



## Alcester Academy Curriculum Planning: Key Stage 4 (Year 11)

Department: Science Year Group: 11						
Term	Topic/Subject	Assessment Objectives and Knowledge acquisition	Skill building <i>Intent</i>	Wider reading to include numeracy and SMSC	SEND & PP Identify where access and learning is supported	Final assessment task and title
Autumn	C6 Rates of reaction	<p>Be able to find the rate of a chemical reaction by measuring the quantity of reactant or product used in g/s or cm<sup>3</sup>/s.</p> <p>(HT) use quantity of reactants in moles and rate of reaction in mol/s.</p> <p>Be able to draw and interpret graphs showing the quantity of product formed or reactant used up against time.</p> <p>Draw tangents to the curves of reaction rate graphs and use the slope of the tangent to measure the rate of reaction.</p> <p>(HT) calculate the gradient of a tangent to the curve on a reaction rate graph.</p> <p>Understand the factors which affect the rate of chemical reactions as concentrations of reactants, pressure, surface area, temperature and catalysts.</p> <p>Conduct a required practical to investigate how changes in concentration affect rates of reaction.</p>	<p>Safely using specified equipment and conduct practicals to measure the rate of reactions.</p> <p>Take accurate measurements of changes in mass or gas volume.</p> <p>Calculate rates of reaction from experimental data.</p> <p>Draw graphs from experimental data, determining slope and intersect.</p> <p>Conduct a practical to investigate how changes in concentration affect reaction rate.</p> <p>Develop a hypothesis.</p>	<p>Using ratios, fractions and percentages.</p> <p>Measuring</p> <p>Conversion of units.</p> <p>Drawing and interpreting graphs.</p> <p>(HT) calculating gradient of a tangent.</p> <p>Calculate means.</p> <p>Safely working with others.</p> <p>Understanding that in industry</p>		<p>Graph question on rates of reaction</p> <p>Concentration 6 marker – method for practical</p>



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		<p>Be able to explain how collision theory affects rates of reactions. Make predictions and explain the effects of changing conditions of reactions including changing the surface area to volume ratio.</p> <p>Be able to explain how catalysts affect the rate of reactions and explain catalytic action in terms of activation energy.</p> <p>Be able to identify and explain the reaction profile for a catalysed reaction.</p> <p>Be able to describe what a reversible reaction is.</p> <p>Understand energy changes in reversible reactions in terms of exothermic one direction, endothermic the opposite direction.</p> <p>Understand when equilibrium in a reversible reaction is reached.</p> <p>(HT) Be able to predict the effects of changing conditions on a system at equilibrium, applying Le Chatelier's Principle.</p> <p>(HT) Be able to interpret data to predict the effect of a change in concentration of a reactant or product, the change in temperature of a system and the change in pressure of a system on given reactions at equilibrium.</p>	<p>Conduct a practical to investigate catalytic effects on reactions.</p>	<p>chemists and chemical engineers determine the effect of different variables on reaction rates to maximise the yield of product in an energy and time efficient way.</p>		
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Autumn	B5 Coordination and control	<p>Identify that homeostasis maintains optimal conditions for enzyme action and all cell functions.</p> <p>Describe the conditions that are monitored and controlled within humans</p> <p>Describe how these automatic control systems may involve nervous responses or chemical responses</p> <p>Identify these responses – receptor, coordination centre and effectors .</p> <p>Students should be able to explain how the structure of the nervous system is adapted to its functions.</p> <p>Students should be able to explain how the various structures in a reflex arc – including the sensory neurone, synapse, relay neurone and motor neurone – relate to their function.</p> <p>Students should understand why reflex actions are important.</p> <p>Students should be able to describe the principles of hormonal coordination and control by the human endocrine system pituitary gland</p>	<p>Explain, with an example, why new data from experiments or observations led to changes in models or theories.</p> <p>Recognise/draw/interpret diagrams.</p> <p>Outline a simple ethical argument about the rights and wrongs of a new technology.</p> <p>Translate data between graphical and numeric form.</p> <p><b><i>Students should be able to describe how kidney dialysis works.</i></b></p> <p><b><i>Evaluate the advantages and disadvantages of treating organ failure by mechanical device or transplant.</i></b></p>	<p>Use simple mathematical processes to identify sugar levels</p> <p>Read and interpret graphs</p> <p>Calculate %</p> <p>Translate data between graphical and numeric form.</p> <p>Use data to make predictions.</p> <p>Recognise or describe patterns and trends in data presented in a variety of tabular, graphical</p>	<p>Discuss the social and ethical decisions about the treatment of type 2 diabetes as a life style disease</p> <p>Consider the idea of healthy living and the consequences of this</p> <p>Discuss the issues of transplants include the lack of donors, opt out possibilities and reciprocal donations</p>	<p>Data handling on reaction times experiment</p> <p>Reflex arc sequence extended answer</p> <p>End of unit test</p>



