	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8
Autumn Term 1	**Chapter 6: Genetics** DNA and Genes The Human Genome Tracing Human Migration	The structure of DNA Proteins	Mutations Meiosis Asexual and sexual reproduction	Genetics Genetic crosses	Tracking gene disorders Gregor Mendel Key concept Genetics are simple or is it ?	Maths Skills Fractions/ Ratios/ Proportions/ Probability **Assessment**	**Chapter 7: Variation and Evolution** Variation Theory of evolution The origin of species by natural selection	Fossils evidence How much have organisms changed Darwin and Wallace
Autumn Term 2	New species Evidence of natural selection and evolution	Key concept, Evolution, fitting the pieces of the jigsaw Antimicrobial resistance Combating antimicrobial resistance	Selective breeding Producing new plant varieties(HT) Genetic Engineering (HT)	Genetically modified crops: the science Is genetic modification safe?	Ethically wrong or essential? Cloning The tree of life	Extinction. . . or survival Maths skills: Using charts and graphs to display data	**Assessment**	
	Ecology in Action	Looking at trophic levels	Competing for resources	Adapting for survival in plants	Cycling carbon	Investigating the effect of temperature		

Spring Term 1	Key Concept: Learning about Ecosystems Changing abiotic factors Investigating predator-prey relationships	Transferring biomass	Required practical: Measure the population size of a common species in a habitat Adapting for survival in animals	recycling materials	Investigati ng decay	on the rate of decay of fresh milk by measuring pH change Learning about land use		
Spring Term 2	Changing the landscape Thinking about global warming Looking at waste management	Investigatin g Pollution Maintaining biodiversity Learning about Food Security	Maintaining food security Using Biotechnology	Maths Skills: Using Graphs to show relationships **Assessments**	Catch up and revision	Revision and exam preparation	Revision and exam preparation	

Summer Term 1	exam preparation	exam preparation	exam preparation	exam preparation	exam preparation	exam preparation	exam preparation	exam preparation
Summer Term 2								

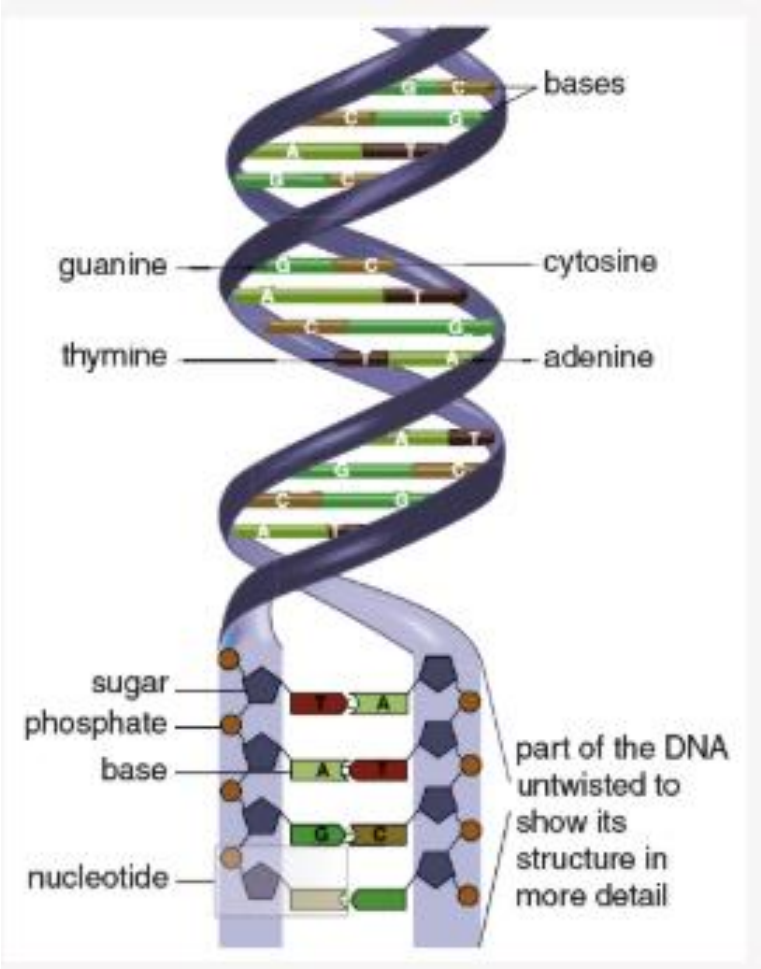
Unit Name: **Chapter 6: Genetics**	**Recommended Teaching Time: 20 hrs**
<u>Overview and Aims:</u> DNA, chromosomes and genes, role and structure. Mutations and cell division for sex cells. Asexual and sexual reproduction. Genetics, gene disorders Gregor Mendel and genetic variation.	
I can statements: • I can describe the structure of DNA. • I can describe a gene as a small section of DNA that codes for a protein. • I can describe a gene as a small section of DNA that codes for a protein. • I can explain the importance of understanding the human genome. **(HT)** • I can explain the importance of understanding the human genome. • I can discuss the use of the human genome in understanding human migration patterns. • I can describe the structure of DNA as repeating nucleotide units. • I can identify the four bases in DNA. • I can explain that the bases A and T, and C and G, are complementary. **(HT)** • I can describe how proteins are synthesised according to the DNA template of a gene. • I can explain that the genetic code of a gene specifies the protein to be made. **(HT)**	**Critical Content, Key Words and Additional Notes.**

