

Biology

BIOLOGY - Breathing, gas exchange and respiration		
9A	EXCELLING	9A
9B		9B
8A		8A
8B		8B
7A		7A
7B		7B
6A		SECURING
6B	6B	
5A	5A	
5B	5B	
4A	4A	
4B	4B	
4B	<p>Evaluate the use of a word equation to model aerobic respiration.</p> <p>Identify the limitations of lungs, gills and body surface covering as sites of gas exchange. Compare burning (combustion) and respiration.</p> <p>Analyse and explain the changes in heartbeat and breathing rate during and after exercise (including EPOC/oxygen debt).</p> <p>Explain how and why a concentration gradient is maintained for oxygen and carbon dioxide between the blood and lungs.</p> <p>Model anaerobic respiration using a word equation.</p> <p>Compare the human gaseous exchange system with those of other animals.</p> <p>Explain how specialised cells keep the lungs clean (mucus production and ciliated epithelial cells).</p> <p>Explain how the lungs are adapted for efficient gas exchange.</p> <p>Explain the effects of some chemicals in tobacco smoke on the body.</p> <p>Explain why aerobic and anaerobic respiration occurs in humans at the same time.</p> <p>Explain why anaerobic activity cannot be sustained.</p> <p>Describe how lactic acid is removed from tissues.</p>	
3A	DEVELOPING	3A
3B		3B
2A		2A
2B		2B
1A		1A
1B		1B
1B		<p>Explain the changes in heartbeat and breathing rate during exercise.</p> <p>Explain some of the effects of reduced oxygen supply on the body.</p> <p>Explain how aerobic respiration can change the surroundings.</p> <p>Describe ways in which respiration can be detected (limewater, hydrogen carbonate indicator, heat).</p> <p>Describe how substances reach respiring cells from the blood and how waste products are returned to the blood.</p> <p>Describe how muscles attached to ribs and the diaphragm produce breathing movements and use a model to explain how lungs expand and contract.</p> <p>Describe how asthma, emphysema and tobacco tar can reduce gas exchange.</p> <p>Recall that anaerobic respiration releases less energy than aerobic respiration.</p> <p>Recall what happens in aerobic respiration (in terms of oxygen and glucose being used up).</p> <p>Recall what happens in anaerobic respiration in humans.</p> <p>Use a model to explain how lungs expand and contract.</p> <p>Describe what happens during gas exchange.</p> <p>Describe the structure of the lungs.</p> <p>Describe the functions of the organs in the human gaseous exchange system and what happens during gas exchange.</p> <p>Describe how gases are carried around the body (in the blood).</p> <p>Recall what happens in respiration (in terms of needing oxygen to release energy from food and producing carbon dioxide)</p> <p>Recall what happens in respiration.</p>

	<p>Identify and recall the main organs in the breathing system.</p> <p>Identify the main organs of the human gaseous exchange system</p> <p>State the function of the breathing system.</p> <p>Correctly use the term: organ system.</p> <p>Describe how organs work together as organ systems.</p> <p>Identify organs working together as a system.</p>	
P8	<p>PRE-GCSE</p> <p>Describe how breathing rate and heart rate are affected by exercise.</p> <p>Recall some harmful chemicals in tobacco smoke.</p>	P8
P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

BIOLOGY – Reproductive system		
9A	EXCELLING Explain the interactions of oestrogen, progesterone, FSH and LH in the control of the menstrual cycle, including the repair and maintenance of the uterus wall, ovulation and menstruation. Explain the use of hormones in Assisted Reproductive Technology (ART) including IVF and clomifene therapy.	9A
9B		9B
8A		8A
8B		8B
7A		7A
7B		7B
6A		SECURING Explain why organisms may rely on asexual reproduction. Explain how IVF and hormones can be used to increase the chances of pregnancy. Explain how sperm cells and egg cells are adapted to their functions. Explain the implications of a certain level of animal offspring aftercare in different situations. Explain the implications of different methods of fertilisation in fish, birds and mammals. Identify and explain the points in reproduction where difficulties in becoming pregnant could occur.
6B	6B	
5A	5A	
5B	5B	
4A	4A	
4B	4B	
3A	DEVELOPING Describe how egg cells are adapted to their function. Describe how materials are supplied and removed from the foetus. Describe how sperm cells are adapted to their function. Describe how the fusing of gametes and their nuclei during fertilisation forms a fertilised egg cell. Describe the effects of some substances that may harm a developing foetus. Explain how identical and non-identical twins occur. Explain the purpose of the menstrual cycle. Identify the role of sex hormones in puberty. Use knowledge of reproductive organs to suggest causes of reproductive problems. Use knowledge of the menstrual cycle to predict timings (e.g. of menstruation, ovulation, fertile period). Use knowledge of the positions or shapes of reproductive organs to make deductions about reproductive processes. Correctly use the terms asexual reproduction and sexual reproduction. Describe how a woman becomes pregnant after fertilisation and correctly use the term: implantation. Describe how the developing foetus is protected inside the mother. Describe the functions of the structures and organs of the human reproductive system. Describe what happens during labour and birth in humans. Describe what happens to parts of the body during puberty and adolescence. Explain why breast milk is best for newborn babies. Identify sperm cells and egg cells as gametes and correctly use the term: gamete. Identify sperm cells and egg cells as specialised cells and recall that they are adapted to their functions. Recall the names of substances in a mother's blood that may harm a developing foetus and correctly use the term: premature baby. Suggest outcomes caused by problems with reproductive organs. Describe an animal's life cycle using a diagram. Describe how different animals care for their offspring. Describe how fish, birds and mammals reproduce sexually. Identify stages of growth from embryo to newborn baby and recall how these stages can be	
3B		3B
2A		2A
2B		2B
1A		1A
1B		1B