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		<p>Students should be able to identify the positions of Pancreas, thyroid, adrenal gland, ovary, testes. Identify what glucose is used to and why levels in the blood are important Describe how the body lowers blood glucose if levels rise Identify the causes and symptoms of type 1 diabetes Describe how a patient will manage the condition Describe the causes and treatments for type 2 diabetes</p> <p>HT Only – describe how glucagon regulates blood sugar and how glucagon and insulin interact</p> <p><b><i>Students should be able to identify the cerebral cortex, cerebellum and medulla on a diagram of the brain, and describe their functions.</i></b>  <b><i>HT only) Students should be able to explain some of the difficulties of investigating brain function and treating brain damage and disease.</i></b>  <b><i>(HT only) Explain tThe complexity and delicacy of the brain makes investigating and treating brain disorders very difficult.</i></b>  <b><i>Students should be able to relate the structures of the eye to their functions.</i></b></p>	<p>HT Only Developments of microscopy techniques have enabled IVF treatments to develop. Understand social and ethical issues associated with IVF treatments. Evaluate from the perspective of patients and doctors the methods of treating infertility.</p>	<p>and other forms. Draw conclusions from given observations.</p>		
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		<p><i>Describe how accommodation is the process of changing the shape of the lens to focus on near or distant objects and link this to eye sight issues</i></p> <p><i>Describe new treatments used to correct eye problems</i></p> <p><i>Describe how the body responds to changes in core temperature as part of a negative feedback cycle</i></p> <p><i>Identify the use of water within the body, where it is lost and gained</i></p> <p><i>Students should be able to describe the function of kidneys in maintaining the water balance of the body.</i></p> <p><i>(HT only) The digestion of proteins from the diet results in excess amino acids which need to be excreted safely. In the liver these amino acids are deaminated to form ammonia. Ammonia is toxic and so it is immediately converted to urea for safe excretion.</i></p> <p><i>Describe how The kidneys produce urine by filtration of the blood and selective reabsorption of useful substances such as glucose, some ions and water.</i></p> <p><i>HT only) Students should be able to describe the effect of ADH on the permeability of the kidney tubules.</i></p> <p><i>(HT only) The water level in the body is controlled by the hormone ADH</i></p>				
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		<p><b><i>which acts on the kidney tubules.</i></b> <b><i>Explain how people who suffer from kidney failure may be treated</i></b> Students should be able to describe the roles of hormones in human reproduction, including the menstrual cycle. – LH, FSH, oestrogen and progesterone (HT only) Students should be able to explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle. (HT only) Students should be able to extract and interpret data from graphs showing hormone levels during the menstrual cycle.</p> <p>Students should be able to describe a variety of hormonal and non-hormonal methods of contraception They should be able to evaluate the uses of these methods of contraception</p> <p>HT only Students should be able to describe the process of IVF and explain the role of different hormones Students should be able to evaluate this process in terms of success and of the side effects Identify the role of thyroxine and adrenaline in the body</p> <p><b><i>Biology only</i></b> <b><i>Identify the role of plant hormones in growth – auxins and gibberellins</i></b></p>				
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		<i>Describe how ethene is used in plant ripening</i>				