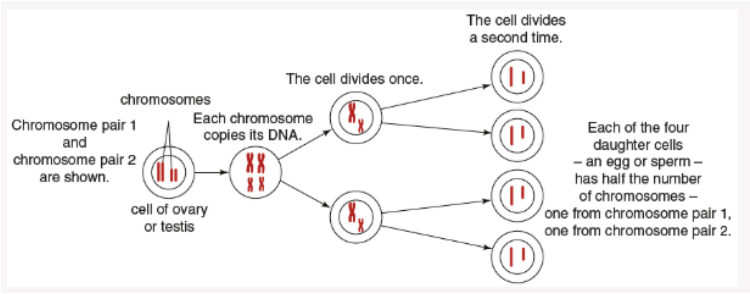
• I can model changes to the base sequences of DNA to illustrate mutations. • I can describe the negative and, sometimes, positive effects of mutations. **(HT)** • I can describe how mutations can affect protein function. **(HT)** • I can explain how meiosis halves the number of chromosomes for gamete production. • I can explain how fertilisation restores the chromosome number. • I can understand that the four gametes produced by meiosis are genetically different. • I can understand that asexual reproduction involves just one parent and produces genetically identical offspring. • I can understand that sexual reproduction leads to variety in the offspring. • I can understand and be able to use genetics terms, such as dominant, recessive, genotype, phenotype, homozygous and heterozygous. • I can know that some human conditions are caused by a recessive allele. • I can use the terms dominant, recessive, genotype, phenotype, homozygous and heterozygous. • I can know that some human conditions, such as cystic fibrosis, are caused by a recessive allele.	

• I can complete or construct a Punnett square to predict the outcome of a genetic cross. • I can understand the use of a family tree to show the inheritance of a characteristic. • I can explain economic, social and ethical issues concerned with embryo screening. • I can plan experiments to explore phenomena and test hypotheses • I can draw conclusions from given observations • I can evaluate data in terms of reproducibility. • I can explain how certain characteristics are controlled by a single gene. • I can understand that many characteristics are the result of multiple genes interacting. • I can describe the search for genes that are linked to disease. • I can understand and use fractions and percentages. • I can understand and use ratio and proportion. • I can understand and use probability when predicting the outcomes of genetic crosses.		

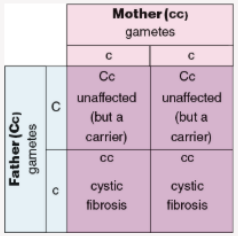
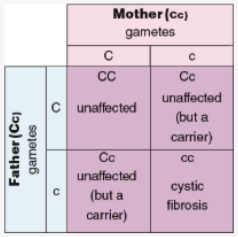
Core Questions