	<p>checked.</p> <p>Identify the parts of the body that change in males and females during puberty and correctly use the terms: puberty, adolescence.</p> <p>Identify the placenta and umbilical cord.</p> <p>Identify the structures and organs in the human reproductive system.</p> <p>Recall the length of and stages in the menstrual cycle.</p> <p>Recall the length of the gestation period in humans and correctly use the term: gestation period.</p> <p>Recall the names of the structures surrounding the developing foetus.</p>	
P8	PRE-GCSE	P8
P7	Identify animals that reproduce sexually and correctly use the term: sexual reproduction.	P7
P6	Identify ways in which animals care for their offspring.	P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

BIOLOGY - Circulatory system			
9A	EXCELLING	9A	
9B	Evaluate some different treatments for cardiovascular disease, including: a life-long medication b surgical procedures c lifestyle changes	9B	
8A		8A	
8B		8B	
7A		7A	
7B		7B	
6A		SECURING	6A
6B		Explain how the structure of the blood is related to its function: a red blood cells (erythrocytes) b white blood cells (phagocytes and lymphocytes) c plasma d platelets Explain how the structure of the blood vessels is related to their function	6B
5A	5A		
5B	5B		
4A	4A		
4B	4B		
3A	DEVELOPING		3A
3B	Describe the functions of red blood cells, white blood cells and plasma. Describe the structure of red blood cells. Explain how the heart pumps blood by the action of muscles. Explain why the left-hand side of the heart has a thicker muscle wall than the right-hand side. State where blood cells are made. Identify and recall the main organs in the circulatory system. State the function of the circulatory system. State the functions of arteries, veins and capillaries. State what the pulse rate measures and where it is measured.	3B	
2A		2A	
2B		2B	
1A		1A	
1B		1B	
P8		PRE-GCSE	P8
P7		P7	
P6		P6	
P5		P5	
P4		P4	
P3		P3	
P2		P2	
P1		P1	

BIOLOGY – Digestive system		
9A	EXCELLING Evaluate different models of basic enzyme action.	9A
9B		9B
8A		8A
8B		8B
7A		7A
7B		7B
6A		SECURING Calculate the rate of enzyme activity from experimental data. Explain how enzymes become denatured. Explain why temperature, substrate concentration and pH affect enzyme activity. Use the lock-and-key model to develop explanations for enzyme activity Describe the effect of pH on enzyme activity. Describe the effect of substrate concentration on enzyme activity. Describe the effect of temperature on enzyme activity. Explain how bile helps in the digestion of lipids. Explain what is meant by the optimum pH/temperature of an enzyme. Explain why enzymes have a particular shape, as a result of the sequence of amino acids in the chain. Use a model to describe basic enzyme action. Describe the role of the active site in enzyme function (including specificity). Explain how the cells in the small intestine are adapted to absorb nutrients quickly. Explain how the structure of the small intestine allows efficient absorption of the soluble products of digestion. Explain why catalysis by enzymes is important for life processes (because reactions happen much faster). State that an enzyme's action is due to its active site. State what enzyme specificity means. Use a knowledge of diffusion to explain how nutrients enter the blood from the small intestine.
6B	6B	
5A	5A	
5B	5B	
4A	4A	
4B	4B	
3A	DEVELOPING State that enzymes are proteins. Define an enzyme as a biological catalyst. Describe the role of enzymes as catalysts in digestion. Describe what enzymes do (catalyse the synthesis and breakdown of substances, such as carbohydrates, proteins and lipids, by speeding up the rate of reaction). Explain how food is moved through the digestive system. Give examples of enzymes and where they are found in the human body and in other species. Recall the subunits from which carbohydrates, proteins and lipids are formed (sugars, amino acids, fatty acids and glycerol). Describe the features of the small intestine wall. Describe the functions of the organs in the human digestive system. Describe what happens during ingestion, absorption and egestion. Explain why digestion is necessary. Recall some benefits and drawbacks of bacteria in the digestive system. Recall what happens in respiration (only in terms of releasing energy from food using oxygen). Identify and recall the main organs in the human digestive system. Recall where digested food enters the blood. State the function of the digestive system.	
3B		3B
2A		2A
2B		2B
1A		1A
1B		1B
P8		PRE-GCSE