Autumn	P5 Forces	<p>To understand what a scalar and vector quantity is, with examples.</p> <p>To describe what a force is and give examples of contact and non-contact forces.</p> <p>Be able to describe the interaction between pairs of objects which produce a force on each other.</p> <p>Be able to describe what weight is and how the force of gravity changes around the Earth.</p> <p>Be able to calculate the weight of an object from its mass and gravitational field strength.</p> <p>Know that weight is measured using a calibrated spring-balance.</p> <p>Understand what resultant force is and be able to calculate the resultant force of two forces acting in a straight line.</p> <p>(HT) Be able to describe examples of forces acting on an isolated object or system.</p> <p>(HT) Be able to use free body diagrams to describe qualitatively examples where several forces lead to resultant force on an object, including balanced forces.</p>	<p>Be able to recall and apply the equation for weight.</p> <p>Be able to recognise and use the symbol of proportionality.</p> <p>Be able to recall and apply the equation for work done.</p> <p>Be able to safely demonstrate Hooke's law though practical.</p> <p>Be able to recall and apply the equation for force on a spring.</p> <p>Be able to apply the equation for elastic potential energy.</p> <p>Using appropriate equipment to make and record a range of measurements and</p>	<p>Apply the formula for weight with given variables.</p> <p>Conversion of units.</p> <p>Apply the formula for work done with given variables.</p> <p>Rearrange equations.</p> <p>Apply the formula for force on a spring with given variables.</p> <p>Apply the formula for elastic</p>		<p>Required practical acceleration</p> <p>6 mark question -Stopping distance</p>



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		<p>To understand what work done is. Recall and apply the equation for calculating work done using force and distance moved.</p> <p>Be able to describe the energy transfer when work is done.</p> <p>Be able to convert between newton-metres and joules.</p> <p>Be able to give examples of the forces involved in stretching, bending or compressing objects.</p> <p>Be able to explain why to change the shape of a stationary object more than one force has to be applied.</p> <p>Be able to describe the difference between elastic deformation and inelastic deformation caused by stretching forces.</p> <p>Know that the extension of an elastic object, such as a spring, is directly proportional to the force applied, provided the limit of proportionality is not exceeded (Hooke's law).</p> <p>Be able to calculate force on a spring using it's spring constant and extension.</p> <p>Describe the difference between a linear and non-linear relationship between force and extension.</p> <p>Be able to calculate a spring constant in linear cases.</p> <p>Be able to interpret data from an investigation between force and extension.</p>	<p>observations accurately in order to investigate the relationship between force and extension of a spring. Use results to produce a graph.</p> <p><b><i>Be able to recall and apply the equation for moment of a force.</i></b></p> <p><b><i>Be able to recall and apply the equation for calculating pressure at the surface of a fluid.</i></b></p> <p><b><i>(HT) Be able to apply the equation for calculating pressure in a column of liquid.</i></b></p>	<p>potential energy with given variables.</p> <p><b><i>Apply the equation for moments of a force.</i></b></p> <p><b><i>Apply the equation for calculating pressure at the surface of a fluid.</i></b></p> <p><b><i>Apply the equation for calculating pressure in a column of liquid.</i></b></p> <p>Change the subject of an equation.</p> <p>Substitute numerical values into algebraic equations using appropriate units.</p>		
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		<p>Calculate work done in stretching a spring using the equation given for elastic potential energy.</p> <p>Conduct a required practical to investigate the relationship between force and extension of a spring.</p> <p><b>Describe the turning effect of a force about a pivot.</b></p> <p><b>Explain and use the principle of moments.</b></p> <p><b>Calculate the size of moments.</b></p> <p><b>Be able to explain how levers and gears transmit the rotational effects of forces.</b></p> <p><b>Understand a fluid is a liquid or gas.</b></p> <p><b>Describe the pressure in fluids and calculate the pressure at the surface of a fluid.</b></p> <p><b>(HT) Be able to calculate the pressure due to a column of liquid and the differences in pressure at different depths in a liquid.</b></p> <p><b>(HT) Be able to describe the factors which influence floating and sinking.</b></p> <p><b>Be able to describe a simple model of the earth's atmosphere and of atmospheric pressure.</b></p> <p><b>Explain why atmospheric pressure varies with height above a surface.</b></p> <p>To be able to express a displacement in terms of magnitude and direction.