the menstrual cycle - evaluate different methods of contraception	**Homeostasis in Action** - link ideas about osmosis to kidney function to explain the control of water and nitrogen balance in the body (biology only) explain the role of hormones in IVF treatment (HT only) - use adrenalin and thyroxine to explain the principles of negative feedback as a control mechanism (HT only)
9	Biology	Ecosystems 	**Interdependence** - recall the features of a food web and make predictions about the effects of changing plant and animal populations. - state the role of toxins in the environment and the effect that they have on food chains. - describe the role of insects in pollination and explain the importance of insects for world food security. - list different ways in which organisms affect their environment and explain the effect of predator-prey relationships on an ecosystem.	**Plant Reproduction** - describe the functional parts of flowering plants and make comparisons between wind-pollinated and insect-pollinated specimens. - describe and explain the importance of pollination and fertilisation for seed formation. - make links between seed dispersal mechanisms and the variety seen in seed structures. - describe the role of fruit formation in seed dispersal and compare the outcomes with different seed dispersal mechanisms.	**Respiration** - explain the importance of respiration and interpret the chemical equation for this process. - use ideas about respiration to give examples of why aerobic and anaerobic respiration take place in the body during different sports and explain oxygen debt. - explain the production of carbon dioxide by plants and microbes in anaerobic respiration and recall the word equation for fermentation. - describe some useful applications of fermentation. - compare the differences between anaerobic and aerobic respiration.	**Organisation of an ecosystem** - explain factors that affect predator-prey numbers in a food web and perform sampling methods to determine species distribution in an ecosystem. describe and explain how nutrients are cycled through an ecosystem - explain the factors that affect the rate of decay of biological material and how this can be used in biogas generation - evaluate the impact of environmental changes on the distribution of species in an ecosystem - Trophic levels in an ecosystem (biology only) - explain the levels of trophic organisation within an ecosystem - construct pyramids of biomass - describe the transfer and loss of biomass	**Biodiversity and the Effect of Human Interaction on Ecosystems** - discuss the importance of biodiversity on Earth and within individual ecosystems - discuss the production and management of waste as a result of a growing human population - evaluate changes in land usage - evaluate environmental implications of deforestation - explain the consequences of global warming - evaluate conflicting pressures on maintaining biodiversity - Food production (biology only) - describe factors that affect food security and sustainable food production methods - evaluate the process of intensive farming. - explain the role of sustainable fisheries - appraise the role of biotechnology in food production												
10		Genes 	**Variation** - define the term variation and differentiate between continuous and discontinuous variation. - identify inherited or environmentally determined features in offspring and use ideas about variation to explain differences in siblings. - use examples to describe and explain the importance of variation for the survival of a species.	**Human Reproduction** - describe the functions of the female reproductive system and the process of menstruation, making links to fertility. - describe the structure and function of the male reproductive system and the process of fertilisation in humans. - recognise the stages of foetal development and describe the role of the mother's body in its growth. - describe factors that affect the development of a foetus. - apply knowledge about smoking and evaluate its effect during pregnancy.	**Evolution** - explain how competition is a driving factor in natural selection. - describe and explain the importance of biodiversity. - interpret theories about dinosaur extinction to identify changes that can cause a species to become extinct and explain the importance of gene banks.	**Cell Division** - use the term chromosome accurately to explain where genetic material is located in a cell. - describe the stages of the cell cycle and explain the importance of mitosis in the growth and development of multicellular organisms. - explain the functions and applications of stem cells, evaluating different perspectives on their use in medicine and research.	**Reproduction** differentiate between the roles of mitosis and meiosis in sexual and asexual reproduction - explain mitosis is involved in gamete formation - evaluate the processes of sexual and asexual reproduction (bio only) - describe the structure of DNA and the use of genome research - use ideas about nucleotides to describe the formation of proteins (HT only) - explain the process of inheritance in terms of alleles making predictions using the theory of probability explain the inheritance of disorders such as polydactlyl and cystic fiibrosis - carry out a genetic cross to explain sex inheritance - assess the work of Watson, Crick, Wilkins and Franklin to describe the structure and location of DNA and explain the link with chromosomes and genes. - apply ideas about numbers of chromosomes in gametes and fertilised eggs to explain how some genetic disorders arise. - explain how inherited differences arise and the effect environment plays on variation using differences seen between siblings and identical twins as examples. - make predictions about the likelihood of offspring inheriting specific traits	**Variation and Evolution** - discuss the genetic and environmental factors giving rise to variation - describe evolution and explain the introduction of new species using the theory of natural selection - discuss the process and impact of selective breeding describe and evaluate the process of genetic engineering compare different methods of cloning and discuss attitudes towards cloning	**Genetics and Evolution** - The development of understanding of genetics and evolution - evaluate evidence the explain the theory of evolution by natural selection (bio only) - use the work of key scientists to describe the process of speciation (bio only) - explain the significance of the work of Gregor Mendel to our understanding of genetics - describe fossil formation and use the fossil record to understand how life developed on Earth - describe causal factors in extinction - discuss the impact of bacterial evolution in terms of resistance										