

	Order	Lesson Title	Content	Specification Link	Literacy/Numeracy/FBV/SMSC	Alleyne's skills for life	
Ecosystems	1	Communities, Abiotic and Biotic factors	Define key terminology. Describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem and the importance of interdependence and competition in a community. o explain how a change in an abiotic or biotic factor would affect a given community given appropriate data or context	4.7.1.2	Key terms and using them in the correct context	Literacy	
	2	Adaptation	Explain how organisms are adapted to live in their natural environment, given appropriate information. Describe how extremophiles are adapted	4.7.1.3	Adapting to a changing world	Communication	
	3	Food chains and webs	Feeding relationships within a community can be represented by food chains. All food chains begin with a producer which synthesises molecules. This is usually a green plant or alga which makes glucose by photosynthesis. Including predator prey cycles	4.7.2.1	Key terminology in the correct context	Literacy	
	Scientific literacy						Literacy
	4	PEER STAR Assessment -food webs					
	5	Carbon Cycle & Water cycle	How carbon and water are cycled in the environment. Recall that many different materials cycle through the abiotic and biotic components of an ecosystem Explain the importance of the carbon and water cycles to living organisms. Explain the role of microorganisms in cycling materials through an ecosystem by returning carbon to the atmosphere as carbon dioxide and mineral ions to the soil	4.7.2.2	Impact of man on the environment	Literacy	
	6	Waste, Pollution, land use, deforestation	Sources of waste & pollution, causes & effects of deforestation. Explain how waste, deforestation and global warming have an impact on biodiversity. Understand the conflict between the need for cheap available compost to increase food production and the need to conserve peat bogs and peatlands as habitats for biodiversity and to reduce carbon dioxide emissions	4.7.3	Impact of man on the environment	Communication	
	7	Global Warming and biodiversity	How GW is caused, impact & factors affecting biodiversity. Describe some of the biological consequences of global warming. Understand that the scientific consensus about global warming and climate change is based on systematic reviews of thousands of peer reviewed publications. Explain why evidence is uncertain or incomplete in a complex context. Evaluate given information about methods that can be used to tackle problems caused by human impacts on the environment. Explain and evaluate the conflicting pressures on maintaining biodiversity given appropriate information	4.7.3.5, 4.7.3.6	Impact of man on the environment	Problem solving	
	8	Revision - optional					Independence
	9	Test - Teacher STAR					Independence
10	Test feedback - address misconceptions					Resilience	

Feedback systems	11	The nervous system	<p>Structure of CNS and neurones. Explain how the structure of the nervous system is adapted to its functions. The nervous system enables humans to react to their surroundings and to coordinate their behaviour.</p> <p>Information from receptors passes along cells (neurones) as electrical impulses to the central nervous system (CNS). The CNS is the brain and spinal cord. The CNS coordinates the response of effectors which may be muscles contracting or glands secreting hormones.</p> <p>Order: stimulus, receptor, coordinator, effector, response</p>	4.5.2	Responding to the environment around you	Communication
	12	Reflexes	<p>Reflex pathways and synapses. Explain how the various structures in a reflex arc – including the sensory neurone, synapse relay neurone and motor neurone – relate to their function. Understand why reflex actions are important. Reflex actions are automatic and rapid; they do not involve the conscious part of the brain.</p>	4.5.2	Calculating speed of reflexes	Numeracy
	13	Caffeine and reflexes	Required practical 6		Calculating reaction times	Teamwork
	14	Hormones & fertility hormones	<p>Hormones, fertility hormones. Describe the principles of hormonal coordination and control by the human endocrine system. The endocrine system is composed of glands which secrete chemicals called hormones directly into the bloodstream. The blood carries the hormone to a target organ where it produces an effect. Compared to the nervous system the effects are slower but act for longer. The pituitary gland in the brain is a 'master gland' which secretes several hormones into the blood in response to body conditions. These hormones in turn act on other glands to stimulate other hormones to be released to bring about effects. Identify the position of the following on a diagram of the human body:</p> <ul style="list-style-type: none"> • pituitary gland • pancreas • thyroid • adrenal gland • ovary • testes. 	4.5.3.2	Key terminology in the correct context	Literacy