</p> <p>Recall that speed is a scalar quantity and typical values of speed for a person walking, running, cycling and speed for different types of transportation.</p>	<p>Recall and apply the equation for calculating speed.</p> <p>Using appropriate equipment to measure distance and time accurately.</p> <p>Draw graphs of distance and time to calculate speed.</p> <p>Recall and apply the equation for calculating acceleration.</p> <p>Draw graphs of velocity and time to calculate acceleration.</p> <p><b>Calculate displacement of an object by</b></p>	<p>Use ratios and proportional reasoning to convert units and compute rates.</p> <p>Apply the equation for calculating speed.</p> <p>Measure speed and distance</p> <p>Draw graphs of distance / time</p> <p>Apply the equation for calculating acceleration</p> <p>Draw graphs of velocity and time</p> <p>Find the gradient of a graph</p> <p>Apply the equation to</p>		
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		<p>Recall speed of sound is 330m/s.</p> <p>Be able to measure distance and time to calculate speed of objects and use the distance = speed x time equation, Recall that velocity is a vector quantity.</p> <p>(HT) Explain qualitatively, with examples, that motion in a circle involves constant speed but changing velocity.</p> <p>Be able to draw distance-time graphs from measurements and extract and interpret lines and slopes.</p> <p>Be able to determine speed from the gradient of a distance-time graph.</p> <p>(HT) Be able to calculate the speed of an accelerating object at a particular time by drawing a tangent and measuring the gradient of the distance-time graph.</p> <p>Be able to calculate acceleration using the equation acceleration = change in velocity/ time taken.</p> <p>Be able to calculate the acceleration of an object from the gradient of a velocity-time graph.</p> <p>Be able to apply the equation to calculate uniform acceleration.</p> <p>Know that an object falling freely under gravity has an acceleration of about <math>9.8\text{m/s}^2</math></p> <p>Understand that eventually an object falling through a fluid will move at its terminal velocity.</p> <p><b>Be able to draw and interpret velocity-time graphs for objects that</b></p>	<p><b><i>calculating the area under a velocity-time graph</i></b></p> <p><b><i>Investigate the effect of air resistance on a falling object.</i></b></p> <p>Be able to recognise the symbol for proportionality</p> <p>Recall and apply the equation to calculate resultant force</p> <p>Recognise and use the symbol for approximate value</p> <p>Use appropriate equipment to make and record measurements to investigate the effect of force on acceleration</p>	<p>calculate resultant forces</p> <p>Engineers analyse forces when designing many machines and instruments we use every day, from road bridges, fairground rides and cars.</p> <p>Recent developments using analysis of forces include artificial limbs to make movement possible for disabled people.</p> <p>Understand how terminal velocity relates to parachutes.</p>	
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		<p><b><i>reach terminal velocity, and. Be able to interpret the changing motion in terms of forces acting.</i></b></p> <p>To understand and apply Newton's First Law regarding resultant forces and motion of objects. (HT) To know what inertia is. To understand Newton's second Law of motion regarding the acceleration of an object. Be able to recognise and use the symbol for proportionality Be able to recall and apply the equation: resultant force = mass x acceleration. (HT) be able to explain that initial mass is a measure of how difficult it is the change velocity of an object and is defined as a ratio of force over acceleration. Be able to estimate speed, accelerations and forces and recognise the symbol for approximate value/answer To be able to carry out the required practical to investigate the effect of varying the force on the acceleration of an object of constant mass, and the effect of varying the mass of an object on the acceleration produced by a constant force. Be able to describe and apply Newton's Third Law when objects interact they exert equal and opposite forces on each other.</p>				
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		<p>To know what the stopping distance of a vehicle is.</p> <p><b>Be able to estimate how the distance for a vehicle making an emergency stop varies over a range of speeds.</b></p> <p><b>Be able to interpret graphs relating to stopping distances.</b></p> <p>Know that reaction times vary between people and can be affected by tiredness, drugs, alcohol and distractions.</p> <p>Be able to explain how to measure human reaction times</p> <p>Be able to interpret and evaluate measurements to measure reaction times.</p> <p>Be able to evaluate the effect of various factors on thinking distance from given data.</p>				
