Wallington
County Grammar School

The Biology Curriculum

Whole School Curriculum Intent:	Wallington County Grammar School is a highly academic but pastorally minded school which delivers a curriculum that enables all students to embody our motto - *Per Ardua ad Summa*, Through Difficulties to the Heights. Each Subject Leader has autonomy over their own curriculum and its intent, i.e. its subject content, skills content, sequencing and assessment schedule. This is vital to ensure the academic curriculum is designed by highly qualified subject experts. The intentions behind whole school approach to curriculum design taken by senior leaders are to provide: ● **Breadth** - We intend to provide a broad, academic and liberal curriculum that equips students with the body of human knowledge and different ways of thinking necessary to succeed in and enjoy their education, careers and wider lives. ● **Depth** - We do not want our students to simply study the national curriculum and examination specifications with grades being our sole focus. We aim for our students to become true scholars of the disciplines that they are learning so that they achieve a deep and sophisticated level of knowledge and understanding. ● **Values** - We aim for our students to develop our four core values: commitment, courage, compassion and creativity. ● **Democracy** - We aim for all our students to have the necessary knowledge and confidence, not just to participate in the democracy of the United Kingdom, but to lead it.
Subject Curriculum Intent:	A high-quality science education provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, pupils should be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They should be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes. KS3: Biology is based on the principles that: 1. Organisms are organised on a cellular basis 2. Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms. 3. Genetic information is passed from one generation of organisms to another. 4. The diversity of organisms, living and extinct, is the result of evolution. There should be an emphasis on developing practical skills with our students at KS3 by following a practical rich curriculum that introduces skills and develops them until students are confident and able scientists. KS4: Y9 scheme of work has remained unchanged but the topics from KS3 that are revisited as part of the spiral curriculum will be taught with the understanding that students may need more revisiting of prior understanding (linking to school wide pedagogical approach). Y10 and Y11 have had the order of a couple of the topics rearranged for this year to support the recovery curriculum. Y10 and Y11 schemes of work have had low stakes recall of knowledge tests included to help develop and enhance student understanding of content that was delivered in previous years (including content taught

	remotely). Content delivered at KS4 (Edexcel GCSE Biology) includes cells and organisation; nutrition; transport systems; genetics and biotechnology; ecology and ecosystems; and, evolution. Practical work at KS4 builds upon the skills developed in years 7 & 8. All of the GCSEs topics include content that goes above and beyond the curriculum including deeper thinking challenges. These are discussed and monitored via departmental meetings and drop ins. The most able students are given additional question booklets on relevant content that include AS questions. At A level the students follow the OCR Biology specification revisiting content that they have come across at KS3 and KS4 but adding detail and depth to their understanding. At A level there must be a focus on developing knowledge and understanding of key content: 1. Cells & the cell cycle – plant cells, animal cells, bacterial cells. Mitosis & Meiosis 2. Movement across membranes – including osmosis diffusion and active transport 3. Biological Systems – mass transport in animals (incl. the heart, lungs, circulatory system) in plants (including transpiration & translocation), nervous system, reproductive system, endocrine system, respiratory system) 4. Biochemistry and cycling of elements – Monomers and polymers of lipids, carbohydrates and proteins 5. Maintenance of a constant internal environment – homeostasis (blood glucose levels, temperature, water regulation) 6. Genes/inheritance – DNA structure, Monohybrid inheritance, Uses of DNA in protein synthesis 7. Reproduction – hormones involved, contraception, infertility and treating infertility 8. Chemical reactions in Biology – Photosynthesis and respiration A level Biology needs to focus on developing mastery in these concepts if the students are to achieve what they are capable of in the U6th. The curriculum features that will support this approach include a focus on identified threshold concepts / knowledge (see above). More time is devoted to these concepts and a mastery learning philosophy is promoted. There needs to be a focus on understanding concepts through testing prior knowledge, explanation, formative assessment, questioning, practice and feedback. In supporting the students to develop this mastery, interleaving and self-testing are a feature of the curriculum as is independent study. There is a focus on practical work to reinforce knowledge and develop the procedures and techniques needed for scientific enquiry.
Subject Curriculum Aims:	The national curriculum for science aims to ensure that all pupils: ● develop scientific knowledge and conceptual understanding through the specific discipline of biology ● develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them ● are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.
Exam Boards	GCSE: Pearson A Level: OCR

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Y7	Cells, Organisation & Microscopy	Human Reproduction	Digestion	Movement	Interdependence	Ecosystems
	Assessment 1 Format:	Cells, Organisation & Microscopy, and Human Reproduction | Multiple choice questions, short and long answer questions		Assessment 2 Format:	Cells, Organisation & Microscopy, Human Reproduction, Digestion and Movement Multiple choice questions, short and long answer questions	
Y8	Breathing & Gas Exchange	Respiration	Inheritance	Photosynthesis	Plant Reproduction	Ecology
	Assessment 1 Format:	Breathing & Gas Exchange, and Respiration Multiple choice questions, short and long answer questions		Assessment 2 Format:	Year 7 content plus Breathing & Gas Exchange, Respiration, Inheritance, Photosynthesis, and Plant Reproduction Multiple choice questions, short and long answer questions	
Y9	SB1 – Key Concepts in Biology		SB2 – Cells and Control		SB5 – Health, Disease and the Development of Medicines	
	Assessment 1 Format:	Units 1 & 2 Multiple choice questions, short and long answer questions		Assessment 2 Format:	Units 1, 2 & 3 Multiple choice questions, short and long answer questions	
Y10	SB6 – Plant Structures and their Functions	SB8 – Exchange and Transport in Animals	SB7 – Animal Coordination, Control and Homeostasis		SB9 – Ecosystems and Material Cycles	
	Assessment 1 Format:	Units 1, 2, 5 & 6 Multiple choice questions, short and long answer questions		Assessment 2 Format:	Units 1, 2, 5, 6, 7 & 8 Multiple choice questions, short and long answer questions	
Y11	SB3 – Genetics		SB4 – Natural Selection and Genetic Modification			

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
	Mock Format:	Units 1, 2, 3, 5, 6, 7, 8 & 9 Multiple choice questions, short and long answer questions		Assessment 2 Format:	Paper 1 – Units 1, 2, 3, 4 & 5 Paper 2 – Units 1, 6, 7, 8 & 9 Multiple choice questions, short and long answer questions	
L6th	2.1 – Cell Structure	2.5 – Biological Membranes	2.6 – Cell Division, Cell Diversity & Cell Differentiation	4.1 – Communicable Disease, Disease Prevention and the Immune System	4.3 – Classification and Evolution	4.2 – Biodiversity 6.5 – Ecosystems
	2.2 – Biological Molecules	2.3 – Nucleic Acids	2.4 - Enzymes	3.1 – Exchange Surfaces and Breathing 3.2 – Transport in Animals	3.3 – Transport in Plants	6.6 – Populations and Sustainability
	Assessment 1 Format:	Unit 2 Multiple choice questions, short and long answer questions		Assessment 2 Format:	Paper 1 – Breadth in Biology Paper 2 – Depth in Biology Both papers cover Units 1, 2, 3 &4 Paper 1: Multiple choice and short answer questions Paper 2: Short and long answer questions	
U6th	5.1 – Communication and Homeostasis 5.2 – Excretion as an example of Homeostatic Control	5.7 - Respiration	5.3 – Neuronal Control 5.4 – Hormonal Control	5.5 – Plant and Animal Responses		
	5.6 - Photosynthesis	6.1 – Cellular Control 6.2 – Patterns of Inheritance	6.3 – Manipulating Genomes	6.4 – Cloning and Biotechnology		
	Mock Format:	Paper 1 – Biological Processes: Units 1, 2, 3 & 5 Paper 2 – Biological Diversity: Units 1, 2, 4 & 6 Multiple choice questions, short and long answer questions				

Key Vocabulary

GCSE

SB1a Microscopes

Word	Pronunciation	Meaning
eyepiece lens		The part of the microscope you look down.
magnification	*mag-nif-ick-**ay**-shun*	How much bigger something appears compared with its actual size.
objective lens		The part of the microscope that is closest to the specimen.
resolution	*rez-O-**loo**-shun*	Smallest change that can be measured by an instrument. For example, in a microscope it is the smallest distance between two points that can be seen as two points and not blurred into one point.
stain		A dye used to colour parts of a cell to make them easier to see.

SB1b Plant and animal cells

Word	Pronunciation	Meaning
aerobic respiration	*air-**O**-bick*	A type of respiration in which oxygen is used to release energy from substances, such as glucose.
cell (surface) membrane		The membrane that controls what goes into and out of a cell. It is often called the cell surface membrane because eukaryotic cells contain other structures with membranes.
cell sap		Liquid found in the permanent vacuole in a plant cell.
cell wall		A tough layer of material around some cells, which is used for protection and support. It is stiff and made of cellulose in plant cells. Bacteria have a flexible cell wall.
chlorophyll	***klor**-O-fill*	The green substance found inside chloroplasts. It traps energy transferred by light.
chloroplasts	***klor**-O-plast*	A green disc containing chlorophyll, found in plant cells. Where the plant makes glucose, using photosynthesis.
chromosome	***krow**-mO-sOwm*	A structure found in the nuclei of cells. Each chromosome contains one enormously long DNA molecule.
cytoplasm	***site**-O-plaz-m*	The watery jelly inside a cell where the cell's activities take place.
DNA		A substance that contains genetic information. Short for deoxyribonucleic acid.
eukaryotic	*you-kar-ee-**ot**-ick*	A cell with a nucleus is eukaryotic. Organisms that have cells like this are also said to be eukaryotic.
field of view		The circle of light you see looking down a microscope.

mitochondrion	*my-tow-**kon**-dree-on*	A sub-cellular structure (organelle) in the cytoplasm of eukaryotic cells, where aerobic respiration occurs. Plural is mitochondria.
nucleus	***new**-clee-us*	The 'control centre' of a eukaryotic cell.
ribosome	***rY**-bow-sowm*	Tiny sub-cellular structure that makes proteins.
scale bar		A line drawn on a magnified image that shows a certain distance at that magnification.
scientific paper		An article written by scientists and published in a science magazine called a journal. It is like an investigation report but usually shows the results and conclusions drawn from many experiments.
vacuole	***vack**-you-oll*	A storage space in cells. Plant cells have a large, permanent vacuole that helps to keep them rigid.