		Describe the roles of hormones in human reproduction, including the menstrual cycle. During puberty reproductive hormones cause secondary sex characteristics to develop. Oestrogen is the main female reproductive hormone produced in the ovary. At puberty eggs begin to mature and one is released approximately every 28 days. This is called ovulation. Testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production. Several hormones are involved in the menstrual cycle of a woman. • Follicle stimulating hormone (FSH) causes maturation of an egg in the ovary. • Luteinising hormone (LH) stimulates the release of the egg. • Oestrogen and progesterone are involved in maintaining the uterus lining. HIGHER ONLY explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle. extract and interpret data from graphs showing hormone levels during the menstrual cycle.		Numeracy: interpretation of diagrams	
15	Puberty and the menstrual cycle		4.5.3.3		Problem solving
16	PEER STAR Assessment -Hormones and the menstrual cycle				Literacy
17	Contraception	Contraception & Hormones to reduce fertility. Evaluate the different hormonal and non-hormonal methods of contraception. Fertility can be controlled by a variety of hormonal and nonhormonal methods of contraception. These include: • oral contraceptives that contain hormones to inhibit FSH production so that no eggs mature • injection, implant or skin patch of slow release progesterone to inhibit the maturation and release of eggs for a number of months or years • barrier methods such as condoms and diaphragms which prevent the sperm reaching an egg • intrauterine devices which prevent the implantation of an embryo or release a hormone • spermicidal agents which kill or disable sperm • abstaining from intercourse when an egg may be in the oviduct • surgical methods of male and female sterilisation.	4.5.3.4	FBV Mutual respect and tolerance of others beliefs	Communication
18	Infertility (HIGHER ONLY)	IVF & fertility treatments. Explain the use of hormones in modern reproductive technologies to treat infertility. This includes giving FSH and LH in a 'fertility drug' to a woman. She may then become pregnant in the normal way. In Vitro Fertilisation (IVF) treatment. • IVF involves giving a mother FSH and LH to stimulate the maturation of several eggs. • The eggs are collected from the mother and fertilised by sperm from the father in the laboratory. • The fertilised eggs develop into embryos. • At the stage when they are tiny balls of cells, one or two embryos are inserted into the mother's uterus (womb). Although fertility treatment gives a woman the chance to have a baby of her own: • it is very emotionally and physically stressful • the success rates are not high • it can lead to multiple births which are a risk to both the babies and the mother.	4.5.3.5	Fertility problems and overcoming them inc impact on mental health	Empathy

	20	Glucoregulation	Regulation of blood glucose. Blood glucose concentration is monitored and controlled by the pancreas. If the blood glucose concentration is too high, the pancreas produces the hormone insulin that causes glucose to move from the blood into the cells. In liver and muscle cells excess glucose is converted to glycogen for storage. Explain how insulin controls blood glucose (sugar) levels in the body	4.5.3.2	Importance of a healthy diet	Communication	
	21	Diabetes	Mechanisms of both types of Diabetes. Type 1 diabetes is a disorder in which the pancreas fails to produce sufficient insulin. It is characterised by uncontrolled high blood glucose levels and is normally treated with insulin injections. In Type 2 diabetes the body cells no longer respond to insulin produced by the pancreas. A carbohydrate controlled diet and an exercise regime are common treatments. Obesity is a risk factor for Type 2 diabetes. Compare Type 1 and Type 2 diabetes and explain how they can be treated. Extract information and interpret data from graphs that show the effect of insulin in blood glucose levels in both people with diabetes and people without diabetes.	4.5.3.2	Diabetes type 1 and 2, healthy lifestyle	Numeracy	
	22	Negative feedback (HIGHER ONLY)	What is negative feedback & examples. If the blood glucose concentration is too low, the pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood. Explain how glucagon interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body.	4.5.3.2	Key terminology in the correct context	Literacy	
	23	Revision - optional					Independence
	24	Test - Teacher STAR					Independence
	25	Test feedback - address misconceptions					Resilience
Genetics	26	Chromosomes and sex inheritance	What are chromosomes & how sex is determined. The nucleus of a cell contains chromosomes made of DNA molecules. Each chromosome carries a large number of genes. In body cells the chromosomes are normally found in pairs. Ordinary human body cells contain 23 pairs of chromosomes. 22 pairs control characteristics only, but one of the pairs carries the genes that determine sex. • In females the sex chromosomes are the same (XX). • In males the chromosomes are different (XY). Carry out a genetic cross to show sex inheritance. Use direct proportion and simple ratios in genetic crosses	4.6.1.6	Numeracy: interpretation of diagrams	Numeracy	