Spring	C8 chemical analysis	<p>Describe, explain and exemplify processes of separation.</p> <p>Suggest separation and purification techniques for mixtures.</p> <p>Distinguish pure and impure substances using melting point and boiling point data. Identify formulations given appropriate information.</p> <p>Explain the particular purpose of each chemical in a mixture.</p> <p>Explain how quantities are carefully measured for formulation. Explain how to set up paper chromatography.</p>	<ul style="list-style-type: none"> <li>Recall the tests for four common gases.</li> <li>Identify the four common gases using these tests.</li> <li>Explain why limewater can be used for testing CO<sub>2</sub>.</li> <li>Measure distances on chromatograms.</li> <li>Calculate <math>R_f</math> values. Record <math>R_f</math> values to an appropriate number of significant figures.</li> </ul>	<p>Make estimates of the results of simple calculations. Use ratios, fractions and percentages. Recognise and use expressions in decimal form.</p>		<p>Required practical chromatography Method for the different tests – triple only</p> <p>End of unit test</p>



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		<p>Distinguish pure from impure substances.</p> <p>Interpret chromatograms and determine <math>R_f</math> values. chromatography apparatus and how accurate measurements are achieved.</p> <p>Make and record measurements used in paper chromatography.</p> <p>Calculate <math>R_f</math> values Recall the tests for four common gases.</p> <p>Identify the four common gases using these tests.</p> <p>Explain why limewater can be used for testing <math>\text{CO}_2</math>. Measure distances on chromatograms.</p> <p>Calculate <math>R_f</math> values.</p> <p>Record <math>R_f</math> values to an appropriate number of significant figures.</p> <p><b>Triple only- Identification of ions by chemical and spectroscopic means (chemistry only) Flame test, Metal hydroxides, Carbonates, Halides, Sulfates.</b></p> <p><b>Instrumental methods</b></p> <p><b>Flame emission spectroscopy</b></p>	<p><b>Triple only- Identification of ions by chemical and spectroscopic means (chemistry only) Flame tests An opportunity to investigate flame colours. An opportunity to make precipitates of metal hydroxides. Required practical 7: use of chemical tests to identify the ions in unknown single ionic compounds covering the ions from sections Flame tests to Sulfates.</b></p> <p><b>An opportunity to observe flame spectra using a hand-held spectroscope.</b></p>			
Summer	C9 The atmosphere	<p>Identify the gases of the atmosphere.</p> <p>Recall the proportions of the gases.</p> <p>Explain how the balance of the gases is maintained.</p> <p>Describe ideas about the Earth's early atmosphere.</p> <p>Interpret evidence about the Earth's early atmosphere.</p>	<ul style="list-style-type: none"> <li>extract and interpret information about resources from charts, graphs and tables use orders of magnitude to evaluate the significance of data.</li> <li>Translate information</li> </ul>	To use ratios, fractions and percentages. use orders of magnitude to evaluate the significance of data.	Earth's atmosphere – looking at pollution	<p>Effects of climate change research</p> <p>Describe how the atmosphere has changed over time</p> <p>Describe ways in which your</p>



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		<p>Evaluate different theories about the Earth's early atmosphere.</p> <p>Identify the processes allowing oxygen levels to increase.</p> <p>Explain the role of algae in the composition of the atmosphere.</p> <p>Recall the equation for photosynthesis.</p> <p>Describe the main changes in the atmosphere over time.</p> <p>Describe some of the likely causes of these changes.</p> <p>Explain how the deposits of limestone, coal, crude oil and gas were formed.</p> <p>Describe the greenhouse gases.</p> <p>Explain the greenhouse effect.</p> <p>Explain these processes as interaction of short and long wavelength radiation with matter.</p> <p>Describe two activities that increase the amounts of carbon dioxide and methane.</p> <p>Evaluate the quality of evidence in a report about global climate change.</p> <p>Describe four potential effects of global climate change.</p> <p>Discuss the scale and risk of global climate change.</p> <p>Discuss the environmental implications of climate change.</p> <p>Explain that the carbon footprint can be reduced by reducing emissions of carbon dioxide and methane.</p> <p>Describe how emissions of carbon dioxide can be reduced.</p>	<p>between graphical and numeric form.</p> <ul style="list-style-type: none"> <li>Required practical 8: analysis and purification of water samples from different sources, including pH, dissolved solids and distillation</li> <li>LCAs should be done as a comparison of the impact on the environment of the stages in the life of a product, and only quantified where data is readily available for energy, water, resources and wastes.</li> <li>Interpret LCAs of materials or products given appropriate information. Recognise the importance of peer review of results and of communicating results to a wide range of audiences.</li> <li>Use fractions and percentages to describe the</li> </ul>	<p>Recognise and use expressions in decimal form. Use ratios, fractions and percentages. Make estimates of the results of simple calculations. Use an appropriate number of significant figures.</p>	<p>family could reduce its carbon footprint</p> <p>End of unit test</p>
