

Biology at King's Academy Ringmer

End point	Knowledge acquired	Skills acquired
YEAR 7		
8- Organisms 8.1 Levels of organisation 8.2 Cells	<ul style="list-style-type: none"> • Function of the skeleton • Location and names of bones • Function joints • Location of joints and types • Function of cartilage, tendons and ligaments • Antagonistic muscle pairs • Scientists can observe cells through a microscope • Structure of animals cells • Structure of plant cells • Function of the subcellular structures: nucleus, cytoplasm, mitochondria, vacuole, cell membrane, cell wall chloroplasts • Structure and function of common specialised plant and animal cells • Movement of substances via diffusion <p style="text-align: center;">Top 5 Keywords cells, tissues, organs, organ systems.</p>	<ul style="list-style-type: none"> • Placing information about a system into a hierarchy • Measuring force using scales • Drawing a table of results (units in heading) • Following a scientific method
9 - Ecosystems 9.1-Interdependence 9.2 Plant reproduction	<ul style="list-style-type: none"> • Describe and construct food chains and food webs are • Plants are producers and how they use photosynthesis to make their own food • Describe the concept of interdependence • Explain bioaccumulation • Explain the importance of pollination • State what is meant by: ecosystem, community, habitat, environment and niche • Describe how different organisms can coexist within an ecosystem • Describe how organisms compete for resources and predator prey relationships • Describe plant reproduction and the structures of a flower • Describe pollination and different methods of pollination • Describe fertilisation and germination • Describe different methods of seed dispersal and how seeds are adapted <p style="text-align: center;">Top 5 Keywords</p>	<ul style="list-style-type: none"> • Writing and testing hypotheses during an investigation into if warmth, oxygen and water are required for germination • Construct a food webs and food chains from descriptions of feeding relationships • Interpret predator-prey graphs

	Competition, ecosystem, food chain, interdependence, fertilisation	
10 Genes 10.1 10.2	<ul style="list-style-type: none"> • The causes of variation in species (environmental and inherited) • Identifying the difference between continuous and discontinuous variation and how to plot each type on a graph • Describe how variation helps species to survive environmental change • Explain how species are adapted to their environment • Describe the main changes that take place during puberty • State the difference between adolescents and puberty • Describe the structure and function of the male and female reproductive systems • Describe the structure and function of gametes • Describe the process of fertilisation • Describe the causes of low fertility in male and female reproductive systems • Describe what happens during gestation and birth • Explain whether substances pass between the mother and the fetus • Describe the menstrual cycle • Describe contraceptives <p style="text-align: center;">Top 5 Keywords</p> <p style="text-align: center;">Adolescence, reproductive system, gestation, menstrual cycle, embryo</p>	<ul style="list-style-type: none"> • Determining which type of graph to use based on the type of data you are presenting (continuous/discontinuous) • Success criteria for producing a bar chart and a line graph • Labeling scientific diagrams
YEAR 8		
8- Organisms 8.3 Breathing 8.4- Digestion	<ul style="list-style-type: none"> • Describe the function of the gas exchange system and explain how its parts are adapted to their function • Explain why your breathing rate and volume can change • Describe the processes of inhaling and exhaling • Explain how exercise, smoking and asthma affect the gas exchange system • Compare medicinal and recreational drugs • Describe the effects of drugs on health and behaviour • State the kind of drug ethanol is and its effects on the human body (health and behaviour) • Describe and explain the effects of tobacco smoke on health • Describe the components of a healthy diet • Describe the effects of deficiencies or excesses of different nutrients on a person's health • Describe how to test foods for starch, lipids, sugar and protein 	<ul style="list-style-type: none"> • Using models as a method for describing how a scientific process works (bell-jar model to show inhalation and exhalation) • Think critically about the sources of data (newspapers, scientific journals etc) RE effects of smoking • Calculations of unit of alcohol (maths in science) • Constructing and analysing data in bar charts (composition of gases in inhaled and exhaled air) • Calculating energy requirements • Following a method to complete a food test • Reading nutritional packs to make judgments about the health implications of food