SB1c Specialised cells

Word	Pronunciation	Meaning
acrosome	*ack-rO-sO'm*	A small vacuole in the tip of the head of a sperm cell, which contains enzymes.
adaptation	*add-app-**tay**-shun*	The features that something has to enable it to do a certain function (job).
adapted		If something has adaptations for a certain function (job), it is said to be adapted to that function.
ciliated epithelial cell	***sill**-ee-ay-ted* *ep-ith-**ee**-lee-al **sell***	A cell that lines certain tubes in the body and has cilia on its surface.
cilium	***sill**-ee-um*	A small hair-like structure on the surface of some cells. Plural is cilia.
digestion	*dye-**jes**-jun*	A process that breaks molecules into smaller, more soluble substances.
diploid	***dip**-loyd*	Describes a cell that has two sets of chromosomes.
egg cell		The female gamete (sex cell).
embryo	***em**-bree-O*	The tiny new life that grows by cell division from a fertilised egg cell (zygote).
enzyme		A substance that can speed up some processes in living things (e.g. breaking down molecules).
epithelial cell	*ep-ith-**ee**-lee-al **sell***	A cell found on the surfaces of parts of the body.
fertilisation	*fert-ill-I-**zay**-shun*	Fusing of a male gamete with a female gamete.
gamete	***gam**-meet*	A cell used for sexual reproduction.
haploid	*hap-loyd*	Describes a cell that has one set of chromosomes.
microvillus	***my**-crO-vill-us*	A fold on the surface of a villus cell. These folds increase the surface area so that digested food is absorbed more quickly. Plural is microvilli.

oviduct		A tube that carries egg cells from the ovaries to the uterus in females. Fertilisation happens here.
specialised cell	*spesh-ee-al-Iz'd*	A cell that is adapted for a certain specific function (job).
sperm cell		The male gamete (sex cell).

SB1d Inside bacteria

Word	Pronunciation	Meaning
chromosomal DNA		DNA found in chromosomes but the term is often used to describe the large loop of DNA found in bacteria.
DNA		A substance that contains genetic information. Short for deoxyribonucleic acid.
flagellum	*flaj-**ell**-um*	A tail-like structure that rotates, allowing a unicellular organism to move. Plural is flagella.
index		A small raised number after a unit or another number to show you how many times to multiply it by itself. For example, 10^3 means multiply 10 together 3 times (10 × 10 × 10).
plasmid	***plaz**-mid*	A small loop of DNA found in the cytoplasm of bacteria.
plasmid DNA	***plaz**-mid*	DNA found in plasmids.
prokaryotic	***prO**-kar-ee-ot-ick*	A cell with no nucleus is prokaryotic. Organisms such as bacteria, which have cells like this, are also said to be prokaryotic.
standard form		A very large or very small number written as a number between 1 and 10 multiplied by a power of 10. Example: $A \times 10^n$ where A is between 1 and 10 and n is the power of 10.

SB1e Enzymes and nutrition

Word	Pronunciation	Meaning
biological catalyst	*bio-**loj**-i-cal **cat**-a-list*	A substance found in living organisms that speeds up reactions (an enzyme).
catalyst	***cat**-a-list*	A substance that speeds up the rate of a reaction, without itself being used up.
digest	*die-**jest***	To break down large molecules into smaller subunits, particularly in the digestive system.
monomer		A small molecule that can join with other molecules like itself to form a polymer.
polymer		A substance made up of very long molecules containing repeating groups of atoms. (Formed by joining monomer molecules together.)
product		A substance formed in a reaction.

substrate		A substance that is changed during a reaction.
synthesis	***sinth****-eh-sis*	To build a large molecule from smaller subunits.

SB1f Testing foods

Word	Pronunciation	Meaning
Benedict's solution		A bright blue chemical reagent that turns orange or red when warmed with a solution of reducing sugars.
biuret test		A test that uses copper sulfate solution and potassium hydroxide solution to test for proteins. The blue of the copper sulfate solution turns purple in the presence of proteins.
calorimeter		Equipment used to measure the energy released from a substance by burning it.
chemical reagent	*ree-**ay**-jent*	A substance or mixture used in chemical analysis or reactions.
iodine solution		A yellow-orange solution that turns black-blue when in contact with starch.
precipitate		Insoluble substance formed when two soluble substances react together.
reducing sugar		A simple sugar, such as glucose or fructose, that reacts with (reduces) Benedict's solution and changes its colour.

SB1g Enzyme action

Word	Pronunciation	Meaning
active site		The space in an enzyme where the substrate fits during an enzyme-catalysed reaction.
denatured		A denatured enzyme is one where the shape of the active site has changed so much that its substrate no longer fits and the reaction can no longer happen.
lock-and-key model		Model that describes the way an enzyme catalyses a reaction when the substrate fits within the active site of the enzyme.
specific	*spe-**sif**-ick*	Where an enzyme only reacts with one kind of substrate.

SB1h Enzyme activity

Word	Pronunciation	Meaning
optimum pH		The pH at which an enzyme-catalysed reaction works fastest.
optimum temperature		The temperature at which an enzyme-catalysed reaction works fastest.

SB1i Transporting substances

Word	Pronunciation	Meaning
active transport		The movement of particles across a cell membrane from a region of lower concentration to a region of higher concentration (*against* the concentration gradient). The process requires energy.
diffusion	*diff-**you**-zshun*	When particles spread and mix with each other without anything moving them. Diffusion into and out of cells occurs for particles that are small enough to pass through the cell surface membrane.
concentration	*con-sen-**tray**-shun*	The amount of a solute dissolved in a certain volume of solvent. Measured in units such as g/cm^3.
concentration gradient		The difference between two concentrations. There will be an overall movement of particles *down* a concentration gradient, from higher concentration to lower concentration.
osmosis	*oz-**mO**-sis*	The overall movement of solvent molecules in a solution across a partially permeable membrane, from a dilute solution to a more concentrated one.
passive		A process that does not require energy is passive. A passive process is the opposite of an active process (which requires energy).
semi-permeable		Describes something that will allow certain particles to pass through it but not others. Another term for 'partially permeable'.
solute	***sol**-yoot*	The solid that has dissolved in a liquid to make a solution.
solvent		The liquid in which a substance dissolves to make a solution.

SB2a Mitosis

Word	Pronunciation	Meaning
anaphase	***an**-na-fays*	The stage of mitosis in which the separated chromosomes move away from each other.
asexual reproduction		Producing new organisms from one parent only. These organisms are genetically identical to the parent.
cancer cell		Cell that divides uncontrollably.
cell cycle		A sequence of growth and division that happens in cells. It includes interphase and mitosis, and leads to the production of two daughter cells that are identical to the parent cell.
clone		Offspring from asexual reproduction. All the cells in a clone are genetically identical to each other and to the parent's cells.
cytokinesis	*site-O-kY-**nee**-sis*	When the cytoplasm of the cell is separated as the cell membrane is pinched to divide the cell into two daughter cells.
daughter cell		New cell produced by cell division.

diploid	***dip**-loyd*	A cell with two sets of chromosomes.
DNA replication	*rep-li-**kay**-shun*	The copying of the DNA within a cell.
haploid	***hap**-loyd*	A cell with one set of chromosomes.
interphase	***in**-ter-fays*	The stage when the cell prepares itself for the process of cell division, and DNA replication takes place. The cell also makes more of its sub-cellular structures.
metaphase	***met**-a-fays*	The stage of mitosis when the chromosomes line up across the middle of the cell.
mitosis	*my-**toe**-sis*	The process of cells dividing to produce two daughter cells that are genetically identical to the parent.
multicellular	*mul-tee-**sell**-U-lar*	An organism that is made of many cells.
prophase	***prO**-fays*	The stage of mitosis in which the nucleus starts to break down and spindle fibres appear.
spindle fibre	***spin**-del **fY**-ber*	Filament formed in a cell during mitosis, which helps to separate chromosomes.
telophase	***tee**-lO-fays*	The stage of mitosis in which the chromosomes arrive at opposite ends of the cell and the nucleus membrane reforms.
tumour	***tyoo**-mer*	Lump formed of cancer cells.

SB2b Growth in animals

Word	Pronunciation	Meaning
differentiation	*diff-er-en-shi-**ay**-shun*	When a group of similar things, such as cells, become different in form from each other.
growth		A permanent increase in the number or size of cells in an organism.
percentile	*pur-**sent**-iyl*	A [redacted]th division of a group. For example, 10 per cent of the data items are below the 10th percentile and 50 per cent are below the 50th percentile.

SB2c Growth in plants

Word	Pronunciation	Meaning
differentiate		To change into different types, for example when meristem cells differentiate into specialised cells such as xylem or root hair cells.
elongation		When something gets longer (such as a cell in a plant root or shoot before it differentiates into a specialised cell).
meristem		A small area of undifferentiated cells in a plant, such as near the shoot tips and root tips, where cells are dividing rapidly by mitosis.
root hair cell		Cell found on the surface of plant roots that has a large surface area to absorb water and dissolved mineral salts quickly from the soil.

xylem cell	***zy**-lem sell*	Cell that joins with other xylem cells to form long, thick-walled vessels after they die. The vessels carry water and dissolved mineral salts through the plant.

SB2d Stem cells

Word	Pronunciation	Meaning
adult stem cell		Stem cell found in specialised tissue that can produce more of the specialised cells in that tissue for growth and repair.
cancer	***can**-ser*	Disease caused by the uncontrolled division of stem cells in a part of the body.
embryonic stem cell		Stem cell from an early embryo that can produce specialised cells of many different types.
meristem cell		Stem cell found in a plant meristem.
rejection		When the immune system attacks and kills cells and tissue that come from another person, such as blood (after transfusion) or stem cells.
stem cell		Unspecialised cell that continues to divide by mitosis to produce more stem cells and other cells that differentiate into specialised cells.

SB2e The brain

Word	Pronunciation	Meaning
cerebellum	*ser-eb-**ell**-um*	Part of the brain that controls balance, posture and fine muscle movements.
cerebral cortex	***ser**-eb-ral **kor**-tex*	The main part of the brain, which is used for most of our senses, language, memory, behaviour and consciousness.
cerebral hemisphere	***ser**-eb-ral **hem**-iss-fear*	One half of the cerebral cortex. (The cerebral cortex has two cerebral hemispheres.)
medulla oblongata		Part of the brain at the top of the spinal cord. It controls breathing and heart rate.
nerve		Large bundle of neurones (and blood vessels).
neurone		A cell that transmits electrical impulses in the nervous system.