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		<p>Describe how emissions of methane can be reduced.</p> <p>Give reasons why actions to reduce levels of carbon dioxide and methane may be limited.</p> <p>Give reasons why methane is difficult to reduce.</p> <p>Describe how carbon monoxide, soot, sulfur dioxide and oxides of nitrogen are produced by burning fuels.</p> <p>Predict the products of combustion of a fuel knowing the composition of the fuel.</p> <p>Predict the products of combustion of a fuel knowing the conditions in which it is used.</p> <p>Describe and explain the problems caused by increased amounts of oxides of carbon, sulfur and nitrogen as pollutants in the air.</p> <p>Describe and explain the effects of acid rain.</p> <p>Evaluate the role of particulates in damaging human health.</p> <p><b>Triple-Using materials (chemistry only) Corrosion and its prevention Investigate the conditions for rusting.</b></p>	<p>composition of mixtures.</p> <ul style="list-style-type: none"> <li>• Use ratios to determine the mass of products expected.</li> <li>• Calculate percentage yields in chemical reactions.</li> </ul>			
Spring	B6 Inheritance, Variation and Evolution	<p>Understand that meiosis leads to non-identical cells being formed while mitosis leads to identical cells. Understand that sexual reproduction involves the fusion of male and female gametes and what these are in animals and plants.</p> <p>Be able to explain how sexual reproduction leads to a variety in</p>	<p>Modelling behaviour of chromosomes during meiosis.</p> <p><b>Interpret diagrams of the structure of DNA.</b></p> <p><b>Model insertions and deletions in</b></p>	<p>Understand and use fractions and percentages.</p> <p>Understand and use ratio and proportion.</p>	<p><b>Have an understanding of the historical developments of our understanding of the causes and prevention of malaria.</b></p> <p>Consider ethical issues which may arise from</p>	<p>Genetic crosses assessment.</p> <p>6 mark question - Speciation in a herring gul</p>



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		<p>offspring and asexual reproduction produces identical offspring. Be able to explain how meiosis changes the number of chromosomes in gametes. Be able to explain how fertilisation restores the number of chromosomes and how a new cell divides by mitosis to form an embryo.</p> <p><b>Be able to describe the advantages and disadvantages of sexual and asexual reproduction.</b> <b>Be able to describe how some organisms reproduce by both sexual and asexual reproduction depending on circumstances.</b> Be able to describe the structure of DNA and define genome. Be able to discuss the importance of understanding the human genome project.</p> <p><b>Be able to describe DNA as a polymer made from four different nucleotides.</b> <b>Identify the four bases in DNA.</b> <b>(HT) Explain that the bases A and T, and C and G, are complementary</b> <b>(HT) Be able to recall a simple description of protein synthesis</b> <b>(HT) Be able to explain how the structure of DNA affects the protein made.</b> <b>(HT) Be able to describe how genetic variants may influence phenotype.</b> <b>(HT) Describe how mutations affect protein function.</b></p>	<p><b>chromosomes to illustrate mutations.</b></p> <p>Complete Punnett square diagrams.</p> <p>Carry out genetic crosses.</p> <p>Make informed judgements about the economic, social and ethical issues concerning embryo screening given information.</p> <p>Use the theory of evolution by natural selection in an explanation.</p> <p>Explain the benefits and risks of selective breeding given appropriate information and consider the ethical issues.</p> <p>(HT) Interpret information about genetic engineering techniques and make informed judgements about issues concerning cloning and genetic engineering, including GM crops.</p>	<p>Understand and use probability when predicting the outcomes of genetic crosses.</p> <p>Use information given to produce an argument for/against.</p>	<p>embryo screening and gene therapy.</p> <p>Understand how scientific theories change over time and can be the result of cooperation between scientists across the World.</p> <p>Understand how some bacteria have evolved to become antibiotic resistant and the importance therefore of completing courses of antibiotics.</p> <p>Understand ethical issues related to selective breeding but also the benefits it has in a growing population.</p> <p><b>Understand the benefits and risks of cloning in agriculture and medicine and the ethical issues involved.</b></p>	