Lesson No (if applicable)	Question	Answer	Probable misconceptions (if applicable)
	1) I can describe the structure of DNA.	DNA stands for DEOXYRIBONUCELIC ACID. This is the molecule that carries all the instructions for genetic reproduction for an organism. The molecule is a polymer of nucleotides, the structure is a double helix. Sections of DNA that code for a specific task is called a gene. The genes align themselves in chromosomes,	
	2) I can describe a gene as a small section of DNA that codes for a protein.	The arrangement of the base pairs reads as an instruction for how to make proteins. It is these proteins that are the building bricks for life.	
	3) I can explain the importance of understanding the human genome. **(HT)**	The human genome is the complete record of human genetic material. If the role of every gene and the meaning of every genetic interplay could be understood we'd have a much greater understanding of what we are and many diseases and conditions could be eradicated.	
	4) I can discuss the use of the human genome in understanding human migration patterns.	By studying the human genome we can identify when new parts of the DNA have been added. By doing this we have concluded that the oldest, most original DNA populations are all in Africa. At approximately 60,000 years ago it looks like populations started to leave Africa over the Arabian Gulf and travelled (mostly) along coastline. If there are changes (mutations in the DNA in these later populations these changes will not appear in sample populations of Africa (unless people went back there later).	
	5) I can explain that the bases A and T, and C and G, are complementary. **(HT**	The 4 bases in DNA are always the same. They are: A = Adenine T = Thyamine C =Cytosine And	

		G =Guanine  We can see that the sides of the helix are composed of phosphate groups interspersed by sugar groups that form a bond with the bases. These form rungs to the ladder. Thymine always pairs with Adenine, Guanine always pairs with Cytosine.	

	6) I can explain that the genetic code of a gene specifies the protein to be made.	The genetic code of a gene specifies what protein is made because the amino acids that make up the protein are made from the blueprint that is made from the DNA code.	
	7) I can describe the negative and, sometimes, positive effects of mutations.	Mutations are when the DNA code changes. This will code for different proteins and this result in a different outcome. If this change in the resulting offspring is beneficial it may mean the offspring has conferred an advantage. If the offspring mate, this advantageous trait might be passed on and indeed improved by further mutations. If a mutation is disadvantageous it is less likely the offspring will survive to breed.	
	8) I can explain how meiosis halves the number of chromosomes for gamete production.	In mitosis cells divide to produce new material for growth and repair. In meiosis the cell divisions are necessary to produce sex cells. Ultimately each cell will end up with half the genetic material of a common non-sex cell.  The cell undergoes 1 replication of the DNA but 2 divisions. Now when the zygotes meet, they'll have a cell made of 23 pairs of chromosomes.	
	9) I can understand that the four	In meiosis there is another level of genetic recombination. After the first division has occurred there can be a mixing of the	

	gametes produced by meiosis are genetically different.	genetic code at this stage. So once the code is in the zygote ready to meet up with a zygote with half a load of genetic material from the other sexual partner, a change has occurred so that swapping of material means variation in the offspring is increased.	
	10) I can understand that asexual reproduction involves just one parent and produces genetically identical offspring.	With just one parent the offspring is a perfect clone of the parent.	
	11) I can understand and be able to use genetics terms, such as dominant, recessive, genotype, phenotype, homozygous and heterozygous.	Glossary of genetic terms. **Allele:** An allele is a gene, but more a gene for a specific outcome in an organism, so you can have a gene for eye colour but the allele will be for a specific colour. **Dominant:** If a gene is described as dominant it means that when it pairs with another, as long as one of the paired genes is dominant, that trait will out. **Recessive:** when a gene is described as recessive it means that only when the gene is paired with another recessive gene will this trait be expressed. **Genotype:** A genotype is a record of the alleles present in an organism for a particular trait. **Phenotype**: A phenotype is a record of how the alleles were expressed in the organism. So, the genotype will be the available alleles for ey colour, but the phenotype is the genetic combination that resulted in the offspring having green eyes. **Homozygous:** If the alleles form a matching pair, they are said to be homozygous, whether dominant or recessive.	