SB2f Brain and spinal cord problems

Word	Pronunciation	Meaning
blood–brain barrier		Barrier that stops substances diffusing out of capillaries and into the brain. The barrier is mainly due to the cells of the capillary walls fitting together tightly.
chemotherapy		The use of drugs to kill cancer cells.

CT scan		A scan in which multiple X-rays are taken of part of the body and put together by a computer. CT stands for computed tomography.
gamma ray		A high-frequency electromagnetic wave emitted from the nucleus of a radioactive atom. Gamma rays have the highest frequencies in the electromagnetic spectrum.
PET scan		A scan in which a radioactive marker is used to pinpoint certain areas in the body, such as very active cells. PET stands for positron emission tomography.
quadriplegia	*kwad-drep-**lee**-jee-a*	A condition in which both arms and both legs are paralysed.
radioactive		A substance is radioactive if it emits ionising particles, or radiation.
radiotherapy		The use of ionising radiation to treat diseases, such as to kill cancer cells.
tumour		A lump formed of rapidly dividing cells.

SB2g The nervous system

Word	Pronunciation	Meaning
axon		The long extension of a neurone that carries an impulse away from the dendron or dendrites towards other neurones.
axon terminal		Small 'button' at the end of the branches that leave an axon.
central nervous system		The main part of the nervous system – the brain and spinal cord. Abbreviated to CNS.
CNS		Stands for central nervous system.
dendrite		A fine extension from a neurone, which carries impulses towards the cell body.
dendron		Large, long extension of a sensory neurone that carries impulses from dendrites towards the axon.
impulse		Electrical signal transmitted along a neurone.
myelin sheath	***my**-ell-in **sheeth***	Fatty covering around the axons of many neurones. It speeds up the transmission of impulses along their length and helps to insulate them from one another.
nerve cell		Another term for neurone.
nervous system		An organ system that contains the brain, spinal cord and nerves, and carries impulses around the body. This system helps us to sense and respond quickly to changes inside and outside our bodies.
neurone	***nyor**-own*	A cell that transmits electrical impulses in the nervous system.
neurotransmission	*new-rO-trans-**mish**-un*	Impulses passing from neurone to neurone.
receptor cell	*re-**sep**-tor sell*	Cell that receives a stimulus and converts it into an electrical impulse to be sent to the brain and/or spinal cord.
response		Action that occurs due to a stimulus.

sense organ		Organ that contains receptor cells.
sensory neurone	***sens****-or-ee* ***nyor****-own*	Neurone that carries impulses from receptor cells, towards the central nervous system.
spinal cord	***spy****-nal* ***cord***	Large bundle of nerves, leading from the brain and down the back.
stimulus		Change in a factor (inside or outside the body) that is detected by receptors. Plural: stimuli.

SB2h The eye

Word	Pronunciation	Meaning
cataract		Protein built up in the lens of the eye so that it becomes cloudy.
ciliary muscle	***sill****-ee-ar-ee* ***muss****-ell*	A muscle that relaxes or contracts to change the shape of the lens in the eye.
colour blindness		An eye defect in which someone cannot see the full range of colours.
cone (cell)		A cell in the retina that detects different colours of light.
constrict		To make narrower.
cornea		The transparent front part of the eye, which covers the iris and pupil.
dilate	*dye-****late***	To make wider.
iris		The coloured part of the eye. Muscles in it control the diameter of the pupil.
lens (biology)		Part of the eye that further converges light rays (which have been converged by the cornea) to focus them on the retina.
long-sightedness		An eye condition in which close objects appear blurred.
optic nerve		The nerve that takes impulses from the retina to the brain.
pupil		The hole in the front of the eye through which light can pass.
receptor cell	*re-****sep****-tor* ***sell***	Cells that detect stimuli, such as cells in the eye that detect changes in light.
retina		The part at the back of the eye that changes energy transferred by light into nerve impulses. The retina contains rods and cones.
rod (cell)		A cell in the retina that detects low levels of light. It cannot detect different colours.
short-sightedness		An eye condition in which distant objects appear blurred.

SB2i Neurotransmission speeds

Word	Pronunciation	Meaning

effector		Muscle or gland in the body that performs an action when an impulse from the nervous system is received.
motor neurone	***mO**-ter **nyor**-own*	Neurone that carries impulses to effectors.
neurotransmitter	*new-rO-trans-**mit**-ter*	Substance that diffuses across the gap between two neurones at a synapse, and triggers an impulse to be generated in the neurone on the other side of the synapse.
reflex	***ree**-flex*	Response to a stimulus that does not require processing by the brain. The response is automatic. Also called a reflex action.
reflex arc	***ree**-flex **ark***	Neurone pathway consisting of a sensory neurone passing impulses to a motor neurone (often via a relay neurone), which allows reflexes to occur.
relay neurone	***ree**-lay **nyor**-own*	A short type of neurone, found in the spinal cord and brain. Relay neurones link with sensory, motor and other relay neurones.
synapse	***sY**-naps*	Point at which two neurones meet. There is a tiny gap between neurones at a synapse, which cannot transmit an electrical impulse.

SB3a Sexual and asexual reproduction

Word	Pronunciation	Meaning
asexual reproduction	*ree-pro-**duck**-shun*	Producing new organisms from one parent only. These organisms are genetically identical to the parent.
clone		All the cells in a clone are genetically identical to each other and to the parent's cells.
fertilisation	*fert-ill-I-**zay**-shun*	Fusing of a male gamete with a female gamete.
invertebrate		An animal without bones, such as an insect or worm.
mitosis	*my-**toe**-sis*	The process of diploid cells dividing to produce two diploid daughter cells that are genetically identical to the parent.
sexual reproduction	*ree-pro-**duck**-shun*	Reproduction that needs a male and a female parent.
variation		Differences in the characteristics of organisms.
vertebrate		Animal with bones, such as a human.

SB3b Meiosis

Word	Pronunciation	Meaning
chromosome	***krow**-mO-sOwm*	A structure found in the nuclei of cells. Each chromosome contains one enormously long DNA molecule packed up with proteins.
daughter cell	***dor**-ter **sell***	A cell produced by another cell that has divided.

diploid	***dipp**-loyd*	A cell or nucleus that has two sets of chromosomes. In humans, almost all cells except the sperm and egg cells are diploid.
DNA		Deoxyribonucleic acid. A polymer made of sugar and phosphate groups joined to bases. One molecule of DNA is found in each chromosome.
egg cell		The female gamete in humans.
fertilisation	*fert-ill-I-**zay**-shun*	Fusing of a male gamete with a female gamete.
gamete	***gam**-meet*	A haploid cell used for sexual reproduction.
gene	***jeen***	Section of the long strand of DNA found in a chromosome, which often contains instructions for a protein.
genome	***jee**-nOhm*	All the DNA in an organism. Each body cell contains a copy of the genome.
haploid	***happ**-loyd*	A cell or nucleus that has one set of chromosomes. Gametes are haploid.
meiosis	*my-**O**-sis*	A form of cell division in which one parent cell produces four haploid daughter cells.
mitosis	*my-**tO**-sis*	A form of cell division in which one parent cell produces two diploid daughter cells.
polymer	***poll**-ee-mer*	A molecule made out of a chain of repeating similar units (called monomers).
replicate		When DNA replicates it makes a copy of itself.
sperm cell		The male gamete in humans.
zygote	***zY**-goat*	Another term for ‘fertilised egg cell’.

SB3c DNA

Word	Pronunciation	Meaning
adenine	***add**-en-een*	One of four bases found in DNA. Often written as A.
base (in DNA)		Four substances that help make up DNA, often shown by the letters A, C, G and T. Pairs of bases form ‘links’ between two ‘spines’ formed of phosphate groups and a type of sugar.
chromosome	***krow**-mO-sOwm*	A structure found in the nuclei of cells. Each chromosome contains one enormously long DNA molecule packed up with proteins.
complementary base pair		Two DNA bases that fit into each other and link by hydrogen bonds. There are two types of complementary base pair: A linking with T, and C linking with G.
cytosine	***cY**-tO-seen*	One of four bases found in DNA. Often written as C.
DNA		Deoxyribonucleic acid. A polymer made of sugar and phosphate groups joined to bases. One molecule of DNA is found in each chromosome.
double helix		Two helices joined together.

gene	***jeen***	Section of the long strand of DNA found in a chromosome, which often contains instructions for a protein.
guanine	***gua****-neen*	One of four bases found in DNA. Often written as G.
hydrogen bond		Weak force of attraction caused by differences in the electrical charge on different parts of different molecules.
thymine	***thY****-meen*	One of four bases found in DNA. Often written as T.

SB3d Protein synthesis

Word	Pronunciation	Meaning
codon	***cOde****-on*	A set of three bases (a triplet) found in DNA and RNA. The genetic code is formed from patterns of codons.
complementary		Means 'fitting together'. Complementary bases in a DNA molecule fit together.
genetic code	*jen-**et**-ick **cOde***	A set of rules defining how the base order in DNA or RNA is turned into a specific sequence of amino acids joined in a polypeptide chain.
messenger RNA (mRNA)		A single strand of RNA produced in transcription.
nuclear pore	***new****-clee-ar **poor***	A small hole in the membrane around the nucleus.
polypeptide	*poll-ee-**pep**-tyde*	A chain of amino acids.
ribonucleic acid	*rye-bO-new-**clay**-ick*	See RNA.
ribosome	***rye****-bO-sOwm*	A protein that attaches to mRNA. It allows transfer RNA (tRNA) molecules to match up with the mRNA codons and also joins the amino acids together.
RNA		Abbreviation of ribonucleic acid. The molecule is made of phosphate groups and sugars (called ribose) linked together with one of four bases.
RNA polymerase	*poll-**im**-er-aze*	An enzyme that creates mRNA from DNA.
template strand		The strand of a DNA molecule that RNA polymerase uses to make mRNA.
transcription	*trans-**crip**-shun*	The process by which the genetic code in one strand of DNA molecules is used to make mRNA.
transfer RNA (tRNA)		A molecule of RNA that carries an amino acid.
translation	*trans-**lay**-shun*	The process by which the genetic code in a molecule of mRNA is used to make a polypeptide.
uracil	***your****-a-sil*	A base found in RNA but not in DNA.