P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

BODY SYSTEMS – Nervous system		
9A	EXCELLING	9A
9B	Explain how the difficulties of accessing brain tissue inside the skull can be overcome by using CT scanning and PET scanning to investigate brain function. Explain some of the limitations in treating damage and disease in the brain and other parts of the nervous system, including spinal injuries and brain tumours	9B
8A		8A
8B		8B
7A		7A
7B		7B
6A		SECURING
6B	Describe how the nervous system responds to stimuli. Describe the routes that impulses take to and from the brain. Describe the structure of sensory neurones. Describe the structures of motor neurones and relay neurones. Describe the structure and function of the reflex arc. Explain how motor neurones are adapted to their functions. Explain how sensory neurones are adapted to their functions (including the myelin sheath). Explain how the structure of the reflex arc allows a faster response. Explain the action and function of synapses. Explain the structure and function of the eye as a sensory receptor including the role of: a the cornea and lens b the iris c rod and cone cells in the retina Describe defects of the eye including cataracts, longsightedness, short-sightedness and colour blindness Explain how cataracts, long-sightedness and short-sightedness can be corrected	6B
5A		5A
5B		5B
4A		4A
4B		4B
3A		DEVELOPING
3B	Describe how the nervous system detects stimuli. State the function of the nervous system. Describe what the parts of the nervous system are made of. List the parts of the nervous system.	3B
2A		2A
2B		2B
1A		1A
1B		1B
P8		PRE-GCSE
P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

BODY SYSTEMS – The urinary system		
9A	EXCELLING	9A
9B	Explain the effect of ADH on the permeability of the collecting duct in regulating the water content of the blood	9B
8A		8A
8B		8B
7A		7A
7B		7B
6A		SECURING
6B	Compare the function of the kidney with a dialysis machine. Explain how the structure of the nephron is related to its function in filtering the blood and forming urine including: a filtration in the glomerulus and Bowman’s capsule b selective reabsorption of glucose c reabsorption of water	6B
5A		5A
5B		5B
4A		4A
4B		4B
4B		Describe the treatments for kidney failure, including kidney dialysis and organ donation State that urea is produced from the breakdown of excess amino acids in the liver
3A	DEVELOPING	3A
3B	Explain why some people need dialysis. Describe the structure of the urinary system	3B
2A		2A
2B		2B
1A		1A
1B		1B
P8		PRE-GCSE
P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

BODY SYSTEMS – The skeletal system		
9A	EXCELLING	9A
9B		9B
8A		8A
8B		8B
7A		7A
7B		7B
6A		SECURING
6B	6B	
5A	5A	
5B	5B	
4A	4A	
4B	4B	
3A	DEVELOPING	
3B		3B
2A		2A
2B		2B
1A		1A
1B		1B
P8	PRE-GCSE	P8
P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

CELLS, TISSUES, ORGANS		
9A	EXCELLING Evaluate the use of stem cells in medicine (by comparing their benefits and risks). Calculations with numbers written in standard form	9A
9B		9B
8A		8A
8B		8B
7A		7A
7B		7B
6A		SECURING Compare embryonic and adult stem cells in animals. Calculate percentage gain and loss of mass in osmosis. Explain how substances are transported by osmosis. Explain the effects of osmosis on cells and tissues. Compare eukaryotic and prokaryotic cells. Describe the stages of growth in plants (cell division/mitosis, elongation, differentiation). Describe what happens in each stage of the cell cycle, including mitosis. Describe what happens in meiosis (without details of the stages). Explain why haploid gametes are needed for sexual reproduction. Identify benefits and risks of using stem cells in medicine. Use percentile growth curves to interpret growth in children. Suggest reasons for differences between the same types of specialised cells from different organisms. Apply microbial growth rates to growth curves of other organisms. Use graphs to calculate population growth rates. Investigate osmosis in potatoes. Describe how bacteria multiply by binary fission. Describe how cancers grow. Describe how mitosis produces genetically identical, diploid cells. Describe the function of stem cells in plants and animals. Describe where stem cells are found. Describe why mitosis is important for an organism. (growth, repair, asexual reproduction) Explain why cell differentiation is important in the development of specialised cells in plants. Explain why cell differentiation is important in the development of specialised cells. Give examples of where stem cells may be used in medicine. List the names and order of the stages of the cell cycle, including mitosis. Recall that gametes are produced by meiosis. Draw conclusions about a cell's function from its adaptations. Explain the importance of surface area:volume ratio for organisms. Identify the contents of plant cells in unfamiliar plants. Justify the classification of an organism as a plant based on cell structure. Justify the classification of an organism as an animal based on cell structure. Suggest a function for an unknown animal cell based on its adaptations. Use a knowledge of diffusion to explain how materials enter and leave unicellular organisms. Describe what is happening in the different parts of a growth curve. Explain how yeast can be used to make both alcoholic drinks and bread. Calculate sizes using magnifications. Calculate total magnification using a formula. Describe how substances are transported by active transport (including the need for energy). State that substances are transported by diffusion, osmosis and active transport. Identify similarities between the functions of different organs (including common life
6B	6B	
5A	5A	
5B	5B	
4A	4A	
4B	4B	