		Heterozygous: If the alleles are matched with one dominant and one recessive, they are said to be heterozygous.	
	12) I can complete or construct a Punnett square to predict the outcome of a genetic cross.	 Figure 6.31 There is a 50%, or 1 in 2, chance that a child will be born with cystic fibrosis  Figure 6.32 he probability of the couple having a child with cystic fibrosis is 1 in 4 Here we have two examples. In the top example, both parents carry the recessive cystic fibrosis gene. We can see there is a 50% chance of the child being born with cystic fibrosis. The second example is when only one of the parents carry the cystic fibrosis gene. This results in a 25% chance of the child being born with cystic fibrosis.	
	13) I can explain economic, social and ethical issues	The prospective parents might want to know if their child has a genetic condition. If the child's life will be very limited or be in painful, the parents can decide based on those facts.	

	concerned with embryo screening.	There are social and cultural factors at play in many societies that might pressure prospective parents into selecting the sex of their offspring.	
	14) I can understand that many characteristics are the result of multiple genes interacting.	Inherited diseases hugely are the result of the interplay of several or many different diseases.	

Unit Name: **Chapter 7: Variation and evolution**		**Recommended Teaching Time: 25 hrs**
Overview and Aims: Introduction to the Theories of Evolution and Natural Selection. The role of the fossil record and the work of Darwin and Wallace. New species, classification and evidence for evolution. Antibacterial resistance as an example of evolution. Selective breeding by man, genetic engineering, the ethical debate. Extinction and survival.		
I can statements		**Critical Content, Key Words and Additional Notes.**
• I can recall that differences in the characteristics of individuals in a population is called variation. • I can understand the genetic and environmental differences leading to variation. • I can recall that all species of living things have evolved from simple life forms. • I can explain how evolution occurs through natural selection. • I can explain the evidence that led Darwin to propose the theory of evolution by natural selection. • I can describe the process of natural selection.		

• I can understand how, and the situations in which, fossils are formed. • I can understand how fossils are used as evidence for evolution of species from simpler life forms. • I can understand why the fossil record is incomplete. • I can use the fossil record to understand how much, or how little, organisms have changed as life developed on Earth. • I can recall how Darwin and Wallace proposed, independently, the theory of evolution. • I can describe how Alfred Wallace gathered evidence for evolution, including warning colouration and mimicry. • I can understand that when natural selection operates differently on populations, a new species is produced. • I can understand that during evolution, new species are formed when populations become so different that they can no longer interbreed. • I can understand how scientific theories develop over time. • I can plan experiments to test hypotheses • I can understand the work of Mendel, Darwin and Wallace. • I can appreciate that the contributions of many scientists led to gene theory being developed. • I can recall that bacteria develop that are resistant to antibiotics, which is evidence of evolution. • I can understand the mechanism by which antibiotic resistance develops. • I can understand the effects of the development of antibiotic resistance on the treatment of disease.		

• I can describe how to reduce the rate of development of antibiotic resistance. • I can understand the requirement for, and the impact of, new antibiotics. • I can describe the process of selective breeding. • I can recall how selective breeding enables humans to choose desirable characteristics in animals and plants. • I can explain how selective breeding can lead to inbreeding. • I can describe the process of selective breeding. • I can recall how selective breeding enables humans to choose desirable characteristics in plants. • I can give examples of how plant crops have been genetically engineered to improve products and describe how fungus cells are engineered to produce human insulin. • I can describe the process of genetic engineering. • I can explain the benefits of, and concerns about, genetic modification. • I can explain the ethical concerns of genetic engineering. • I can explain the concerns that people have about genetic modification. • I can explain the possible safety issues of genetic engineering in agriculture and medicine. • I can explain the benefits of, and concerns about, genetic modification. • I can explain the ethical issues of genetic engineering in agriculture and medicine. • I can describe how cuttings and tissue culture are used to produce new plants. • I can describe the use of embryo transplants and adult cell cloning in animals. • I can describe how living things have been classified using a system devised by Linnaeus.		

• I can describe how new models of classification have developed. • I can list the causes of extinction. • I can explain how new predators, competitors and diseases can lead to extinctions. • I can understand when and how to use bar charts. • I can understand how to show sub-groups on bar charts. • I can understand how to plot histograms.		