	<ul style="list-style-type: none"> Describe the health issues of an imbalanced diet Recall how animals get and use energy Define digestion Describe the structure and function of the digestive system Describe the role of bacteria in digestion Describe the role of enzymes in digestion <p>Top 5 Keywords</p> <p>Breathing, drug, nutrients, enzymes, digestion</p>	
9 - Ecosystems 9.1-Respiration 9.2 Photosynthesis	<ul style="list-style-type: none"> State what happens during anaerobic respiration Use a word equation to describe aerobic respiration State the difference between aerobic and anaerobic respiration Use a word equation to describe anaerobic respiration Explain when anaerobic respiration occurs Describe fermentation and how it helps to produce bread, beer and wines Describe how plant carry out photosynthesis Write the word equation for photosynthesis Describe and explain how the leaf is adapted for photosynthesis State the factors that affect the rate of photosynthesis State what fertilisers are used for Describe and explain how plants use minerals for healthy growth <p>Top 5 Keywords</p> <p>Aerobic respiration, anaerobic respiration, fermentation, photosynthesis, stomata</p>	<ul style="list-style-type: none"> Write a hypothesis that can be tested during an investigation Sketch graphs to show how a factor affects the rate of photosynthesis Describe how to measure the rate of photosynthesis
10 Genes 10.3- Evolution 10.4- Inheritance	<ul style="list-style-type: none"> Describe the theory of natural selection Explain how species evolve over time Evaluate the evidence Darwin used to develop his theory of natural selection State some factors that can lead to extinction and describe why a species has become extinct Describe the importance of biodiversity to an ecosystem and humans Describe what is meant by an endangered species Describe some techniques used to prevent extinction Describe how characteristics are inherited Describe the relationship between DNA, genes and chromosomes Explain how a DNA mutation may affect an organism and its future offspring 	<ul style="list-style-type: none"> Describe the process of peer review Practice debating a topic e.g. captive breeding and oracy skills Use the discovery of DNA to describe how scientists work together to solve a problem and piece of evidence come about from different experimentation and different points in time

	<ul style="list-style-type: none"> Describe the structure of DNA Describe the differences between dominant and recessive alleles Use a Punnet square to show how genes are inherited Explain why offspring are not identical to their parents Describe genetic modification and its advantages and disadvantages <p>Top 5 Keywords Evolution, natural selection, extinct, DNA, genes</p>	
YEAR 9		
8.5/6 - organisms	<ul style="list-style-type: none"> Describe how microscopes work Describe how to prepare slides of specimens Describe the differences and similarities between prokaryotic and eukaryotic cells Explain how vaccines work to produce immunity Justify the importance of vaccinations Describe how our immune system works Describe how antibiotics work to prevent disease Explain antibiotic resistance can develop <p>Top 10 Keywords Resolution, magnification, prokaryote, eukaryote, focusVaccine, antibiotic, immune response, antibiotic resistance, antibody</p>	<ul style="list-style-type: none"> Using a microscope and preparing specimen slides Create scientific drawings of specimens viewed under a microscope Evaluation of evidence and sources of evidence Using models to explain how biological processes work
9.5/6 - Ecosystems	<ul style="list-style-type: none"> Describe how fossils are formed Evaluate the evidence fossils provide for evolution Explain the process and importance of peer review Describe how Darwin developed his theory of evolution Explain how animals became extinct Describe how we can prevent further extinction of organisms <p>Top 10 Keywords Fossil, primate, peer review, index fossil, sedimentary rockExtinct, endangered, conservation, captive breeding, binomial nomenclature, evolution</p>	<ul style="list-style-type: none"> Evaluation of evidence and sources of evidence Describe how scientists ensure data is correctly reported Modeling biological processes using practicals Developing conclusions based on collected evidence
10.5/6 - Genes	<ul style="list-style-type: none"> Describe how DNA and its structure was discovered 	<ul style="list-style-type: none"> Describe how scientists work together to