SB3e Genetic variants and phenotypes

Word	Pronunciation	Meaning

allele	*a-**leel***	Most genes come in different versions called alleles. So a gene for eye colour may have one version (allele) that can cause dark eyes, and another allele that can cause pale eyes.
genetic disorder		A problem caused by genes.
mutation	*mew-**tay**-shun*	A change to a gene caused by a mistake in copying the DNA base pairs during cell division, or by the effects of radiation or of certain chemicals.
phenotype	***fee**-nO-tYpe*	The characteristics that a certain set of alleles display.

SB3f Mendel

Word	Pronunciation	Meaning
variation		Differences in the characteristics of organisms.

SB3g Alleles

Word	Pronunciation	Meaning
allele	*a-**leel***	Most genes come in different versions, called alleles. So a gene for eye colour may have a version (allele) that can cause dark eyes and an allele that can cause pale eyes.
dominant		Allele that will always affect the phenotype (as opposed to a recessive allele, whose effect will not be seen if a dominant allele is present).
genetic diagram		Diagram showing how the alleles in two parents may form different combinations in the offspring when the parents reproduce.
genetic variation		Also called inherited variation. Differences between organisms passed on to offspring by their parents in reproduction.
genotype	***jee**-nO-tYpe*	The alleles for a certain characteristic that are found in an organism. Written in a shorthand using letters to represent the alleles (with the dominant allele having a capital and being written first).
heterozygous		When both the alleles for a gene are different in an organism.
homozygous		When both the alleles for a gene are the same in an organism.
monohybrid inheritance	***mon**-O-hy-brid* *in-**herr**-it-anse*	The study of how the alleles of just one gene are passed from parents to offspring.
phenotype	***fee**-nO-tYpe*	The characteristics that a certain set of alleles produce.
ratio	***ray**-shee-O*	A relationship between two quantities, usually showing the number of times one value is bigger than the other. For example, if there are six red buttons and two blue buttons, the ratio of red to blue is 3 to 1, also written 3:1.

recessive	*res-**ess**-iv*	Allele that will only affect the phenotype if the other allele is also recessive. It has no effect if the other allele is dominant.
zygote	***zY**-goat*	Another term for 'fertilised egg cell'.

SB3h Inheritance

Word	Pronunciation	Meaning
family pedigree chart		A chart showing the phenotypes and sexes of several generations of the same family, to track how characteristics have been inherited.
probability		The likelihood of an event happening. Can be shown as a fraction from 0 to 1, a decimal from 0 to 1 or as a percentage from 0% to 100%.
Punnett square		Diagram used to predict the different characteristics in the offspring of two organisms with known combinations of alleles. You can use the square to work out the probability (how likely it is) that offspring will inherit a certain feature.
sex chromosome	***krow**-mO-sOwm*	Chromosome that determines the sex of an organism. In humans, males have one X sex chromosome and one Y sex chromosome, while females have two Xs.

SB3i Multiple and missing alleles

Word	Pronunciation	Meaning
ABO blood group		Blood group system in humans which produces four phenotypes: blood groups A, B, AB and O.
carrier		An individual that has inherited a recessive allele but does not show the phenotype caused by that allele. For example, a woman who has one allele for a sex-linked genetic disorder and one 'healthy' allele will not suffer from the disorder but can pass it on to a son.
codominant		Two alleles that both affect the phenotype. For example a person with the blood group alleles I^A and I^B has blood group AB.
sex-linked genetic disorder		A disorder caused by genes that are inherited differently in males and females because they are carried on the sex chromosomes. An example is red–green colour blindness, which is more common in men than in women.

SB3j Gene mutation

Word	Pronunciation	Meaning
Human Genome Project	***jee**-nOhm*	The project that mapped the base pairs in one human genome.
mutation	*mew-**tay**-shun*	A change to a gene, caused by a mistake in copying the DNA base pairs during cell division or by the effects of radiation or certain chemicals.

variation	*vair-ee-**ay**-shun*	Differences in the characteristics of organisms.

SB3k Variation

Word	Pronunciation	Meaning
acquired characteristic	*ak-**wired***	A characteristic that can change during life, due to a change in the environment. (See also environmental variation.)
continuous variation		Continuous data can take any value between two limits. Examples include length, mass, time. Continuous variation is when differences in a characteristic are continuous.
discontinuous variation		Data values that can only have one of a set number of options are discontinuous. Examples include shoe sizes and blood groups. Discontinuous variation is when differences in a characteristic are discontinuous.
environmental variation		Differences between organisms caused by environmental factors, such as amount of heat, light, damage. These differences are called acquired characteristics.
genetic variation		Differences between organisms caused by differences in the alleles they inherit from their parents, or differences in genes caused by mutation.
mean		An average calculated by adding up the values of a set of measurements and dividing by the number of measurements in the set.
median		The middle value in a data set.
mode		The most common value in a data set.
normal distribution		When many individuals have a middle value for a feature, with fewer individuals having greater or lesser values. This sort of data forms a bell shape on charts and graphs.
range		The difference between the highest and lowest values in a set of data (usually ignoring any outliers or anomalous results).

SB4a – Evidence for human evolution

Word	Pronunciation	Meaning
Ardi		Nickname for a 4.4-million-year-old fossilised specimen of *Ardipithecus ramidus*.
binomial system	*by-**nO**-mee-al **sis**-tem*	System of naming organisms using two Latin words.
evolution	*e-vol-**oo**-shun*	A change in one or more characteristics of a population over a long period of time.
Lucy		Nickname for a 3.2-million-year-old fossilised specimen of *Australopithecus afarensis*.
species	***spee**-shees or **spee**-sees*	A group of organisms that can reproduce with each other to produce offspring that will also be able to reproduce. Organism names have two Latin words – the first is its genus and the second is its species.

SB4b – Darwin's theory

Word	Pronunciation	Meaning
ancestor	***an****-ses-ter*	An organism from which more recent organisms are descended.
antibiotic		Medicine that helps people recover from a bacterial infection by killing the pathogen.
competition	*com-pet-**ish**-un*	There is competition between organisms that need the same things as each other (such as food). We say that they 'compete' for those things.
genetic variation	*jen-**et**-ick* *vair-ee-**ay**-shun*	Differences between organisms caused by differences in genes and passed on to offspring by their parents through reproduction. Also called inherited variation.
natural selection		A process in which certain organisms are more likely to survive and reproduce than other members of the same species, because they possess certain genetic variations.
resistant		Unaffected or less affected by something.

SB4c Development of evolution theory

Word	Pronunciation	Meaning
pentadactyl limb	*pen-ta-**dak**-til **lim***	A limb that has five digits (fingers and thumbs). Amphibians, reptiles, birds and mammals share this characteristic.

SB4d – Classification

Word	Pronunciation	Meaning
classification		Sorting things into groups.
domain		The three main groups that organisms are now sorted into: Archaea, Bacteria and Eukarya.
genus		A group of similar organisms. The genus name is the first word in the scientific name for a species (the second word is the 'species name'). Different closely related species belong to the same genus.
kingdom		There are five kingdoms into which organisms are divided: plants, animals, fungi, protists and prokaryotes.
species	***spee****-shees or* ***spee****-sees*	A group of organisms that can reproduce with each other to produce offspring that will also be able to reproduce. Organism names have two Latin words – the first is its genus and the second is its species.

SB4e – Breeds and varieties

Word	Pronunciation	Meaning
artificial selection		When people choose organisms with certain characteristics and use only those ones for breeding.

breed		Group of animals of the same species that have characteristics that make them different to other members of the species.
disease resistance		Unaffected or less affected by a certain disease.
gene	***jeen***	Section of the long strand of DNA found in a chromosome, which often contains instructions for a protein.
genetic engineering		Altering the genome of an organism, often by adding genes from another species. Also called genetic modification.
genetically modified organism (GMO)		Organism that has been produced using genetic engineering.
genome	***jee**-nOhm*	All the DNA in an organism. Each body cell contains a copy of the genome.
GMO		Short for 'genetically modified organism'.
selective breeding		When humans choose an organism that has a certain characteristic and then breed more of these organisms, making that chosen characteristic more and more obvious.
variety		Group of plants of the same species that have characteristics that make them different to other members of the species.
yield		The amount of useful product that you can get from something.

SB4f Tissue culture

Word	Pronunciation	Meaning
callus		Small clump of unspecialised plant cells.
clone		Offspring that is genetically identical to its parent.
differentiate	*diff-er-**en**-she-ate*	When a cell becomes specialised for a particular function.
extinction	*ex-**tink**-shun*	When a species dies out.
reject (biology)		When the immune system attacks tissue and cells that it does not recognise.
stem cell		An unspecialised cell that continues to divide by mitosis to produce more stem cells and other cells that differentiate into specialised cells.
tissue culture		Growing tiny pieces of tissue or cells in or on a medium containing nutrients.
virus		A particle that can infect cells and cause the cells to make copies of the virus.

SB4g – Genes in agriculture and medicine

Word	Pronunciation	Meaning

allele	*a-**leel***	Most genes come in different versions, called alleles. So a gene for eye colour may have a version (allele) that can cause dark eyes and an allele that can cause pale eyes.
base		There are four substances called bases that help make up DNA, often shown by the letters A, C, G and T. Pairs of bases form 'links' between two 'spines' formed of phosphate groups and a type of sugar.
diabetes		Disease in which the body cannot control the blood glucose concentration at the correct level.
insulin	***in**-syu-lin*	The hormone that decreases blood glucose concentration. Used in the treatment of type 1 diabetes.
ligase	***lie**-gaze*	An enzyme that joins two DNA molecules together.
plasmid	***plaz**-mid*	A small loop of DNA found in the cytoplasm of bacteria.
recombinant DNA		DNA made by joining two sections of DNA together.
restriction enzyme		An enzyme that cuts DNA molecules into pieces.
sticky end		A short section of single-stranded DNA found at the end of a section of DNA that has been cut by a restriction enzyme.
type 1 diabetes		Type of diabetes in which the pancreas does not produce insulin.
vector		Anything that transfers material from one organism to another.

SB4h GM and agriculture

Word	Pronunciation	Meaning
Bt toxin		A natural insecticide made by the bacterium *Bacillus thuringiensis* that kills some kinds of caterpillar.
insecticide	*in-**sect**-iss-I'd*	A chemical substance used to kill insect pests of crops.
monoculture		A large area of one kind of crop.
pest		An animal that causes problems, such as by damaging crops.
resistance (biology)		Being unaffected or less affected by something.
strain		Bacteria of a species that are slightly different to other strains of the species.
yield	***yeeld***	The amount of useful product obtained from an organism.