	processes).	
3A	DEVELOPING	3A
3B		3B
2A		2A
2B		2B
1A		1A
1B		1B
		<p>Change numbers to and from standard form.</p> <p>Describe why bacteria are classified as being prokaryotic.</p> <p>Explain why bacteria are used to make yoghurt.</p> <p>Explain why bacteria grow well in certain conditions.</p> <p>Describe what happens during cell division.</p> <p>Describe how ciliated epithelial cells are adapted to their function.</p> <p>Describe how structure of specialised animal cells is related to their function.</p> <p>Describe how the structures of specialised plant cells are related to their functions.</p> <p>Describe the functions of the sub-cellular structures commonly found in eukaryotic cells (nucleus, cell membrane, cell wall, chloroplasts, mitochondria and ribosomes).</p> <p>Explain why multicellular organisms need efficient transport systems.</p> <p>Suggest reasons for differences between animal cells (in terms of their function).</p> <p>Suggest reasons for differences between plant cells (in terms of their function).</p> <p>Use the key characteristics of microorganism cell structure to classify microorganisms.</p> <p>Explain what happens in fermentation.</p> <p>Estimate sizes using microscope fields of view.</p> <p>Estimate sizes using scale bars.</p> <p>Explain how diffusion occurs in terms of movement of particles</p> <p>Explain how substances are transported by diffusion.</p> <p>Describe the functions of different tissues in an organ.</p> <p>Describe the functions of common parts of bacteria.</p> <p>Describe, identify and state the basic functions of the parts of a bacterial cell (soft cell wall, flagella, cytoplasm, cell membrane, chromosome).</p> <p>Identify the common parts of bacteria.</p> <p>Describe the function of mitochondria.</p> <p>Describe what the cell wall, permanent vacuole and chloroplasts do.</p> <p>Describe what the nucleus, cell membrane and cytoplasm do.</p> <p>Give examples of specialised animal cells.</p> <p>Give examples of specialised plant cells.</p> <p>Identify a cell as a plant cell.</p> <p>Identify mitochondria.</p> <p>Identify organisms that are unicellular and those that are multicellular.</p> <p>Identify the cell nucleus, cell membrane and cytoplasm on a diagram of a cell.</p> <p>Identify the cell wall, permanent vacuole and chloroplasts on a diagram of a cell.</p> <p>Identify the parts of plant and animal cells.</p> <p>List the main features commonly found in plant cells.</p> <p>Recall the parts of plant and animal cells</p> <p>State the meaning of: multicellular, unicellular.</p> <p>Compare life processes in a range of plants and animals.</p> <p>Recall what happens in aerobic and anaerobic respiration in yeast.</p> <p>Describe how to prepare a microscope slide.</p> <p>Describe how to use a light microscope to examine a slide.</p> <p>Describe the functions of the parts of a light microscope.</p> <p>Explain why some cell structures can be seen with an electron microscope but not with a light microscope.</p> <p>Interpret the SI prefixes milli-, micro-, nano- and pico-.</p> <p>Make drawings of plant and animal cells using a light microscope and identify their parts.</p> <p>Recall what an electron microscope is.</p> <p>Recall what is meant by an instrument's resolution.</p> <p>Describe the functions of a large range of human, animal and plant organs.</p> <p>Describe, identify and state the basic functions of common parts of protoctist cells (cell wall, flagella, cilia, pseudopods, cytoplasm, cell membrane, chloroplast, nucleus).</p>

	<p>Correctly use the word: tissue.</p> <p>Identify and recall named tissues in human and plant organs.</p> <p>Define growth in animals as an increase in cell number and size.</p> <p>Identify ways in which an organism shows each life process.</p> <p>Identify the basic parts of a light microscope.</p> <p>Identify the basic parts of a prepared light microscope slide.</p> <p>Correctly use the word: organ.</p> <p>Describe the functions of major human and plant organs.</p> <p>Locate and identify some human and plant organs.</p>	
P8	PRE-GCSE	P8
P7	Use life processes to justify whether something is an organism or is non-living.	P7
P6	State the use of a microscope.	P6
P5	Recall the conditions under which bacteria grow quickly.	P5
P4	Describe the life processes.	P4
P3	Identify things as being alive or not.	P3
P2	Recall the life processes: movement, reproduction, sensitivity, growth, respiration, excretion, nutrition (MRS GREN).	P2
P1	State the meaning of and correctly use the word: organism.	P1
	Recall that some foods, such as bread, beer and wine, are made using yeast.	
	Recall the conditions under which yeast grow quickly.	
	Recall the conditions under which algae grow quickly.	