	<ul style="list-style-type: none"> - Describe the structure of DNA - Describe the steps to extract DNA from peas - Discuss the differences between dominant and recessive alleles - Describe to use a punnett square to determine outcomes of a genetic cross - Describe what a genetically inherited disorder is - Describe the process of selective breedings and the advantages and disadvantages - Describe genetic modification and the advantages and disadvantages of GMOs - State a clone is and evaluate the advantages and disadvantages of cloning - Describe we use organisms to produce products - State what enzymes are and how they are used commercially <p style="text-align: center;">Top 10 Keywords Gene, base, chromosome, inheritance, carrier, allele Selective breeding, genetic engineering, cloning, fermentation, enzyme, denature</p>	<p>make discoveries</p> <ul style="list-style-type: none"> - Using punnett squares to determine genetic inheritance - Debating and oracy skills when analysing the advantages and disadvantages of selective breeding, genetic modification and cloning
YEAR 10 (Paper 1 GCSE course)		
B1 - Cell structure and transport	<ul style="list-style-type: none"> • Calculating magnification • The utility of electron microscopes • The similarities and differences between prokaryotic and eukaryotic cells • The roles of diffusion, osmosis and active transport in the movement of materials in and between cells • How plant and animal cells may be specified including examples • How exchange surfaces are adapted to efficient exchange of materials <p style="text-align: center;">Top 5 Keywords Cell, microscope, osmosis, activate transport, prokaryotic, eukaryotic</p>	<ul style="list-style-type: none"> • Calculating total magnification of a microscope • Using a rearranging the equation that links: magnification, image size and actual size • Moving between orders of magnitude • Using standard form • Converting between micro/nano/milli metres • RP: Preparing a specimen of animal tissue for viewing under a microscope • RP: Investigating osmosis in plant cells with different concentrations of sugar solutions

B2 - Cell division	<ul style="list-style-type: none"> • The role of chromosomes in cells • The importance of the cell cycle • How cells divide by mitosis • Differentiation in plant and animal cells • The structure and function of stem cells • Stem cell treatments and therapeutic cloning • Ethical and social dilemmas of stem cells <p>Top 5 Keywords</p> <p>Stem cell, clone, mitosis, differentiation, therapeutic cloning</p>	<ul style="list-style-type: none"> • Using pie charts to present data about proportions, percentages and ratios • Making balanced arguments about topics that have complex ethical, social and moral dilemmas
B3 -Organisation and the digestive system	<ul style="list-style-type: none"> • Tissues, organs and organ systems • The structure and function of the human digestive system • The basic structures of carbohydrates, proteins and lipids • What a catalyst is and how enzymes work as biological catalysts • What the metabolism of the body involves • How temperature and pH affect enzymes action • The role of different digestive enzymes • The role of hydrochloric acid and bile in digestion <p>Top 5 Keywords</p> <p>Digestion, enzymes, lipids, protein, carbohydrates</p>	<ul style="list-style-type: none"> • Using models to describe complex interactions of biological molecules (lock and key model) • Using chemicals to test for the presence of nutrients in food • Following a complex method to produce valid results • Investigating the effect of pH on the rate of reaction of amylase
B4 - Organising animals and plants	<ul style="list-style-type: none"> • How substances are transported to and from cells • The components of the blood and their function • The types of blood vessels and their structure and function • Importance of the double circulatory system • The structure and function of the heart • Problems with the supply to the heart and problems with valves, including treatment. • The structure and function of the human gas exchange system, including how alveoli function • Plant organs and organ systems • Transport of substances in plants (phloem and xylem) • Transpiration: how the plant controls it and factors that affect the rate <p>Top 5 Keywords</p> <p>Double circulatory system, valves, alveoli, transpiration, gas exchange</p>	<ul style="list-style-type: none"> • Using a flow chart to show the path of a substance through a complex organ system • Evaluating the different treatment options for a health condition to come to a logical conclusion about which is best using the available evidence • Using a bell-jar model to explain the mechanism behind breathing • Finding the mean and estimating before calculating. Number of stomata on the underside of a leaf
B5 - Communicable diseases	<ul style="list-style-type: none"> • Defining health • The causes of ill health and the types of disease • Pathogens: what are they, how they cause disease and how they are spread • <i>(T) Bacteria: how they multiply, how to grow an uncommitted</i> 	<ul style="list-style-type: none"> • Using data from a graph to determine correlations between two variables (e.g. stress and depression) • <i>(T) Growing an uncontaminated culture of bacteria</i>