SB4i Biological control and fertilisers

Word	Pronunciation	Meaning
biological control		Using living organisms to kill problem organisms such as pests or weeds.

fertiliser		Substances that add plant nutrients to soil, such as artificial fertilisers containing nitrogen compounds, or manure (a natural fertiliser made from animal waste).
pollution	*poll-**oo**-shun*	Harm caused to the environment, for example by the addition of poisonous substances or by abnormally high amounts of a substance.
weeds		Plants that are growing where they are not wanted, and where they cause problems, such as competing with crop plants for light, water and nutrients.

SB5a Health and disease

Word	Pronunciation	Meaning
cause		A factor that, when it changes, makes something else change.
communicable disease		A disease caused by a pathogen that can be passed from an infected individual to others. Also called an infectious disease.
correlation		When two factors change in a similar pattern, we say they are correlated.
disease		Something that causes the body not to work properly.
health		A state of complete physical, social and mental well-being.
immune system	*im-**youn sis**-tem*	The system that helps protect the body from harm by diseases, especially communicable diseases.
lifestyle		The way we live, such as our diet, whether we smoke tobacco, and how much exercise we take. Lifestyle can affect whether we develop some diseases.
non-communicable disease		A disease that cannot be passed from individuals to those around them. Examples include inherited diseases and some diseases caused by lifestyle.
pathogen	***path**-o-jen*	A microorganism that causes a communicable disease.

SB5b Non-communicable diseases

Word	Pronunciation	Meaning
cirrhosis	*si-**rO**-sis*	A disease of the liver, often caused by drinking a large amount of ethanol (alcohol) over a long period of time.
deficiency disease	*def-**ish**-un-see*	A disease caused by a lack of a particular nutrient in the body, such as anaemia caused by a lack of iron.
drug		A substance that we take into the body, which affects how the body works.

genetic disorder		A disease caused by faulty alleles of our genes.
malnutrition	*mal-new-**trish**-un*	Health problems caused by a diet that contains too little or too much of one or more nutrients.

SB5c Cardiovascular disease

Word	Pronunciation	Meaning
body mass index (BMI)		An estimate of how healthy a person's mass is for their height.
cardiovascular disease	*car-dee-O-**vas**-kyoo-lar*	A disease in which the heart or circulatory system does not function properly.
heart attack		When the heart stops pumping properly due to a lack of oxygen reaching part of it.
obesity	*o-**bee**-sit-ee*	A condition in which someone is overweight for their height and has a BMI above 30.
stent		A small mesh tube used to widen narrowed blood vessels and allow blood to flow more easily.
stroke		Death of brain cells caused by a lack of blood, due to a blockage in a blood vessel in the brain.
waist : hip (waist-to-hip) ratio		A measure of the amount of fat in the body, calculated by dividing the waist measurement by the hip measurement.

SB5d Pathogens

Word	Pronunciation	Meaning
AIDS (acquired immune deficiency syndrome)		When HIV has damaged a person's immune system, so they are more likely to get secondary infections.
chalara dieback	*cal-**ar**-ra*	A communicable disease of ash trees caused by a fungus. It produces lesions of the trunk and branches, and dieback of the top of the tree.
cholera	***col**-e-ra*	A communicable disease caused by a bacterium, which causes extreme diarrhoea.
diarrhoea	*dye-a-**ree**-a*	Loose or watery faeces.
haemorrhagic fever	*hem-or-**raj**-ik*	A disease that includes a fever (high body temperature) and internal bleeding, such as caused by the Ebola virus.
host		An individual or species that can be infected by a certain pathogen.
HIV (human immunodeficiency virus)		A virus that attacks white blood cells in the human immune system, often leading to AIDS.

malaria	*mal-**air**-ee-a*	A dangerous disease, caused by a protist, that causes serious fever, headaches and vomiting and can lead to death.
protist		A kingdom of eukaryotic and mainly single-celled organisms (also called 'protoctists').
secondary infection		An infection due to the immune system being weakened previously by a different pathogen.
tuberculosis (TB)	*tyoo-ber-cyoo-**lOw**-sis*	A communicable bacterial disease that infects the lungs.
ulcer	***ull**-ser*	A sore area in the stomach lining which can be caused by a bacterium.
virus		A microbe that multiplies by infecting a cell and taking over the cell's DNA copying processes. Virus particles have no cellular structure and so are not true organisms.
white blood cell		A type of blood cell that forms part of the body's defence system against disease.

SB5e Spreading pathogens

Word	Pronunciation	Meaning
epidemic		When many people over a large area are infected with the same pathogen at the same time.
hygiene	***hy**-jean*	Keeping things clean, by removing or killing pathogens.
oral route		When something enters the body through the mouth.
vector	***vek**-tor*	Something that transfers things from one place to another.

SB5f Virus life cycles

Word	Pronunciation	Meaning
bacterial lawn plate		A nutrient agar plate covered in a thin film of bacteria.
capsid		The protein coat of a virus.
cross-sectional area (of a cylinder)		The area of a circle cut at right angles through a cylinder. It is calculated as πr^2, where r is the radius of the circle.
lysis	***lie**-sis*	When the cell membrane of a cell breaks open, releasing everything inside the cell.
lysogenic pathway	*lie-so-**jen**-ick*	The pathway in a virus life cycle where the virus genetic material inserts into the cell's genetic material and is replicated each time the cell divides.
lytic pathway	***lit**-tick*	The pathway where a virus enters a cell, takes over the cell's replication process to produce more viruses, and causes lysis of the cell as the new viruses are released.
nutrient agar		Agar containing nutrients; used for growing cells, such as in bacterial lawn plates.

SB5g Plant defences

Word	Pronunciation	Meaning
aseptic techniques		Techniques used to keep out unwanted microorganisms, such as out of cultures.
autoclave		Machine used to sterilise equipment and culture media using pressure and heat.
chemical defence		Use of chemical compounds to defend against attacks by pathogens, such as lysozyme and hydrochloric acid in humans, and poisons and insect repellents in plants.
cuticle		An outer covering that is not made of cells. Plants have a cuticle covering the leaves.
pest		Any unwanted organism, such as animals that damage crop plants.
physical barrier		A barrier that makes it difficult for pathogens to get into the body, such as skin, mucus and cilia in animals, and cuticles and cell walls in plants.
symptom	***simp****-tom*	Something that is suffered when an organism is ill, such as pain, or is a sign of illness, such as a high temperature.

SB5h Plant diseases

Word	Pronunciation	Meaning
diagnosis		The identification of the cause of a problem.
distribution analysis		Looking at where damaged plants occur, to help identify the cause of damage.
lesion	***lee****-zshun*	An area of damage, such as the cracks in bark caused by chalara dieback fungus in ash trees.
yield (crop)	***yeeld***	The amount of the harvested part of a crop, such as grain from wheat.

SB5i Physical and chemical barriers

Word	Pronunciation	Meaning
chemical defence		The use of chemical compounds to defend against attacks. Examples include lysozyme and hydrochloric acid.
Chlamydia	*clam-**id**-ee-a*	A bacterium that causes a sexually transmitted infection.
ciliated cells		A cell that lines certain tubes in the body and has cilia on its surface.
hydrochloric acid		Acid produced by cells lining the stomach, of about pH 2, which destroys many pathogens in food and drink.
lysozyme		An enzyme produced in tears, saliva and mucus, which damages pathogens.
mucus	***myou****-kus*	A sticky substance secreted by cells that line many openings to the body.

physical barrier		A structure that stops something from entering a certain area. For example, the body has physical barriers, such as the skin, that stop microbes from getting inside the body.
screening		Tests on samples of body fluids to check if people have a certain condition, e.g. an STI.
sexually transmitted infection (STI)		A communicable disease that is passed from an infected person to an uninfected person during sexual activity.

SB5j Immune system

Word	Pronunciation	Meaning
activate		To make active, such as when a lymphocyte is triggered by a pathogen to start dividing rapidly.
antibody		A protein produced by lymphocytes. It attaches to a specific antigen on a microorganism and helps to destroy it.
antigen		A protein on the surface of a cell. White blood cells are able to recognise pathogens because of their antigens.
herd immunity		When the majority of people in a group are immunised, which provides protection to the few who are not by reducing their chance of meeting an infected person.
immune	*im-**youn***	When a person does not fall ill after infection, because their immune system attacks and destroys the pathogen quickly.
immunisation	*im-youn-l-**zay**-shun*	Giving a vaccine that causes an immune response without the person becoming ill, and which will make the person immune to the pathogen.
lymphocyte	***lim**-fO-site*	A type of white blood cell that produces antibodies.
memory lymphocyte		A lymphocyte that remains in the blood for a long time after an infection or vaccination.
MMR		Stands for measles, mumps and rubella. The vaccine given to develop immunity to these diseases.
secondary response		A much more rapid, and larger, production of antibodies to a pathogen when it infects the body again.
vaccine	***vack**-seen*	A mixture containing weakened or inactive pathogens, or antigens from the pathogen. When put into the body it causes an immune response.

SB5k Antibiotics

Word	Pronunciation	Meaning
antibiotic	*an-ti-by-**ot**-ick*	A substance that, when inside the body, either kills bacteria or stops them growing.
clinical trial		Testing of a medicine on people.

colony		A cluster of microorganisms living closely together.
dose		The total amount of something received, such as of a medicine.
inhibit		To stop or slow down a process.
penicillin	*pen-i-**sill**-in*	The first kind of antibiotic. It was extracted from a mould (fungus).
pre-clinical testing		Testing a drug before it is tried on humans, including testing on cells or tissues and on other animals.
resistance (to an antibiotic)		When a bacterium is no longer damaged by an antibiotic.
side effect		Unintended effect of a medicine, which may be harmful.

SB5l Monoclonal antibodies

Word	Pronunciation	Meaning
cancer cell		A cell that continues dividing uncontrollably, causing disease inside the body.
chemotherapy		Use of drugs to treat a disease, such as in the treatment of cancer.
clone		Offspring from asexual reproduction. All the cells in a clone are genetically identical to each other and to the parent's cells.
diagnosis		The identification of the cause of a problem.
hybridoma cell		A cell made by fusing a lymphocyte and a cancer cell.
monoclonal antibodies		Many identical antibodies.
PET scanner		A scanner used to identify the position of radioactive substances inside the body.
platelet		Cell fragments that are important in the clotting mechanism of the blood.
radiotherapy		Use of ionising radiation to treat diseases, such as to kill cancer cells.