BIOLOGY – Health, Disease and homeostasis		
9A	EXCELLING	9A
9B	<p>Describe different ways plant diseases can be detected and identified, in the lab and in the field including the elimination of possible environmental causes, distribution analysis of affected plants, observation of visible symptoms and diagnostic testing to identify pathogens</p> <p>Describe the production of monoclonal antibodies, including:</p> <p>a use of lymphocytes which produce desired antibodies but do not divide</p> <p>b production of hybridoma cells</p> <p>c hybridoma cells produce antibodies as they divide</p> <p>Explain the use of monoclonal antibodies, including:</p> <p>a in pregnancy testing</p> <p>b in diagnosis including locating the position of blood clots and cancer cells and in treatment of diseases including cancer</p> <p>c the advantages of using monoclonal antibodies to target specific cells compared to drug and radiotherapy treatments</p> <p>Explain that adrenalin is produced by the adrenal glands to prepare the body for fight or flight, including:</p> <p>a increased heart rate</p> <p>b increased blood pressure</p> <p>c increased blood flow to the muscles</p> <p>d raised blood sugar levels by stimulating the liver to change glycogen into glucose</p> <p>Explain how thyroxine controls metabolic rate as an example of negative feedback, including:</p> <p>a low levels of thyroxine stimulates production of TRH in hypothalamus</p> <p>b this causes release of TSH from the pituitary gland</p> <p>c TSH acts on the thyroid to produce thyroxine</p> <p>d when thyroxine levels are normal thyroxine inhibits the release of TRH and the production of TSH</p> <p>Explain how blood glucose concentration is regulated by glucagon</p> <p>Explain how body temperature is regulated by vasoconstriction and vasodilation</p> <p>Explain the effect of ADH on the permeability of the collecting duct in regulating the water content of the blood</p>	9B
8A		8A
8B		8B
7A		7A
7B		7B
6A	SECURING	6A
6B	<p>Compare how cardiovascular diseases are treated.</p> <p>Explain how disease can affect the immune system.</p> <p>Explain how the spread of the STIs Chlamydia and HIV can be reduced or prevented.</p> <p>Explain how immunisation protects against infection by a pathogen.</p> <p>Explain why each stage of the development of a new medicine is needed.</p> <p>Explain why exercise is recommended to help people with cardiovascular disease.</p> <p>Explain the effect of alcohol consumption on liver disease at local, national and global levels.</p> <p>Explain the links between specific forms of malnutrition, diet and lifestyle.</p> <p>Interpret results from food tests for reducing and non-reducing sugars (glucose and sucrose).</p> <p>Interpret results from simple food tests (e.g. fat, starch, protein, vitamin C).</p> <p>Use dietary advice and nutrition information to design a healthy diet.</p> <p>Compare benefits and drawbacks of transplants compared with other forms of treatment.</p> <p>Explain how signs of a disease can be used to identify the pathogen.</p> <p>Explain how the spread of different pathogens can be reduced or prevented.</p> <p>Describe how antigens trigger the release of antibodies and the production of memory lymphocytes.</p> <p>Describe the role of antibodies in the immune response.</p> <p>Describe the role of memory lymphocytes in triggering a secondary response.</p> <p>Outline the role of the immune system in protecting against disease.</p>	6B
5A		5A
5B		5B
4A		4A
4B		4B

3A	DEVELOPING	3A
3B		3B
2A		2A
2B		2B
1A		1A
1B		1B
	Describe the stages of development of new medicines.	
	Explain why antibiotics are useful for treating bacterial infections (because they do not damage human cell processes).	
	Explain why antibiotics cannot be used to treat infections by pathogens other than bacteria.	
	Describe how obesity correlates with cardiovascular disease.	
	Describe how smoking correlates with cardiovascular disease.	
	Define the term health.	
	Describe how communicable and non-communicable diseases differ.	
	Describe the link between alcohol and liver disease.	
	Describe tests for fat and starch.	
	Describe the causes and control of Type 2 diabetes.	
	Describe the relationships between diet, exercise, age, sex and energy.	
	Describe the roles of vitamin A, vitamin C, calcium and iron in the body.	
	Explain how deficiency diseases are caused.	
	Explain why body mass changes if energy input into the body does not match energy output.	
	Explain why exercise and diet affect obesity.	
	Interpret Reference Intake (RI) information.	
	Give examples of pathogens that are spread in different ways (e.g. cholera bacteria by water, tuberculosis bacteria and chalaria dieback fungi by air, malaria protist by vector, Helicobacter by mouth, Ebola by body fluids).	
	Describe how chemical barriers protect the body (e.g. lysozymes, hydrochloric acid).	
	Describe how physical barriers protect the body (e.g. skin, mucus and cilia).	
	Define the term antibiotic (as medicines that inhibit cell processes in bacteria).	
	Describe the importance of testing drugs.	
	Explain the effects of stimulants and depressants on the body by reference to the nervous system.	
	Explain the short- and long-term effects of alcohol.	
	Define the term disease.	
	Give examples of non-communicable diseases.	
	Calculate energy requirements for daily needs and activities.	
	Describe how obesity is measured (BMI and waist : hip calculations).	
	Describe the effects of obesity on health.	
	Describe the factors that may lead to obesity.	
	Describe the general uses of carbohydrates, fats (lipids), proteins, vitamins and minerals by the body.	
	Describe the uses of fibre and water by the body.	
	Explain how diet can lead to malnutrition.	
	Interpret nutrition information labels.	
	Recall and identify examples of deficiency diseases (kwashiorkor, scurvy, rickets).	
	Recall sources of some individual vitamins and mineral salts (e.g. vitamin A, vitamin C, calcium, iron).	
	Use nutrition information labels to perform calculations.	
	Give examples of when organ transplants are needed.	
	Describe a disease caused by a fungus.	
	Describe a disease caused by a protist.	
	Describe a disease caused by a virus.	
	Describe some problems and diseases caused by bacteria.	
	State the ways in which pathogens can be spread.	
	Give examples of chemical barriers.	
	Give examples of physical barriers.	
	State that the immune system protects the body by attacking pathogens.	
	Classify drugs as legal, illegal, medical, recreational.	
	Describe the effects of stimulants and depressants, including on reaction times	
	Describe the short- and long-term effects of alcohol on the body.	