	<p><i>culture in the lab, how cultures are used and why they are cultured at lower temperatures in schools than industry</i></p> <ul style="list-style-type: none"> • <i>(T) How to calculate the number of bacteria in a population and measure the effect of disinfectants and antibiotics on bacterial growth</i> • How the spread of disease can be reduced • The symptoms, treatment and contagion of a selection of: viral diseases, bacterial diseases, fungi and protists • How the body stops pathogens getting in and how your white blood cells protect you from disease • <i>(T) The variety of plant pathogens</i> • <i>(T) How mineral deficiencies can cause non-communicable diseases in plants</i> • <i>(T)(H) How to detect plant diseases</i> • <i>(T) A variety of plant defences against pathogens and herbivores</i> <p>Top 5 Keywords Communicable diseases, non-communicable disease, pathogen, health, white blood cells</p>	<ul style="list-style-type: none"> • <i>(T) Investigating the effect of disinfectants and antibiotics on bacterial growth</i> • <i>(T) Calculating the effect of disinfectants on bacterial growth</i> • Evaluating evidence of historical scientists to determine the validity of their conclusions
B6 - Preventing and treating disease	<ul style="list-style-type: none"> • How the immune system works • How vaccination protects the body against disease • What medicines are and how they work • The differences between painkillers and other medicines including antibiotics and what they treat • How penicillin was discovered • How drugs have been extracted from plants and how scientists discover new drugs • The stages involved in drugs testing • <i>(T)(H) How monoclonal antibodies are produced and used</i> <p>Top 5 Keywords Immune system, vaccine, antibiotics, painkillers, penicillin</p>	<ul style="list-style-type: none"> • Using data to evaluate the effect of vaccines on the number of deaths from various diseases • The methodology behind how drugs moves through trials • The ideal of bias and how it can be mitigated
B7- Non-communicable diseases	<ul style="list-style-type: none"> • What a lifestyle factor is • How scientists consider risk • What a causal mechanism is • The financial and human cost involved in non-communicable diseases • What a tumour is and the different types: malignant and benign • How cancer spreads • The health impacts of smoking: cardiovascular disease, cancer, unborn babies and lung disease • The effect of diet and exercise on the development of obesity, 	<ul style="list-style-type: none"> • Using data to determine the health risk of smoking and other lifestyle factors on health • The difference between correlation and causation • How to assess risk in a scientific way

	<p>risk of cardiovascular disease and type 2 diabetes</p> <ul style="list-style-type: none"> The health impacts of alcohol and other carcinogens on the human body <p>Top 5 Keywords</p> <p>Immune system, vaccine, antibiotics, painkillers, penicillin</p>	
B8- Photosynthesis	<ul style="list-style-type: none"> The raw materials that are required for photosynthesis That photosynthesis is an endothermic reaction The equations that summarise photosynthesis How the leaf is adapted for photosynthesis Which factors limit the rate of photosynthesis How plants use the glucose they make The extra materials that plant cells need to produce proteins How different factors affecting the rate of photosynthesis interact How humans can manipulate the environment in which plants grow <p>Top 5 Keywords</p> <p>Photosynthesis, glucose, light intensity, limiting factor, endothermic</p>	<ul style="list-style-type: none"> Suggest changes to a scientific method to increase the accuracy and validity of an experiment Completing the chemical tests for starch and analysing the results Plan an investigation to measure the rate of photosynthesis at different light intensities
B9- Respiration	<ul style="list-style-type: none"> The chemistry of aerobic respiration Why cellular respiration is so important How the body responds to the increased demands for energy during exercise Why less energy is transferred by anaerobic respiration than by aerobic respiration (H) which is meant by oxygen debt Anaerobic respiration in: plants, bacteria and fungi The definition of metabolism (H) how the liver is involved in repaying the oxygen debt <p>Top 5 Keywords</p> <p>Aerobic respiration, anaerobic respiration, metabolism, exothermic, oxygen debt</p>	<ul style="list-style-type: none"> Investigating the effect of exercise on respiration and its effects on the human body Discuss ethical issues with completing experiments on humans Analyse graphs to determine the level of fitness of an individual based on resting heart rate, increase in heart rate and recovery time
YEAR 11 (Paper 2 GCSE course)		
B10 - The human nervous system	<ul style="list-style-type: none"> The basic principle of homeostasis How receptors, coordination centres and effectors work together Structure and function of the human nervous system What reflexes are, how they work and why they are important <i>(T) The main areas of the brain and their function</i> <i>(T)(H) How scientists find out about the structure and</i> 	<ul style="list-style-type: none"> Calculating reaction time required practical Calculating means and removing anomalous results Suggest ethical issues with completing experiments on humans <i>(T) How scientists have developed conclusions about the brain using evidence</i>