	27	DNA, the genome & genetic inheritance	<p>What DNA is, the genome and genetic diagrams. Describe the structure of DNA and define genome. The genetic material in the nucleus of a cell is composed of a chemical called DNA. DNA is a polymer made up of two strands forming a double helix. The DNA is contained in structures called chromosomes. A gene is a small section of DNA on a chromosome. Each gene codes for a particular sequence of amino acids, to make a specific protein. The genome of an organism is the entire genetic material of that organism. The whole human genome has now been studied and this will have great importance for medicine in the future. Discuss the importance of understanding the human genome.</p> <p>This is limited to the:</p> <ul style="list-style-type: none"> • search for genes linked to different types of disease • understanding and treatment of inherited disorders • use in tracing human migration patterns from the past. 	4.6.1.3	Understanding individual differences	Literacy
	Scientific literacy					Literacy
	28	Genetic diseases	<p>CF, Polydactyly & gen inheritance diagrams. Explain the terms: Gamete, Chromosome, Gene, Allele, Dominant, Recessive, Homozygous, Heterozygous, Genotype, Phenotype. Some characteristics are controlled by a single gene, such as: fur colour in mice; and red-green colour blindness in humans. Each gene may have different forms called alleles. The alleles present, or genotype, operate at a molecular level to develop characteristics that can be expressed as a phenotype. A dominant allele is always expressed, even if only one copy is present. A recessive allele is only expressed if two copies are present (therefore no dominant allele present). If the two alleles present are the same the organism is homozygous for that trait, but if the alleles are different they are heterozygous. Most characteristics are a result of multiple genes interacting, rather than a single gene. Understand the concept of probability in predicting the results of a single gene cross, but recall that most phenotype features are the result of multiple genes rather than single gene inheritance. Use direct proportion and simple ratios to express the outcome of a genetic cross. Complete a Punnett square diagram and extract and interpret information from genetic crosses and family trees.</p>	4.6.1.4	Understanding genetic diseases inc Down's syndrome	Empathy
29	PEER STAR Assessment - genetic diagrams				Independence	

	30	Genetic Engineering & GM foods	<p>How it works and the uses/importance. Describe genetic engineering as a process which involves modifying the genome of an organism by introducing a gene from another organism to give a desired characteristic. Plant crops have been genetically engineered to be resistant to diseases or to produce bigger better fruits. Bacterial cells have been genetically engineered to produce useful substances such as human insulin to treat diabetes. explain the potential benefits and risks of genetic engineering in agriculture and in medicine and that some people have objections. In genetic engineering, genes from the chromosomes of humans and other organisms can be 'cut out' and transferred to cells of other organisms. Crops that have had their genes modified in this way are called genetically modified (GM) crops. GM crops include ones that are resistant to insect attack or to herbicides. GM crops generally show increased yields. Concerns about GM crops include the effect on populations of wild flowers and insects. Some people feel the effects of eating GM crops on human health have not been fully explored. Modern medical research is exploring the possibility of genetic modification to overcome some inherited disorders</p> <p>HIGHER ONLY describe the main steps in the process of genetic engineering.</p> <p>In genetic engineering:</p> <ul style="list-style-type: none"> • enzymes are used to isolate the required gene; this gene is inserted into a vector, usually a bacterial plasmid or a virus • the vector is used to insert the gene into the required cells • genes are transferred to the cells of animals, plants or microorganisms at an early stage in their development so that they develop with desired characteristics. 	4.6.2.4	the ethics of GM foods	Literacy
	31	Sexual and asexual reproduction	<p>How the 2 types are different. Sexual reproduction involves the joining (fusion) of male and female gametes:</p> <ul style="list-style-type: none"> • sperm and egg cells in animals • pollen and egg cells in flowering plants. <p>In sexual reproduction there is mixing of genetic information which leads to variety in the offspring. The formation of gametes involves meiosis.</p> <p>Asexual reproduction involves only one parent and no fusion of gametes. There is no mixing of genetic information. This leads to genetically identical offspring (clones). Only mitosis is involved.</p>	4.6.1.1	Key terminology in the correct context	Literacy