SB6a – Photosynthesis

Word	Pronunciation	Meaning
biomass		The total mass in living organisms, usually shown as the mass after drying.
cellulose	***sell**-you-lOws*	Plant cell walls are made of tough cellulose, which support the cell and allow it to keep its shape.
chloroplast	***klor**-O-plast*	A green disc containing chlorophyll, found in plant cells. This is where the plant makes glucose through photosynthesis.

endothermic reaction		A type of reaction in which energy from the surroundings is transferred to the products, e.g. photosynthesis.
food chain		A diagram that uses arrows to show the flow of energy through organisms that depend on each other for food.
gas exchange		A process in which one gas diffuses across a membrane and another gas diffuses in the opposite direction.
glucose	***glue**-cO's*	The sugar produced by photosynthesis and needed for respiration.
guard cell	***gard sell***	A pair of guard cells open and close plant stomata.
lipid		A substance in a large group of compounds that includes fats and oils.
palisade cell	***pal**-iss-ayd **sell***	Tall, column-shaped cell near the upper surface of a plant leaf.
photosynthesis	*fOw-tow-**sinth**-e-sis*	A series of enzyme-catalysed reactions carried out in the green parts of plants. Carbon dioxide and water combine to form glucose. This process requires energy transferred by light.
polymer		A long-chain molecule made by joining many smaller molecules (monomers) together.
producer	*prod-**you**-ser*	An organism such as a plant that makes its own food using photosynthesis.
protein	***prO**-teen*	A polymer made up of amino acids.
protist	***prO**-tist*	An organism that belongs to a kingdom of eukaryotic and mainly single-celled organisms (also called a protoctist).
respiration	*res-per-**ay**-shun*	A series of reactions occurring in all living cells, in which glucose is broken down to release energy.
starch		A polymer carbohydrate that is made by the joining together of glucose molecules.
stoma	***stO**-ma*	A tiny pore in the lower surface of a leaf, which, when open, allows gases to diffuse into and out of the leaf. Plural is stomata.
storage organ		A plant organ used to store energy-rich substances such as starch – for example, a potato.
sucrose	***soo**-crO's*	The type of sugar found in the phloem of plants and used as table sugar.

SB6b – Factors that affect photosynthesis

Word	Pronunciation	Meaning
concentration	*con-sen-**tray**-shun*	The amount of something found in a certain volume of another substance. For example, the amount of a solute dissolved in a certain volume of solvent.
direct proportion		A linear relationship in which the percentage change in a variable occurs with an equal percentage change in another variable. A direct proportion is seen as a straight line through the origin when the two variables are plotted on a graph.
inverse proportion		A non-linear relationship where one variable decreases in size at the same rate as another increases.

inverse square law		A mathematical relationship in which a quantity varies in inverse proportion to the square of the distance from the source of the quantity.
limiting factor		A single factor that, when in short supply, can limit the rate of a process such as photosynthesis.
linear relationship		A relationship between two variables (quantities) shown by a straight line on a graph.
rate	***rayt***	How quickly something happens.

SB6c – Absorbing water and mineral ions

Word	Pronunciation	Meaning
active transport		The movement of particles across a cell membrane from a region of lower concentration to a region of higher concentration (*against* the concentration gradient). This process requires energy.
concentration gradient	*con-sen-**tray**-shun* ***gray**-dee-ent*	The difference between two concentrations.
diffusion	*diff-**you**-shun*	The random movement and spreading of particles. There is a net (overall) diffusion of particles from regions of higher concentration to regions of lower concentration.
fluid		A liquid or a gas.
mineral ion		Ion from a naturally occurring salt.
nitrate	***ny**-trayt*	A compound that contains nitrogen in the form of a nitrate ion.
osmosis	*os-**mO**-sis*	The overall movement of *solvent* molecules in a solution across a partially permeable membrane, from a dilute solution to a more concentrated one.
partially permeable membrane		Describes a membrane that will allow certain particles to pass through it but not others. Another term for semi-permeable membrane.
protein	***prO**-teen*	A polymer made up of amino acids.
root hair cell		A cell found on the surface of plant roots that has a large surface area to absorb water and dissolved mineral salts quickly from the soil.
wilt		Drooping of parts of a plant caused by a lack of water.

SB6d – Transpiration and translocation

Word	Pronunciation	Meaning
companion cell		A specialised cell located in the phloem tissue of plants. They pump sucrose into sieve cells.
lignin		A type of polymer that is combined with cellulose in some plant cell walls to make the cells woody, e.g. in xylem cells.

phloem tissue	***flow**-em*	Living tissue formed of sieve tubes and companion cells that transports sugars and other soluble compounds around a plant.
potometer	*pot-**om**-et-er*	A device used for measuring the rate of water uptake by a plant.
sieve tube/cell	***siv***	Tubes formed of phloem sieve cells (so called because the cells have holes in their ends). The tubes carry sugars and other soluble compounds around the plant.
translocation	*trans-low-**kay**-shun*	The transport of sugars (mainly sucrose) and other soluble compounds in the phloem tissue of a plant.
transpiration	*trans-per-**ay**-shun*	The flow of water into a root, up the stem and out of the leaves.
xylem vessel/cell	***zy**-lem*	A long, thick-walled tube found in plants, formed from many dead xylem cells. The vessels carry water and dissolved mineral salts through the plant.

SB6e Plant adaptations

Word	Pronunciation	Meaning
conifer		A type of tree that has needle-shaped leaves and has seeds contained in cones (not fruits).
cuticle	***cyoo**-tick-ul*	An outer covering that is not made of cells. Plant leaves have a cuticle covering the leaves.
deciduous	*dess-**id**-yoo-us*	Describes a plant that sheds its leaves at a certain time of year. Deciduous plants shed their leaves in winter.
epidermis cells	*ep-id-**der**-mis **sells***	Cells that form a surface layer in a plant or animal organ.
spongy cells	***spun**-jee **sells***	Irregularly shaped cells in a plant leaf that form air spaces.
stoma	***stO**-ma*	A tiny hole in a leaf through which gases can diffuse into and out of the leaf. It is opened and closed by two guard cells. Plural is stomata.

SB6f Plant hormones

Word	Pronunciation	Meaning
auxins	***orx**-ins*	A group of plant hormones that affect the growth and elongations of cells.
ethene	***ee**-theen*	A gaseous plant hormone that is involved in the ripening of fruit.
gibberellins	*jib-er-**ell**-ins*	A group of plant hormones that cause seeds to germinate and flowers and fruits to form.
gravitropism	*grav-ee-**trOh**-piz'm*	A growth response to the stimulus of gravity.
phototropism	*fOh-tOh-**trOh**-piz'm*	A growth response to the stimulus of light.
plant hormone		A substance released by certain cells in a plant that has an effect on other cells, usually causing the cells to grow and develop in a certain way.
response		An action that occurs due to a stimulus.

stimulus		Change in a factor (inside or outside an organism) that is detected. For example, plants detect light. Plural is stimuli.
tropism	***trOh****-piz'm*	A response to a stimulus in which an organism grows towards or away from the stimulus. A positive tropism is a growth towards a stimulus, and a negative tropism is a growth away from the stimulus.

SB6g Uses of plant hormones

Word	Pronunciation	Meaning
ethene	***ee****-theen*	A gaseous plant hormone that is involved in the ripening of fruit.
gibberellins	*jib-er-**ell**-ins*	A group of plant hormones that cause seeds to germinate and flowers and fruits to form.
photoperiodism		The response of an organism to the number of daylight hours in a day.
rooting powder		A powder containing plant hormones into which cuttings are dipped to speed up the growth of new roots.
selective weedkiller		A substance that kills a certain type of plant only, leaving others unaffected.

SB7a Hormones

Word	Pronunciation	Meaning
adrenal gland	*ad-**reen**-al **gland***	A gland located on top of a kidney that produces the hormone adrenalin. It can be referred to as an adrenal.
endocrine gland		An organ that makes and releases hormones into the blood.
hormone	***hor****-moan*	Chemical messenger that is released into the blood from an endocrine gland and causes target cells to change how they work.
hormonal system		The collection of glands in the body that release hormones. This system controls long-term or widespread responses by the body to changes inside and outside the body.
ovary		Organ in the female reproductive system that releases egg cells and the hormones oestrogen and progesterone.
pancreas	***pan****-cree-as*	Organ in the body that produces some digestive enzymes, as well as the hormones insulin and glucagon.
pituitary gland	*pit-**you**-i-tar-ee*	An organ just below the brain that controls many activities of the body (e.g. metabolic rate and the menstrual cycle) by the release of hormones into the blood. It can be referred to as the pituitary.
sex hormone		Any hormone that affects reproduction (e.g. oestrogen, testosterone).
target organ		An organ on which a hormone has an effect.

testis		An organ in the male reproductive system that produces sperm cells and the hormone testosterone. Plural is testes.
thyroid gland		A gland that releases the hormone thyroxine into the blood.

SB7b Hormonal control of metabolic rate

Word	Pronunciation	Meaning
adrenalin		A hormone that is released from the adrenal glands when you are nervous or excited.
fight-or-flight response		Several responses that prepare the body for sudden action, including increased heart rate, increased blood flow to muscles, and release of glucose into the blood.
glycogen	*__gly__-co-jen*	A polymer storage material made from glucose, particularly in liver cells
metabolic rate	*met-a-__bol__-ick*	The overall rate at which chemical reactions take place in the body.
negative feedback		A control mechanism in which a change in a condition, such as temperature, causes the opposite change to happen and so brings the condition back to a normal level.
resting metabolic rate		The metabolic rate when the body is at rest.
thyroxine	*thy-__rox__-in*	A hormone released by the thyroid gland, which affects metabolic rate by changing how certain cells work (e.g. causes heart cells to contract more strongly).

SB7c The menstrual cycle

Word	Pronunciation	Meaning
contraception	*con-tra-__sep__-shun*	The prevention of pregnancy.
fertilisation		Fusing of a male gamete with a female gamete.
menopause	*men-o-__paws__*	When the menstrual cycle stops completely.
menstrual cycle	*__men__-strew-al*	A monthly cycle involving the reproductive organs in women.
menstruation	*mens-strew-__ay__-shun*	The breakdown and loss of the thickened part of the uterus lining at the start of a woman's menstrual cycle.
oestrogen	*ee-__stro__-jen*	A hormone produced by the ovaries which is important in the menstrual cycle.
ovulation		The release of an egg from an ovary.
period		The 'bleed' that occurs during menstruation.
pregnancy	*__preg__-nan-see*	The time during which a fertilised egg develops in the uterus until the birth of the baby.

progesterone	*pro-**jest**-er-own*	One of the hormones released by the ovaries.
puberty	***pew**-ber-tee*	The stage of life when the body develops in ways that make it able to reproduce (e.g. production of sperm cells in testes, and the release of egg cells from ovaries).