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		<p>Be able to explain key terms for genetic inheritance such as gamete, chromosome, gene, dominant, recessive, genotype, phenotype, homozygous and heterozygous. Know that some characteristics are controlled by single genes but most are the result of multiple genes interacting.</p> <p>Be able to use direct proportion and simple ratios to express the outcome of a genetic cross.</p> <p>Be able to complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees.</p> <p>(HT) Be able to use a Punnett square diagram to make predictions using the theory of probability.</p> <p>Understand that some disorders are inherited; polydactyly from a dominant allele and cystic fibrosis caused by a recessive allele.</p> <p>Be able to explain the economic, social and ethical issues concerned with embryo screening.</p> <p>Understand how chromosomes determine sex in humans.</p> <p>Recall that differences in the characteristics of individuals in a population is called variation.</p> <p>Understand the genetic and environmental differences leading to variation.</p> <p>Recall that all species of living things have evolved from simple life forms.</p>	<p>(HT) Interpret information about genetic engineering techniques and make informed judgements about issues concerning cloning and genetic engineering, including GM crops.</p> <p><b><i>Explain the potential benefits and risks of cloning in agriculture and in medicine and that some people have ethical objections.</i></b></p> <p><b><i>Appreciate that the history of evolution by natural selection developed over time and from information gathered by scientists.</i></b></p> <p>Extract and interpret information from fossils. Appreciate why the fossil record is incomplete.</p> <p>Interpret evolutionary trees</p>			
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		<p>Explain how evolution occurs through natural selection.</p> <p>Describe what selective breeding is, why it takes place and the problems caused by inbreeding.</p> <p>Be able to describe what genetic engineering is and the potential benefits and risks in agriculture and medicine.</p> <p>Describe how bacterial cells are engineered to produce human insulin.</p> <p>(HT) Be able to describe the main steps in the process of genetic engineering.</p> <p><b><i>Describe the process of cloning relating to tissue culture, cuttings, embryo transplants and adult cell cloning.</i></b></p> <p><b><i>Explain the evidence that led Darwin to propose the theory of evolution by natural selection.</i></b></p> <p><b><i>Be able to describe why the theory of evolution by natural selection was only gradually accepted and be able to compare it with other theories such as that of Jean-Baptiste Lamarck.</i></b></p> <p><b><i>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 biology.</i></b></p> <p><b><i>Describe the development of our understanding of genetics including the work of Mendel.</i></b></p>				
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## Alcester Academy Curriculum Planning: Key Stage 4 (Year 11)

		<p><b><i>Understand why the importance of Mendel's discovery was not recognised until after his death.</i></b></p> <p>To be able to describe the evidence for evolution including fossils and antibiotic resistance in bacteria.</p> <p>Be able to describe what fossils are, how they have formed and how they can show how different organisms have changed as life developed on earth.</p> <p>Describe what extinction is and the factors that contribute to the extinction of a species.</p> <p>Recall that bacteria develop that are resistant to antibiotics, which is evidence of evolution.</p> <p>Understand the mechanism by which antibiotic resistance develops.</p> <p>Understand the effects of the development of antibiotic resistance on the treatment of disease.</p> <p>Describe how to reduce the rate of development of antibiotic resistance.</p> <p>Understand the requirement for, and the impact of, new antibiotics.</p> <p>Recognise the difficulties associated with developing new antibiotics.</p> <p>Describe how living things have been classified into groups using a system devised by Carl Linnaeus.</p> <p>Describe how new models of classification have developed.</p> <p>Understand the use of evolutionary trees.</p>				
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Last updated: *June 2023*