		<p>How & why body cells are made. Cells divide in a series of stages called the cell cycle. Describe the stages of the cell cycle, including mitosis.</p> <p>During the cell cycle the genetic material is doubled and then divided into two identical cells. Before a cell can divide it needs to grow and increase the number of sub-cellular structures such as ribosomes and mitochondria. The DNA replicates to form two copies of each chromosome. In mitosis one set of chromosomes is pulled to each end of the cell and the nucleus divides.</p> <p>Finally the cytoplasm and cell membranes divide to form two identical cells.</p> <p>Understand the three overall stages of the cell cycle but do not need to know the different phases of the mitosis stage. Cell division by mitosis is important in the growth and development of multicellular organisms. Recognise and describe situations in given contexts where mitosis is occurring.</p>		Key terminology in the correct context	
32	Mitosis & Cell cycle		4.1.2.2		Literacy
		<p>How & why gametes are made in this way. Explain how meiosis halves the number of chromosomes in gametes and fertilisation restores the full number of chromosomes. Cells in reproductive organs divide by meiosis to form gametes. When a cell divides to form gametes:</p> <ul style="list-style-type: none"> • copies of the genetic information are made • the cell divides twice to form four gametes, each with a single set of chromosomes • all gametes are genetically different from each other. <p>Gametes join at fertilisation to restore the normal number of chromosomes. The new cell divides by mitosis. The number of cells increases. As the embryo develops cells differentiate. Knowledge of the stages of meiosis is not required.</p>		Key terminology in the correct context	
33	Meiosis		4.6.1.2		Literacy
		<p>Types of, sources of & uses of. A stem cell is an undifferentiated cell of an organism which is capable of giving rise to many more cells of the same type, and from which certain other cells can arise from differentiation. Describe the function of stem cells in embryos, in adult animals and in the meristems in plants. Stem cells from human embryos can be cloned and made to differentiate into most different types of human cells. Stem cells from adult bone marrow can form many types of cells including blood cells. Meristem tissue in plants can differentiate into any type of plant cell, throughout the life of the plant. Knowledge and understanding of stem cell techniques are not required. Treatment with stem cells may be able to help conditions such as diabetes and paralysis. In therapeutic cloning an embryo is produced with the same genes as the patient. Stem cells from the embryo are not rejected by the patient's body so they may be used for medical treatment. The use of stem cells has potential risks such as transfer of viral infection, and some people have ethical or religious objections. Stem cells from meristems in plants can be used to produce clones of plants quickly and economically.</p>		The ethics of uses of stem cells	
34	Stem cells		4.1.2.3		Empathy

		<ul style="list-style-type: none"> • Rare species can be cloned to protect from extinction. • Crop plants with special features such as disease resistance can be cloned to produce large numbers of identical plants for farmers. 			
35	Variation	<p>Variation in living organisms. Describe simply how the genome and its interaction with the environment influence the development of the phenotype of an organism. Differences in the characteristics of individuals in a population is called variation and may be due to differences in:</p> <ul style="list-style-type: none"> • the genes they have inherited (genetic causes) • the conditions in which they have developed (environmental causes) • a combination of genes and the environment. <p>State that there is usually extensive genetic variation within a population of a species. Recall that all variants arise from mutations and that: most have no effect on the phenotype; some influence phenotype; very few determine phenotype. Mutations occur continuously. Very rarely a mutation will lead to a new phenotype. If the new phenotype is suited to an environmental change it can lead to a relatively rapid change in the species.</p>	4.6.2.1	Understanding individual differences	Communication