	<p>Define the term malnutrition.</p> <p>Explain the benefits of a balanced diet and correctly use the term: malnutrition.</p> <p>Recall how food acts as fuel for the body.</p> <p>Recall some good sources of carbohydrates, fats, proteins and fibre.</p> <p>Recall that if a person's energy intake is different from the amount of energy they need, their mass will change</p> <p>Recall the names of the nutrients in food.</p> <p>Recall what is meant by a balanced diet.</p> <p>Recall why we need food (energy, growth and repair, health).</p>	
P8	PRE-GCSE	P8
P7	Identify the effects and side effects of drugs on the body.	P7
P6	Recall that drugs are substances that affect how the body works.	P6
P5	Recall that drugs can be addictive and correctly use the term: substance abuse.	P5
P4	Recall the short- and long-term effects of commonly abused substances.	P4
P4	Correctly use the term: diet.	P4
P3	State what is shown on food labelling.	P3
P2		P2
P1		P1

BIOLOGY - Ecosystems		
9A	EXCELLING	9A
9B	Evaluate the use of indicator species as evidence to assess the level of pollution, including: a polluted water – bloodworm, sludgeworm b clean water – freshwater shrimps, stonefly c air quality – different species of lichen, blackspot fungus on roses	9B
8A		8A
8B		8B
7A		7A
7B		7B
6A		SECURING
6B	Explain why biologists often now classify organisms into three domains. Explain how eutrophication occurs and the problems associated with eutrophication in an aquatic environment. Explain ways in which decay can be prevented, such as freezing, refrigeration, drying, canning, salting, jamming, pickling and pasteurisation. Make predictions about how changes in physical and biological factors will affect carbon supply in an ecosystem. Compare models of energy transfer in food chains (pyramids of number, biomass). Evaluate food chains and food webs as models of feeding relationships. Describe how selective breeding is done. Explain how particular adaptations limit an organism's distribution and abundance. Explain how biodiversity can be preserved using gene banks, seed banks, tissue banks, cryopreservation and pollen banks. Explain how changes in a population or community in an ecosystem will affect other populations. Explain why environmental variation can confuse the idea of a species and make classification and identification difficult. Explain why preserving biodiversity is important (useful products, organism interactions, enriches our lives, disaster recovery). Justify the lack of a virus kingdom. Use simple calculations (e.g. biodiversity index) to compare biodiversity. Describe the methods by which carbon is recycled in an ecosystem. Explain the importance of decomposers in an ecosystem. Model the recycling of carbon in an ecosystem using the carbon cycle. Describe how a learned behaviour is beneficial to an organism. Describe how certain learned and innate behaviours can be beneficial to organisms. Explain how changes in a population or community in an ecosystem affect other populations. Explain why organisms are in competition in a given habitat. Describe examples of interdependence and explain how changes in a population or community in an ecosystem affect other populations. Explain the effects of some persistent pesticides on ecosystems. Explain the gains and losses of energy from living organisms. Interpret models of energy transfer (pyramids of numbers). Use data to create food webs. Use food webs to predict the effects of changes in biological factors (including human activity). Use food webs to predict the effects of changes in populations. Describe the methods by which nitrogen is recycled in an ecosystem. Explain how attack of plants by pests and pathogens can have an impact on human populations. Explain how food production for humans can be increased using different plant varieties and pest management strategies (including insecticides and herbicides).	6B
5A		5A
5B		5B
4A		4A
4B		4B

	Explain the effects of phosphates, nitrates and persistent pesticides on ecosystems. Make predictions about how changes in physical or biological factors will interact with adaptations and affect survival (e.g. effects of disease on monoculture).	
3A	DEVELOPING	3A
3B		3B
2A		2A
2B		2B
1A		1A
1B		1B
	Compare similar adaptations in plants and animals that live in similar places. Describe how hybrids can be distinguished from species. Explain how organisms are classified, using smaller and smaller groupings of shared characteristics. Identify an organism as a member of one of the five kingdoms. Identify genus and species from a binomial name. Identify the parents of a hybrid. Describe how the distribution of organisms is controlled by the availability of resources. Describe physical and behavioural adaptations of organisms to daily and seasonal changes, including deciduous and evergreen trees, nocturnal organisms, hibernation and migration. Describe the causes of environmental variation (differences in the environment, acquired characteristics). Explain how changes in an ecosystem can lead to endangerment and extinction. Recall the differences between innate and learned behaviours. Suggest methods of conservation that can be used to ensure the survival of organisms and habitats. Describe the sources and effects of some pesticides. Sketch pyramids of numbers. Use a food web to identify food sources for different animals and give reasons for identifying organisms as: carnivores, consumers, herbivores, omnivores, predators, prey, producers. Describe how increased human population growth affects food supply. Explain why phosphates and potassium, are important nutrients for plants. Correctly use the terms: community, ecosystem. Correctly use the term biodiversity. Correctly use the terms species and hybrid. Describe how organisms are classified into smaller and smaller groups (based on their characteristics). Describe the key characteristics of the five kingdoms of organisms and use this to assign organisms to their kingdoms. Recognise binomial species names. Correctly use the terms: ecosystem, decomposer. Give examples of decomposer microorganisms. State the names of the compounds in which carbon is held in an ecosystem. Explain how changes in a physical environmental factor affect the distribution of organisms. Explain how changes in a physical environmental factor in a habitat affect populations and communities. State the resources that organisms need from their habitats and ecosystems. Define feeding relationships in terms of energy flow. Use food chains to create food webs and identify food chains within food webs. Explain the importance of nitrates to plants. Recall the main nutrients required by plants and identify signs that a plant may be lacking in nutrients (in general terms only). State the names of compounds in which nitrogen is held in an ecosystem Describe the adaptations of a range of organisms to their habitats. Recall the five kingdoms of organisms. Describe how physical environmental factors vary in a habitat, both on a daily basis and seasonally. Identify and give examples of environmental variation.	
P8	PRE-GCSE	P8