	<p><i>functions of the brain</i></p> <ul style="list-style-type: none"> • (T) <i>The main parts of the human eye and how their structure relate to their function</i> • (T) <i>How the eye focuses light on far and near object</i> • (T) <i>What happens in short and long sightedness and how to solve these problems</i> <p>Top 5 Keywords</p> <p>receptors, coordination centres, effectors, neurones, reflex arc</p>	
11- Hormonal coordination	<ul style="list-style-type: none"> • What are hormones • What is the endocrine system and the function of the endocrine glands • The role of the pancreas in controlling blood glucose levels • The difference between type 1 and 2 diabetes and how they are treat • The importance of negative feedback systems • The role of thyroxine and adrenaline • The humans reproductive hormones, puberty and the menstrual cycle • Methods of contraception and (H) <i>infertility treatments</i> • (T)<i>Plant hormones and tropism</i> • (T)(H)<i>Using plant hormones</i> <p>Top 5 Keywords</p> <p>Hormone, endocrine gland, insulin, pancreas, menstrual cycle</p>	<ul style="list-style-type: none"> • Using flowcharts and models to describe how a system works (blood glucose control) • Constructing and identifying negative feedback loops and how they control a condition in the body • Using data to determine the best course of treatment for an individual based on their circumstance (fertility treatments/ contraception)
12- Homeostasis in action	<ul style="list-style-type: none"> • T) <i>Controlling body temperature</i> • (T) <i>How the body removes waste</i> • (T) <i>The role of the kidneys and (H) the importance of ADH</i> • T) <i>Dialysis: advantages, disadvantages and how it works</i> • (T) <i>Kidney transplants and how to solve rejection</i> <p>Top 5 Keywords</p> <p>ADH, kidney, transplant, rejection, thermoregulatory centre</p>	<ul style="list-style-type: none"> • Using pie charts to present data about composition
13- Reproduction	<ul style="list-style-type: none"> • Comparing sexual and asexual reproduction • The progress of meiosis and fertilisation • (T) <i>Advantages and disadvantages of asexual and sexual reproduction and how some organisms use both types</i> • DNA and the human genome • (T) <i>what a nucleotide is</i> • (T)(H) <i>Transcription and translation of DNA. Protein synthesis</i> • (T)(H) <i>How protein synthesis is controlled, mutations and gene expression</i> • Alleles, genetic crosses, punnet squares and genetic diagrams to show inheritance in action 	<ul style="list-style-type: none"> • Using and constructing genetic diagrams • Interpreting genetic diagrams • Calculating ratios from punnett squares to express probability inheritance • Writing complementary strands of DNA using the genetic code (A,T,G,C) • (T) <i>Using models to describe transcription and translation</i>