SB7d Hormones and the menstrual cycle

Word	Pronunciation	Meaning
Assisted Reproductive Technology (ART)		Technology that helps to increase the chance of pregnancy, such as the use of hormones to stimulate egg release.
clomifene therapy	***clom**-if-een*	A form of therapy used to stimulate ovulation.
corpus luteum	***cor**-pus lew-**tee**-um*	A structure formed from the egg follicle after an egg cell is released from an ovary. It produces progesterone.
egg follicle	***egg foll**-ick-ul*	Cells in the ovary that surround a developing egg. The follicle produce hormones, such as oestrogen.
follicle-stimulating hormone (FSH)		A hormone produced by the pituitary gland that causes egg cells to mature in ovaries.
in vitro fertilisation (IVF)		Fertilising an egg cell by placing it in a sterile container then adding sperm cells.
luteinising hormone		A hormone produced by the pituitary gland that causes ovulation.

SB7e Control of blood glucose

Word	Pronunciation	Meaning
diabetes		A disease in which the body cannot control blood glucose concentration at the correct level.
glucagon	***gloo**-ka-gon*	A hormone that increases blood glucose concentration.
homeostasis	***gly**-co-jen*	Controlling the internal environment of the body at stable levels.
insulin	***in**-syoo-lin*	A hormone that decreases blood glucose concentration by causing cells to take in glucose. It is used in the treatment of type 1 diabetes.
type 1 diabetes	*die-a-**beet**-ees*	A type of diabetes in which the pancreas does not produce insulin.

SB7f Type 2 diabetes

Word	Pronunciation	Meaning

body mass index (BMI)		An estimate of the amount of fat in a person's body, using their mass and height, on which judgements of health are made.
correlation		A relationship between two variables, so that if one variable changes so does the other correlation can be positive or negative.
type 2 diabetes	*die-a-**beet**-ees*	A type of diabetes in which cells do not respond to insulin, or too little insulin is produced.
waist : hip ratio		An estimate of the amount of the fat in the body, calculated by dividing the waist measurement by the hip measurement. It can be used to make judgements about health.

SB7g Thermoregulation

Word	Pronunciation	Meaning
dermis		Layer below the epidermis of the skin, which contains temperature receptors, sweat glands and erector muscles.
epidermis		Outer layer of skin.
erector muscle		Muscle in the skin dermis that contracts and raises a body hair.
fever		A core body temperature that is too high (above 38 °C).
hypothalamus		Part of the brain that monitors and controls body temperature.
hypothermia		A core body temperature that is too low (below 36 °C).
negative feedback		Where a change in a system causes a response that brings about the opposite change, returning the system to a 'normal' level.
shivering		Rapid contraction and relaxation of muscles that causes the body to warm up.
thermoregulation		The control of body temperature, especially in core parts of the body (e.g. heart, liver and brain).
vasoconstriction	*vay-so-con-**strik**-shun*	Narrowing of blood vessels, which reduces blood flow.
vasodilation	*vay-so-die-**lay**-shun*	Widening of blood vessels, which increases blood flow.

SB7h Osmoregulation

Word	Pronunciation	Meaning
antigen	***an**-tee-jen*	A substance on the outside of a cell that the immune system uses to identify whether the cell is from the same body or a different one.

dialysis	*die-**al**-i-sis*	Process used to clean the blood of people with kidney failure. It involves the exchange of substances between blood and dialysis fluid across a partially permeable membrane.
kidney		The organ that removes urea, excess water and other substances from the blood to form urine.
kidney failure		When both kidneys do not work properly.
organ donation		The transfer of a healthy organ (e.g. kidney) into the body of someone whose own organ has failed.
osmoregulation		The control of the balance of water and mineral ions in the body.
rejection		When the immune system attacks cells, tissues or an organ that has been placed in the body.
urea		A waste product from the breakdown of excess amino acids in the liver.
urinary system		Body system that removes excess substances and waste products from the body in urine.

SB7i The kidneys

Word	Pronunciation	Meaning
active transport		The movement of particles across a cell membrane from a region of lower concentration to a region of higher concentration (*against* the concentration gradient). The process requires energy.
ADH		Antidiuretic hormone. Hormone produced by the pituitary gland that increases the permeability of the collecting duct in a nephron to water.
Bowman's capsule		The start of a nephron where filtration occurs.
collecting duct		The final part of a nephron.
dehydrated		Lacking in water.
filtration (in kidney)		Separating large molecules from smaller ones, as in the glomerulus and Bowman's capsule of a nephron.
first convoluted tubule		Part of a nephron where selective reabsorption of glucose and some mineral ions takes place.
glomerulus		A network of blood capillaries associated with the Bowman's capsule of a nephron.
loop of Henle		Long loop of a nephron involved in osmoregulation.
microvilli		Finger-like projections of the cell surface membrane that greatly increase its surface area.
nephron		Long tubule found in the kidney where filtration of blood occurs, and reabsorption of useful substances, leaving waste and excess substances in urine.
permeability		A measure of how well a membrane allows substances to pass through it. More permeable membranes allow more substances through.

pituitary gland		Part of the brain that detects changes in the body and controls them by releasing many hormones.
selective reabsorption		Taking back particular (useful) substances, such as glucose and some mineral ions, into the nephron.
urine		A fluid produced by the kidneys, containing urea and other waste or excess substances dissolved in water.

SB8a Efficient transport and exchange

Word	Pronunciation	Meaning
aerobic respiration	*air-**O**-bick res-pir-**ay**-shun*	A type of respiration in which oxygen is used to release energy from substances such as glucose.
alveolus	*al-vee-**O**-lus*	A small pocket in the lungs in which gases are exchanged between the air and the blood. (Plural is alveoli.)
capillary		A tiny blood vessel with thin walls to allow for the transfer of substances between the blood and tissues.
circulatory system		The system that moves blood through the body. It consists of the heart, arteries, veins and capillaries.
diffusion	*diff-**yoo**-zshun*	The random movement and spreading of particles. There is a net (overall) diffusion of particles from a region of higher concentration to a region of lower concentration.
excretion	*ex-**kree**-shun*	The removal of waste materials that have been produced inside an organism.
gas exchange		A process in which one gas diffuses across a membrane and another gas diffuses in the opposite direction.
metabolism		All the chemical reactions that occur in an organism.
multicellular organism		An organism that is made up of many cells.
surface area : volume (SA : V) ratio		The total amount of surface area of an object divided by its volume. The bigger the ratio, the more surface area something has per unit volume.
urea	*yoo-**ree**-a*	A waste product made in the liver from excess amino acids.

SB8b Factors affecting diffusion

Word	Pronunciation	Meaning
concentration	*con-sen-**tray**-shun*	The amount of solute dissolved in a certain amount of solution.
concentration gradient	*con-sen-**tray**-shun **gray**-dee-ent*	The difference between two concentrations. There will be an overall movement of particles *down* a concentration gradient, from higher concentration to lower concentration.

directly proportional		A relationship between two variables in which if one variable doubles, the other also doubles.
Fick's law		The relationship between the different variables that affect diffusion: $\text{rate of diffusion} \propto \frac{\text{surface area} \times \text{concentration difference}}{\text{thickness of membrane}}$
inversely proportional		A relationship between two variables in which if one variable doubles, the other halves.
linear relationship		A relationship between two variables shown by a straight line on a graph.

SB8c The circulatory system

Word	Pronunciation	Meaning
antibody		A protein produced by lymphocytes. It attaches to a specific antigen on a microorganism and helps to destroy or neutralise it.
artery		A blood vessel that carries blood away from the heart.
blood		The fluid that carries oxygen and other substances from the heart to the body.
capillary		A tiny blood vessel with thin walls to allow for the transfer of substances between the blood and tissues.
erythrocyte	*er-**ree**-throw-site*	Another term for red blood cell.
haemoglobin	*hee-mO-**glO**-bin*	The red, iron-containing pigment found in red blood cells.
heart		A muscular organ in the circulatory system that pumps blood around the body.
lymphocyte	***lim**-fO-site*	A type of white blood cell that produces antibodies.
phagocyte	***fag**-O-site*	A white blood cell that is capable of engulfing microorganisms such as bacteria.
plasma		The straw-coloured liquid component of blood.
platelet		Cell fragments that are important in the clotting mechanism of the blood.
pulse		A shock wave caused by the contraction of the heart muscles, which travels through the walls of arteries leading from the heart.
red blood cell		A biconcave disc containing haemoglobin that gives blood its red colour and carries oxygen around the body to the tissues. Also known as an erythrocyte.
valve		A structure made of flaps of tissue that stops blood flowing in the wrong direction.

vein		A blood vessel that transports blood towards the heart.
white blood cell		A type of blood cell that forms part of the body's defence system against disease. There are many different types of white blood cell, including lymphocytes and phagocytes.

SB8d The heart

Word	Pronunciation	Meaning
aorta		The major artery leading away from the heart.
atrium		An upper chamber in the heart that receives blood from the veins. (Plural is atria.)
cardiac output		The volume of blood the heart can pump out in one minute. It is calculated using the equation: cardiac output = stroke volume × heart rate
chamber		An enclosed space. A human heart has four chambers.
contract		To become smaller. When muscles contract, they shorten and become fatter.
deoxygenated blood		Blood in which the red blood cells are only carrying small amounts of oxygen. Deoxygenated blood is a dark red colour.
heart attack		When the heart stops pumping properly due to a lack of oxygen reaching part of it.
heart rate		The number of heart beats in a unit of time, usually per minute (beats/min).
heart valve		A structure made of flaps of tissue between an atrium and a ventricle of the heart. The heart valve stops blood flowing in the wrong direction when the heart muscle contracts.
impulse		An electrical signal transmitted along a neurone.
oxygenated blood		Blood in which the red blood cells are carrying large amounts of oxygen. Oxygenated blood is a bright red colour.
pulmonary artery		An artery that carries deoxygenated blood from the right atrium to the lungs.
pulmonary vein		A vein that carries oxygenated blood from the lungs to the left atrium.
septum		A wall of tissue. The septum in the heart completely separates the chambers on the right from those on the left.
stroke volume		The volume of blood the heart can pump out with each beat.
tendon		A strand of tissue used to connect other tissues. The tendons in the heart connect the valves with the heart walls.
vena cava	***vee****-na* ***kay****-va*	A major vein leading to the heart.
ventricle		A lower chamber in the heart that pumps blood out into the arteries.