Core Questions

Lesson No (if applicable)	Question	Answer	Probable misconceptions (if applicable)
	1) I can recall that differences in the characteristics of individuals in a population is called variation.	The differences in characteristics of individuals in a population is called variation.	
	2) I can understand the genetic and environmental differences leading to variation.	A population may show variation because of a genetic root. For example, the size of a person's hands is dictated by genetics. The size of a person's waist is more likely determined by environmental factors (what type of food is eaten, how often is it eaten and how much energy is used up through work/exercise).	
	3) I can recall that all species of living things	The fossil record shows us that the earliest life forms were very simple and as the years	

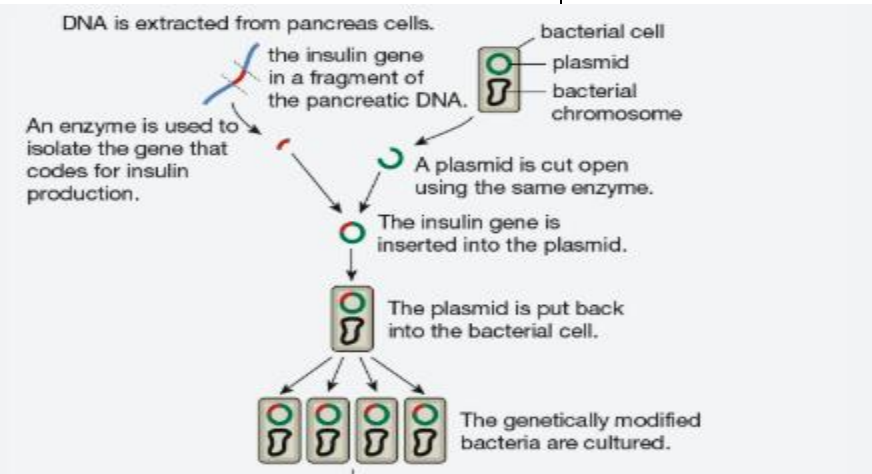
	have evolved from simple life forms.	have progressed, those earliest species have evolved into increasingly complex forms of life.	
	4) I can explain how evolution occurs through natural selection.	Natural selection is the idea that our children inherit our genetic material. If we parents have undergone a mutation in our genetic material does it confer some type of advantage to us? If it does, and we reproduce, there is a chance our offspring might inherit that advantage and as time goes by their children might also inherit the advantage. If there is a further mutation at some point, that exacerbates the original mutation, an even greater advantage may be passed on to future generations.	
	5) I can explain the evidence that led Darwin to propose the theory of evolution by natural selection.	The evidence that led Charles Darwin to his conclusions were his observations that similar birds appeared to be substantially different on different islands of the remote Galapagos islands.	
	6) I can understand how, and the situations in which, fossils are formed.	Fossils are the bodies of ancient animals preserved in stone. For this to occur the animal must die and be covered so scavengers cannot get to it. Once the body is covered and oxygen is limited the slow process of (lithification) turning into stone can begin. As more and more sediments are	

		layered on top of the carcass, the heat and pressure of being underground results in chemical changes occurring to the bones. A chemical change occurs, and the bones become new, stone minerals over time. This process might take millions of years. As stone beds descend so they can rise again. It is the ones closest to the surface that might be found.	
	7) I can understand how fossils are used as evidence for evolution of species from simpler life forms.	Fossils can be used as evidence for evolution of species from simpler life forms because fossils have been found that demonstrate incremental changes to the evolving creature's structure over many generations.	
	8) I can understand why the fossil record is incomplete.	The conditions under which an animal's remains can be preserved through fossilization are very rare. Even if this happens, the fossils must be lifted close to the surface for them to be found and at this precise time period. Because of these factors we do not have a full record of all animals that lived on Earth before us.	
	9) I can recall how Darwin and Wallace proposed, independently,	Alfred Russell Wallace and Charles Darwin worked independently and then together to develop the ideas of evolution.	