P7	Identify the physical environmental factors that make up the environment in a habitat. Correctly use the term: habitat.	P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

BIOLOGY – Inheritance and Evolution		
9A	EXCELLING	9A
9B	Evaluate the benefits and risks of using selective breeding and genetic engineering to produce new varieties and breeds.	9B
8A	Explain the impact of selective breeding on domesticated plants and animals.	8A
8B	Explain how the development of resistance in organisms supports Darwin's theory.	8B
7A	Explain how the order of bases in a section of DNA decides the order of amino acids in the protein and that these fold to produce specifically shaped proteins such as enzymes.	7A
7B	Describe the stages of protein synthesis, including transcription and translation: a RNA polymerase binds to non-coding DNA located in front of a gene b RNA polymerase produces a complementary mRNA strand from the coding DNA of the gene c the attachment of the mRNA to the ribosome d the coding by triplets of bases (codons) in the mRNA for specific amino acids e the transfer of amino acids to the ribosome by tRNA f the linking of amino acids to form polypeptides Describe how genetic variants in the coding and non-coding DNA of a gene can affect phenotype by influencing the binding of RNA polymerase and altering the quantity of protein produced. Explain how sex-linked genetic disorders are inherited Describe the main stages of genetic engineering including the use of: a restriction enzymes b ligase c sticky ends d vectors	7B
6A	SECURING	6A
6B	Calculate probabilities of certain phenotypes occurring when organisms are crossed.	6B
5A	Calculate ratios of phenotypes (controlled by alleles of a single gene) when organisms are crossed.	5A
5B	Explain how a mutation can cause variation (limited to changes in the protein formed, which can affect processes in which that protein is needed).	5B
4A	Explain why the effects of some alleles in an organism's genotype are not seen in its phenotype.	4A
4B	Interpret family pedigree charts to work out possible inherited genotypes and phenotypes. Use (draw) genetic diagrams to work out possible combinations of alleles in the offspring of parents. Evaluate the evidence for suggested physical and behavioural adaptations of extinct species. Explain how evidence from fossils supports Darwin's theory. Explain how natural selection can lead to evolution. Explain how natural selection can lead to the evolution of a new species. Describe the overall structure of DNA. Describe the roles played by Watson, Crick, Franklin and Wilkins in the discovery of the structure of DNA. Explain the effects of alleles on inherited characteristics. Explain why many mutations have no effect on the phenotype. Use (complete) Punnett squares to work out possible combinations of alleles in the offspring of parents. Use a model to illustrate the relationship between DNA, chromosomes, genetic information and genes. Describe how selective breeding is carried out. Recall some uses of genetically engineered organisms (in agriculture, in medicine).	4B

	<p>Explain how natural selection allows some members of a species to survive better than others when conditions change.</p> <p>Explain how natural selection determines the survival of certain variations of adaptations within a population.</p> <p>Describe how DNA can be extracted from fruit (Core Practical).</p> <p>Describe how DNA strands are held together.</p> <p>Describe the relationship between a genotype and a phenotype.</p> <p>Give examples of mutations in human genes that affect the phenotype, and examples of those that have little or no obvious effect.</p> <p>Identify homozygous and heterozygous genotypes.</p> <p>Name the bases in DNA.</p> <p>Recall the pairing of bases in DNA.</p> <p>Describe what genetic analysis is.</p> <p>Describe what is meant by a 'genetically modified organism'.</p> <p>Describe why new breeds and varieties are created.</p> <p>Recall some uses of selectively bred organisms (in agriculture).</p> <p>Explain how evidence from fossils and stone tools supports current ideas about human evolution.</p> <p>Explain how particular adaptations increase the chances of survival.</p> <p>Analyse the contribution of genes and environment to the variation in a characteristic.</p> <p>Describe the work of Mendel in discovering the basis of genetics.</p>	
3A	DEVELOPING	3A
3B	Define the term mutation.	3B
2A	Describe how genes control characteristics [in terms of containing instructions].	2A
2B	Describe how sex is determined in humans.	2B
1A	Describe some potential applications of mapping human genomes.	1A
1B	Describe the difference between a gene and an allele	1B
	Describe where genes are found.	
	Give examples of characteristics controlled by multiple genes.	
	Recall the function of genes.	
	Recall what an organism's genome is.	
	State the number of pairs of chromosomes in most human cells.	
	State what chromosomes are made of.	
	Describe how stone tools created by human-like species have developed over time.	
	Describe the fossil evidence for human-like species that lived 4.4, 3.2 and 1.6 million years ago.	
	Describe how genetic information is stored in the nucleus of a cell.	
	Describe the causes of genetic variation (mutation and sexual reproduction)	
	Describe what genetic information does.	
	Explain how inherited variation is caused (by parents, does not include genes).	
	Identify normal distribution.	
	Interpret information on continuous genetic variation using normal distribution curves.	
	Recall that some animal behaviour is learned (environmental) and some is innate (inherited).	
	Recall where DNA is found in a eukaryotic cell.	
	Describe how adaptations allow organisms to survive.	
	Recall how stone tools are dated from their environment.	
	State that the individuals in a population are likely to vary from one another genetically.	
	Distinguish between continuous and discontinuous variation.	
	Define 'evolution'.	
	Distinguish between genetic variation and environmental variation.	
	Identify and give examples of inherited variation.	
	Identify variation between organisms of the same type and of different types.	
	Recall the cause of genetic variation.	
P8	PRE-GCSE	P8