SB8e Cellular respiration

Word	Pronunciation	Meaning
aerobic respiration	*air-**O**-bick* *res-pir-**ay**-shun*	A type of respiration in which oxygen is used to release energy from substances such as glucose.
anaerobic respiration	***an**-air-O-bick* *res-pir-**ay**-shun*	A type of respiration that does not need oxygen.
cellular respiration		Chemical process by which living cells produce energy in the cell.
exothermic		A type of reaction in which energy is transferred to the surroundings from the reactants. This energy transfer usually causes the temperature of the surroundings to rise.
glucose		A sugar produced by the digestion of carbohydrates and needed for respiration.
lactic acid		The waste product of anaerobic respiration in animal cells.
mitochondrion	*my-toe-**kon**-dree-on*	A sub-cellular structure (organelle) in the cytoplasm of eukaryotic cells, where aerobic respiration occurs. (Plural is mitochondia.)

SB9a Ecosystems

Word	Pronunciation	Meaning
abundance		A measure of how common something is.
community		All the different organisms living and interacting with one another in a particular area.
ecosystem		An area in which all the living organisms and all the non-living physical factors in an area form a stable relationship that needs no input from outside the area to remain stable.
food web		A diagram of interlinked food chains. It shows how the feeding relationships in a community are interdependent.
habitat		The place in which an organism lives, e.g. woodland or sea shore.
interdependent		When organisms in an area need each other for resources, e.g. for food and shelter.
population		A group of one species living in the same area.
quadrat	*qwod-rat*	A square frame of known area, such as 1 m^2, that is placed on the ground to get a sample of the organisms living in a small area.
resources		Something that an organism needs to stay alive such as food, water and space.
sample		A small portion of an area or population.

SB9b Energy transfer

Word	Pronunciation	Meaning
biomass		Mass of tissues in an organism.
biotic (factor)	*bi-ot-ick*	Factors caused by living organisms in an environment, such as competition or predation.
pyramid of biomass		Diagram showing the amount of biomass at different trophic levels of a food chain.
Sankey diagram		A diagram showing energy transfers, where the width of each arrow is proportional to the amount of energy the arrow represents.
trophic level	***trOh****-fick level*	Feeding level in a food chain, such as producer or primary consumer.

SB9c Abiotic factors and communities

Word	Pronunciation	Meaning
abiotic factors	*ay-bi-ot-ick*	Non-living conditions that can influence where plants or animals live (e.g. temperature, the amount of light).
adaptation	*ad-ap-tay-shun*	The features of an organism that enable it to do a certain function (job).
belt transect		A line in an environment along which samples are taken to measure the effect of an abiotic factor on the distribution of organisms.
distribution		The places in which a certain organism can be found in an area.
drought	*drowt*	Lack of water.
pollutant	*poll-oo-tant*	A substance that harms living organisms when released into the environment.
pollution	*poll-oo-shun*	Harm caused to the environment, such as by adding poisonous substances or by abnormally high amounts of a substance.

SB9d Biotic factors and communities

Word	Pronunciation	Meaning
biodiversity		The variety of species in an area.
biotic factors	*bi-ot-ick*	Living components (the organisms) in an ecosystem.
compete	*com-peet*	When organisms interact to get a limited resource that they need.

competition	*com-pet-i-shun*	When organisms need the same resources as each other, they struggle against each other to get those resources. We say that they 'compete' for those things.
predation	*pre-day-shun*	When one animal species kills and eats another animal species.
predator–prey cycle		The regular variation in numbers of predators and numbers of prey within a feeding relationship.

SB9e Assessing pollution

Word	Pronunciation	Meaning
aquatic	*a-**qwa**-tick*	Living in water.
blackspot fungus		Pathogen of roses that is killed by acidic air pollution.
eutrophication		Adding more nutrients to an ecosystem than it normally has.
indicator species		Organism whose presence indicates the presence or absence of certain types of pollution.
invertebrate		Animal without bones, such as an insect or worm.
lichen	***ly**-ken* or ***litch**-en*	A mutualistic relationship between a fungus and an alga. The presence of some species can indicate different levels of air pollution.
pollution	*poll-**oo**-shun*	Harm caused to the environment, such as by adding poisonous substances or abnormally high amounts of a substance.
sewage		Human waste collected for treatment.

SB9f Parasitism and mutualism

Word	Pronunciation	Meaning
host		An individual that can be infected by a certain pathogen.
mutualism	*mew-tew-a-lism*	A relationship between individuals of different species where both individuals benefit, e.g. by getting more food or shelter than if they were on their own.
parasite		An organism that lives on or in a host organism and takes food from it while it is alive.
parasitism		A feeding relationship in which a parasite benefits and its host is harmed.

SB9g Biodiversity and humans

Word	Pronunciation	Meaning
eutrophication		The addition of more nutrients to an ecosystem than it normally has.
fish farming		Growing fish in a contained area, usually to supply humans with food.
indigenous	*in-dij-en-us*	Organisms that have always been in an area. (Another word for native.)
native		See indigenous.
non-indigenous	*non-in-dij-en-us*	Organisms that have been introduced to an area where they haven't been before.
overfishing		Taking more fish from a population than are replaced by the fish reproducing so that the population number falls each year.

SB9h Preserving biodiversity

Word	Pronunciation	Meaning
captivity		Keeping something in unnatural surroundings, such as animals in a zoo.
conservation	*con-ser-vay-shun*	The protection of an area or species to prevent damage.
endangered		An area or species that is at great risk of destruction.
reforestation		Planting new forests where old forests have been cut down.

SB9i Food security

Word	Pronunciation	Meaning
agricultural input		Something needed for growing food, such as farm equipment, fertilisers or pesticides for crops.
biofuel		Fuel produced from biomass.
climate change		Change in weather patterns around the world.
food security		Having access to enough safe and healthy food at all times.
sustainability		Ability to continue something, such as food production, at the same level without negative effects now or in the future.
vector (disease)	***vek****-tor*	Something that transfers things from one place to another, for example an organism that carries a pathogen from one infected person to another, such as the mosquito that carries the malaria protist.
yield		The amount of useful product that you can get from something.

SB9j The water cycle

Word	Pronunciation	Meaning
desalination		A process that produces fresh drinking water by separating the water from the salts in salty water.
distillation		The process of separating a liquid from a mixture by evaporating the liquid and then condensing it (so that it can be collected).
potable		Suitable for drinking.
water cycle		A sequence of processes by which water moves through abiotic and biotic parts of an ecosystem.

SB9k The carbon cycle

Word	Pronunciation	Meaning
biomass		The total mass in living organisms, usually shown as the mass after drying.
carbon cycle		A sequence of processes by which carbon moves from the atmosphere, through living and dead organisms, into sediments and into the atmosphere again.
decay		A process in which complex substances in dead plant and animal biomass are broken down by decomposers into simpler substances.
decomposer		An organism that feeds on dead material, causing decay.
faeces	*fee-sees*	Undigested food that forms a waste material.
fossil fuel		A fuel formed from the dead remains of organisms over millions of years, i.e. coal, oil and natural gas.

SB9l The nitrogen cycle

Word	Pronunciation	Meaning
crop rotation		Where a different crop is planted in the same field each year in a 3- or 4-year cycle, such as potatoes, oats, beans and cabbages. This helps to control the build-up of soil pests for each crop.
manure	*man-yure*	A mixture containing animal waste that is added to soil to improve its fertility.
nitrate		A compound that contains nitrogen in the form of a nitrate ion.
nitrogen cycle		A sequence of processes by which nitrogen moves from the atmosphere through living and dead organisms, into the soil and back to the atmosphere.
nitrogen-fixing bacteria		Bacteria that can take nitrogen from the atmosphere and convert it to more complex nitrogen compounds such as ammonia.

SB9m Rates of decomposition

Word	Pronunciation	Meaning
compost		Waste vegetable material that has been decomposed for use in increasing the fertility of garden soil.
decomposer		Microorganism that breaks down dead plant and animal tissue and animal waste as it feeds and grows. Examples include fungi and bacteria.
fertility (of soil)		The nutrient content of a soil, which affects how well plants grow.
irradiate		Exposing something to ionising radiation, for example using gamma rays to kill decomposers in certain foods.
preservation		Keeping something from being damaged.

Suggested Reading List

KS3

Bill Bryson: The Body
Paul Nurse: What if life?
Adam Rutherford: A Brief History of Everyone Who Ever Lived: The Stories Of Our Gene

KS4

Richard Dawkins: The Selfish Gene
Siddhartha Mukherjee: The Gene: An Intimate History
Jonathan Kennedy: Pathogenesis: How Infectious Disease Shaped Human History

A Level

Richard Dawkins: The Blind Watchmaker
Nessa Carey: The Epigenetics Revolution
Siddhartha Mukherjee: The Emperor of All Maladies
Steve Jones:

- Y: The Descent of Men
- In the Blood: God, Genes and Destiny
- Almost Like a Whale: The 'Origin of Species' Updated
- The Language of the genes

Matt Ridley

- Genome: The Autobiography of a Species in 23 Chapters
- The Red Queen: Sex and the Evolution of Human Nature

- The Language of Genes
- Francis Crick: Discoverer of the Genetic Code
- Nature Via Nurture

James Watson:

- DNA: The Secret of Life
- The Double Helix:

Lewis Thomas:

- The Lives of a Cell: Notes of a Biology Watcher.
- The Medusa and the Snail: More Notes of a Biology Watcher Barry Gibb: The Rough Guide to the Brain (Rough Guides Reference Titles)

Charles Darwin: On the origin of species
Armand Marie Leroi: Mutants:
David S. Goodsell: The Machinery of Life
Ernst Mayr: This Is Biology: The Science of the Living World
George C. Williams: Plan and Purpose in Nature
Steve Pinker: The Language Instinct
Edward O Wilson: The Diversity of Life
Primo Levi: The Periodic Table
Richard Leaky: The Origin of Humankind