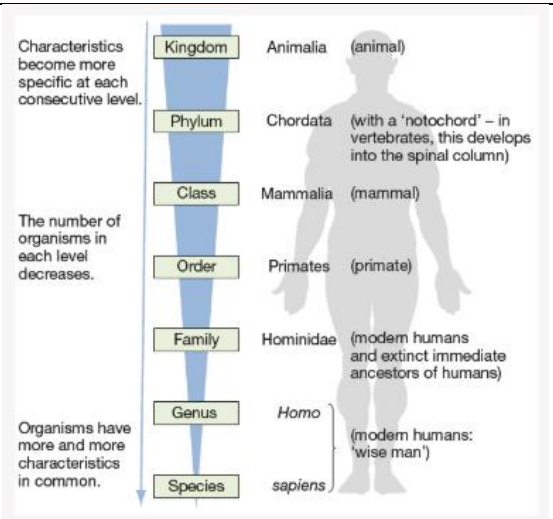
	the theory of evolution.		
	10) I can understand that during evolution, new species are formed when populations become so different that they can no longer interbreed.	This is basically our definition of what a species is: when animals cannot mate to produce viable (fertile) offspring because they have become so different.	
	11) I can understand how scientific theories develop over time.	The empirical scientific method is how science progresses. Someone has an idea. They make a statement framing that idea. This is an hypothesis. The hypothesis must then be tested. An experiment is devised. This is written up giving the apparatus and the method. This is so someone else can copy the experiment and see if they can reproduce our results. An experiment must have an independent variable. This is the one thing we want to change at each step of the experiment. A dependent variable. This is the thing we measure. This should change because the independent variable changes. Lastly, we seek to keep all other features the same, for them not to change. These are the control variables. We record our results and	

		make a conclusion. This is a comment as to whether the results match the hypothesis. Once the experiment has been repeated often enough and the same results found repeatedly, the world of science may accepts this to be a new scientific truth and the process moves on with more hypotheses. This is how scientific ideas progress, through theorizing, experiment, accurate recording and reporting.	
	12) I can recall that bacteria develop that are resistant to antibiotics, which is evidence of evolution.	Bacteria that would have been killed by antibiotics may develop increased resistance especially if antibacterial courses of medication are not taken fully. Once some resistance develops, there is the possibility that the resistance will spread through future mutations.	
	13) I can describe how to reduce the rate of development of antibiotic resistance.	Most importantly, if proscribed antibacterial medication, you should take the whole course, not skipping days, not saving some and not sharing with someone else. Failure to take the full course provides any bacteria with a slight resistance, a chance to survive and perhaps mutate again becoming more resistant to the antibiotics. Antibiotics are used on an industrial scale in many countries in farming. The farmers use them to keep down infection in their animals, but risk infection resistance developing in the animals and this crossing over into the human population.	

	14) I can understand the requirement for, and the impact of, new antibiotics.	A constant supply of new antibiotics would mean the human race would always be able to fight back against newer strains of drug resistant bacteria.	
	15) I can describe the process of selective breeding.	Selective breeding is when people breed plants or animals to develop certain characteristics. These include picking the cows that give most milk, or the fastest horses or the wooliest sheep and keeping them for breeding. By continuing to do this over generations specific desirable characteristics can be accentuated.	
	16) I can explain how selective breeding can lead to inbreeding.	Inbreeding is genetic problems that occur in the offspring when the gene pool becomes too restricted. For example, with pedigree dogs. If there are very few pure breed dogs the temptation will be for breeders to breed their dogs amongst themselves. If there is not enough variation in the gene pool a range of disabilities and deformities can often develop.	
	17) I can describe the process of genetic engineering.		



		The desired genes are 'cut' from the DNA of the donor. This desired gene is inserted another source of DNA (a plasmid or virus). The carrier or vector is reintroduced back to the population we want to genetically modify.	
	18) I can explain the ethical concerns of genetic engineering.	There are very many benefits and objections to genetic engineering. Some of the benefits are that there may be much greater yields from our food, so we can feed more people. Concerns are a) religious or spiritual, it is somehow unnatural for people to play with the natural order so directly. There is concern that the search for perfection might result in a rich people paying for augmented children bigger, stronger, faster, cleverer than before or perhaps soldier bred to fight, like stormtroopers. There are very deep ethical issues here.	
	19) I can describe how living things have been classified into groups using a system devised by Linnaeus.	Science seeks to classify all life according to a process designed by Swedish scientist Carl Linnaeus in the 17th Century. All life is classified into increasingly precise categories.	