P7		P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1

BIOLOGY – Plant Biology		
9A	EXCELLING	9A
9B	<p>Explain the interactions of temperature, light intensity and carbon dioxide concentration in limiting the rate of photosynthesis</p> <p>Explain how the rate of photosynthesis is directly proportional to light intensity and inversely proportional to the distance from a light source, including the use of the inverse square law calculation</p> <p>Describe the commercial uses of auxins, gibberellins and ethene in plants, including: a auxins in weedkillers and rooting powders b gibberellins in germination, fruit and flower formation and the production of seedless fruit c ethene in fruit ripening</p>	9B
8A		8A
8B		8B
7A		7A
7B		7B
6A	SECURING	6A
6B	<p>Evaluate the advantages and disadvantages of sexual and asexual reproduction in plants in different conditions</p> <p>Model photosynthesis using a balanced symbol equation. Evaluate different methods of pollination.</p> <p>Explain how and why some seeds are prevented from germinating until a certain time. Explain the importance of light/darkness for some seeds and their germination.</p> <p>Evaluate different methods of seed dispersal. Explain how some pollen grains are adapted to their functions.</p> <p>Explain the difference in outcomes of asexual and sexual reproduction in plants. Explain the importance of pollination for the production of foods. Explain the production of seedless fruits using hybridisation. Use a knowledge of diffusion to explain how different conditions cause different rates of transpiration. Explain how the features of leaves and plant cells are adaptations for photosynthesis. Explain how the rate of photosynthesis can be controlled by a limiting factor Explain the functions of light and chlorophyll in photosynthesis (in terms of energy transfer). Model aerobic respiration using a word equation. Model photosynthesis using a word equation. Use the word equation to identify factors that would affect the rate of photosynthesis</p>	6B
5A		5A
5B		5B
4A		4A
4B		4B
3A		DEVELOPING
3B	<p>Describe how a fertilised egg cell grows into an embryo. Describe how plants avoid self-pollination.</p> <p>Describe how the fusing of male and female gametes (sex cells) and their nuclei during fertilisation form a fertilised egg cell (or zygote). Describe why plants are cross-bred.</p> <p>Explain the importance of seed dispersal. Explain why plants try to avoid self-pollination. Use flower structure and pollen shape to identify wind-pollinated and insect-pollinated flowers. Describe how water is lost from a plant. Explain how roots and stems are adapted for their function. Explain how wilting occurs. Describe how gas exchange occurs in plants. Describe the adaptations of leaves and plant cells for photosynthesis. Describe the test for starch. Explain the functions of light and chlorophyll in photosynthesis (in terms of energy transfer). Recall the factors that affect the rate of photosynthesis. Describe how the structures of a flower are adapted to their functions. Describe the events that occur after pollination leading to fertilisation.</p>	3B
2A		2A
2B		2B
1A		1A
1B		1B

	<p>Describe the functions of structures in flowers.</p> <p>Identify different kinds of fruits and describe how they disperse seeds.</p> <p>Identify pollen grains and ovules as containing the male and female gametes.</p> <p>Recall ways in which plants reproduce asexually.</p> <p>Describe how water and mineral salts are absorbed and moved around a plant.</p> <p>Describe how starch is used as a food storage material.</p> <p>Describe ways in which respiration can be detected (limewater, hydrogencarbonate indicator, heat).</p> <p>Describe what happens in photosynthesis.</p> <p>Recall that plants use glucose produced by photosynthesis to make new substances, often using mineral salts.</p> <p>Recall what happens in respiration.</p> <p>Correctly use the term pollination.</p> <p>Describe a plant's life cycle using a diagram.</p> <p>Identify the main structures in a flower and identify those that are male and those that are female.</p> <p>Identify and recall the parts in the plant water transport system.</p> <p>State the function of the plant water transport system.</p>	
P8	PRE-GCSE	P8
P7	Recall the resources needed for germination.	P7
P6		P6
P5		P5
P4		P4
P3		P3
P2		P2
P1		P1