	<ul style="list-style-type: none"> • Sex determination in humans • How human genetic disorders polydactyly and cystic fibrosis are inherited • Screening for genetic disorders <p>Top 5 Keywords Alleles, meiosis, DNA, gene, inheritance</p>	
14- Variation and evolution	<ul style="list-style-type: none"> • Genetic, environmental and combined causes of variation, with examples of each • Evolution via the process of natural selection • Selective breeding: how it works and the risks • <i>(H) How organisms can be genetically modified</i> • What is genetic engineering and what are the benefits and concerns • <i>(T) Methods of cloning plants and animals</i> • <i>(T) Adult cell cloning: risks and benefits</i> • Ethics of genetic engineering and uncertainties <p>Top 5 Keywords Evolution, natural selection, selective breeding, genetic modification, variatio</p>	<ul style="list-style-type: none"> • Determining beneficial characteristics that might be useful in agriculture and farming • Reasoning for why agriculture and farming may benefit from having organisms with certain characteristics • Using balanced arguments to discuss the uncertainties and benefits of genetic engineering
15- Genetics and evolution	<ul style="list-style-type: none"> • <i>(T) The work of Gregor Mendel and how it fits with modern ideas about genetics</i> • <i>(T) Darwin's evidence for the theory of evolution and why it was only gradually accepted</i> • <i>(T) How new species are formed</i> • <i>(T) Wallace's ideas and how they influenced Darwin</i> • Evidence for the origins of life on Earth • Fossils: how they are formed and the evidence they provide • How organisms can become extinct from: environmental change and single catastrophic events • Antibiotic resistance: how it occurs and how to reduce the rate it happens • Classification: basic principles, the system developed by Linnaeus, how technology has changed it and the binomial naming system • How scientists use evolutionary trees • The three domain system <p>Top 5 Keywords evolutionary tree, fossils, antibiotic resistance, clafficiation, domain</p>	<ul style="list-style-type: none"> • Discussing why scientific ideas take time to become accepted • Determining the strength of evidence for a theory • Constructing and interpreting evolutionary trees
16- Adaptations, interdependence and competition	<ul style="list-style-type: none"> • Stable ecosystems • How organisms are adapted to the conditions they live in • The relationship between ecosystems and communities 	<ul style="list-style-type: none"> • Using a quadrat to measure the distribution or abundance of an organism in an environment • Calculating the mean, medium and mode

	<ul style="list-style-type: none"> • Biotic and abiotic factors that affect communities • How to measure the distribution of living things in their natural environment • Completion: how organisms compete for resources, the types of resources they compete for and what makes a successful competitor • How and what plants compete for • How plants and animals are adapted to live in extreme environments (with examples) <p>Top 5 Keywords adaptation, ecosystem, communities, completion, biotic</p>	<ul style="list-style-type: none"> • Explaining how calculating the different types of averages is helpful
17- Organising an ecosystem	<ul style="list-style-type: none"> • The importance of photosynthesis in feeding relationships • The main feeding relationships within a community • How predator and prey numbers are related • Material cycling: how water, carbon and other materials are recycled in a stable community • (T) <i>The factors that affect decay and how composting works</i> <p>Top 5 Keywords feeding relationships, producer, prey, predator, material cycling</p>	<ul style="list-style-type: none"> • Draw and interpret predator prey graph • Predict how the populations of predators and prey will change in a community over time • Construct and interpret food webs and food chains
18- Biodiversity and ecosystems	<ul style="list-style-type: none"> • Biodiversity: what it is and how it can be maintained • Some of the effects of human population growth on the Earth and its resources • How human activities pollute the land and water • Acid rain: how it is formed and how it affects living organisms • How air pollution causes global dimming and smog • What is meant by deforestation • Why loss of diversity matters • Effects of peat bog destruction • Global warming: what is it and how does it affect life on Earth • (T)(H) <i>How to evaluate the effect of environmental changes on the distribution of organisms</i> • (T)(H) <i>Different types of environmental change</i> • Ways to reduce the impact of human activities on ecosystems and maintain biodiversity • (T) <i>Trophic levels</i> • (T) <i>How to construct accurate pyramids of biomass from appropriate data</i> • (T) <i>How much of the biomass from each level is transferred to the next</i> • (T) <i>How biomass is lost at each stage of the food chain</i> • (T) <i>Factors that threaten global food security</i> • (T) <i>Efficient food production: using short food chains, reducing</i> 	<ul style="list-style-type: none"> • Evaluating the data/ evidence for global warming and its strength • Producing flowcharts to show how materials are cycled in a ecosystem • (T) <i>Constructing accurate pyramids of biomass from appropriate data</i>

	<p><i>wasted energy and advantages and disadvantages of modern farming techniques</i></p> <ul style="list-style-type: none">• <i>(T) Sustainable food production: using biotechnology to make food, tackling overfishing and managing the oceans</i> <p>Top 5 Keywords</p> <p>biodiversity, pollution, deforestation, global warming, resources</p>	
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