		<p>Why it is useful to humans. Explain the impact of selective breeding of food plants and domesticated animals. Selective breeding (artificial selection) is the process by which humans breed plants and animals for particular genetic characteristics. Humans have been doing this for thousands of years since they first bred food crops from wild plants and domesticated animals. Selective breeding involves choosing parents with the desired characteristic from a mixed population. They are bred together. From the offspring those with the desired characteristic are bred together. This continues over many generations until all the offspring show the desired characteristic. The characteristic can be chosen for usefulness or appearance:</p> <ul style="list-style-type: none"> • Disease resistance in food crops. • Animals which produce more meat or milk. • Domestic dogs with a gentle nature. • Large or unusual flowers. <p>Selective breeding can lead to 'inbreeding' where some breeds are particularly prone to disease or inherited defects.</p>		using animals to help our lifestyle	
36	Selective breeding		4.6.2.3		Problem solving
		<p>The theory of evolution & Darwin's research. Describe evolution as a change in the inherited characteristics of a population over time through a process of natural selection which may result in the formation of a new species.</p> <p>The theory of evolution by natural selection states that all species of living things have evolved from simple life forms that first developed more than three billion years ago. Explain how evolution occurs through natural selection of variants that give rise to phenotypes best suited to their environment.</p> <p>If two populations of one species become so different in phenotype that they can no longer interbreed to produce fertile offspring they have formed two new species.</p>		Looking at origins of life	
37	Evolution		4.6.2.2		Problem solving
		<p>Bacteria can evolve rapidly because they reproduce at a fast rate. Mutations of bacterial pathogens produce new strains. Some strains might be resistant to antibiotics, and so are not killed. They survive and reproduce, so the population of the resistant strain rises. The resistant strain will then spread because people are not immune to it and there is no effective treatment. MRSA is resistant to antibiotics. To reduce the rate of development of antibiotic resistant strains:</p> <ul style="list-style-type: none"> • doctors should not prescribe antibiotics inappropriately, such as treating non-serious or viral infections • patients should complete their course of antibiotics so all bacteria are killed and none survive to mutate and form resistant strains • the agricultural use of antibiotics should be restricted. <p>The development of new antibiotics is costly and slow. It is unlikely to keep up with the emergence of new resistant strains.</p>		Looking at origins of life	
38	Antibiotic resistant bacteria		4.6.3.4		Communication

		Describe the evidence for evolution including fossils and antibiotic resistance in bacteria. The theory of evolution by natural selection is now widely accepted. Evidence for Darwin's theory is now available as it has been shown that characteristics are passed on to offspring in genes. There is further evidence in the fossil record and the knowledge of how resistance to antibiotics evolves in bacteria. Fossils are the 'remains' of organisms from millions of years ago, which are found in rocks. Fossils may be formed: <ul style="list-style-type: none"> • from parts of organisms that have not decayed because one or more of the conditions needed for decay are absent • when parts of the organism are replaced by minerals as they decay • as preserved traces of organisms, such as footprints, burrows and rootlet traces. Many early forms of life were soft-bodied, which means that they have left few traces behind. What traces there were have been mainly destroyed by geological activity. This is why scientists cannot be certain about how life began on Earth. We can learn from fossils how much or how little different organisms have changed as life developed on Earth. Extract and interpret information from charts, graphs and tables such as evolutionary trees.			
39	Fossils and evidence for evolution (& extinction)		4.6.3.1, 4.6.3.2	FBV : Tolerance of others beliefs	Communication
TRIPLE	Darwin vs Lamarck	Anaysising the thoeries of both scientists	Triple	Researching important scientists	Communication
40	Classification	Principles & methods of classification. Traditionally living things have been classified into groups depending on their structure and characteristics in a system developed by Carl Linnaeus. Linnaeus classified living things into kingdom, phylum, class, order, family, genus and species. Organisms are named by the binomial system of genus and species. use information given to show understanding of the Linnaean system. Describe the impact of developments in biology on classification systems. As evidence of internal structures became more developed due to improvements in microscopes, and the understanding of biochemical processes progressed, new models of classification were proposed. Due to evidence available from chemical analysis there is now a 'three-domain system' developed by Carl Woese. In this system organisms are divided into: <ul style="list-style-type: none"> • Archaea (primitive bacteria usually living in extreme environments) • Bacteria (true bacteria) • Eukaryota (which includes protists, fungi, plants and animals) Evolutionary trees are a method used by scientists to show how they believe organisms are related. They use current classification data for living organisms and fossil data for extinct organisms.	4.6.4	Key terminology in the correct context	Literacy
41	Revision - optimal				Indepdendance
42	Test - Teacher STAR				Indepdendance
43	Test feedback - address misconceptions				Resilience