		 When a new specie is discovered a decision must be made how it is to be classified. Sometimes forms of life are so different there is disputes about their classification or indeed new categories need to be agreed for them.	
	20) I can describe how new models of classification have developed.	Our science is so sophisticated compared with when Linnaeus devised his system. What scientists can do today is compare the DNA of species. If the DNA is very similar, then the animals are more closely related.	
	21) I can explain how new predators, competitors and diseases can lead to extinctions.	Predators can kill all the food sources; competition might mean a population cannot feed itself and disease can drastically wither away a population. Climate change may mean the environment changes so quickly that a specie may not be able to adapt or move and as such, die out. Pollution is another cause of possible	

		population decimation. Humans are the main reason for the sixth possible mass extinction on the planet. So many species of plant, animal, fish, bird, amphibian, reptile, insect and more are being threatened by mankind, our numbers and the way we live out of harmony with the Earth.	

Unit Name: **Chapter 8: Ecology in Action**	**Recommended Teaching Time: 25 hrs**
Overview and Aims: We explore ecosystems and biodiversity. Biotic and abiotic factors, predators and prey, producers and consumers, trophic levels and biomass, resources and competition. We explore the carbon cycle, recycling and decay. Our changing World and environment. What it is, how it happens and how it will affect us. Food security and its implications.	
I can statements • I can describe what an ecosystem is. • • I can explain the importance of high biodiversity. • • I can explain what is meant by a self-supporting ecosystem • • I can identify abiotic factors that affect ecosystems. • • I can explain changes in the distribution of species in an ecosystem. • • I can describe stable and unstable populations. • • I can describe how changes in one population affect another. •	**Critical Content, Key Words and Additional Notes.** **KEY WORDS** biodiversity community ecosystem habitat interdependence population self-supporting ecosystem

• I can explain interdependent relationships. • • I can explain how predator–prey population cycles have cyclical changes. • • I can explain trophic levels. • • I can explain and construct pyramids of biomass. • • I can explain the difficulties in constructing pyramids. • • I can identify how biomass is lost. • • I can calculate the efficiency of biomass transfers. • • I can explain the impact of biomass loss on the numbers of organisms. • • I can describe how competition impacts on populations. • • I can explain why animals in the same habitat are in competition. • • I can explain interspecific and intraspecific competition. • • I can use scientific ideas to develop a hypothesis. • • I can plan experiments to test a hypothesis. • • I can explain the apparatus and techniques used to sample a population. • I can explain how a representative sample was taken. •	

• I can develop a reasoned explanation for some data. • • I can recall why animals have adaptations. • • I can explain some adaptations. • • I can use surface-area-to-volume ratios to explain some adaptations. • • I can identify some adaptations of plants and bacteria. • • I can explain the importance of plant adaptations. • • I can explain a range of plant adaptations. • • I can recall that many materials are recycled in nature. • • I can explain the stages in the water and decay cycles. • • I can explain the importance of recycling materials. • • I can recall that plants take in carbon as carbon dioxide. • • I can explain how carbon is recycled. • • I can interpret a diagram of the carbon cycle. • • I can recall the factors needed for decay. • • I can describe how different factors affect decay. •	

• I can explain extracellular digestion. • • I can describe how safety is managed, apparatus is used and accurate measurements are made. • • I can make and record observations and make accurate measurements. • • I can evaluate methods and suggest possible improvements and further investigations. • • I can recall causes of environmental change. • • I can describe the impact of environmental change. • • I can explain the impact of an environmental change. • • I can identify why land use has changed. • • I can describe the effects of changing land use. • • I can evaluate a change in land use. • • I can identify the reasons for deforestation. • • I can describe the impact of peat bog destruction and deforestation. • • I can evaluate the destruction of peat bogs and forests. • • I can recall what global warming is. • • I can describe the causes of global warming.	

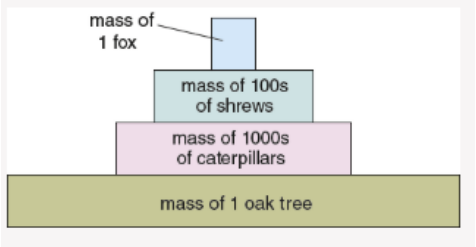
• I can explain how global warming impacts on biodiversity. • I can describe how waste production is linked to human population growth. • I can describe the impact of waste on ecosystems. • I can explain how waste impacts on biodiversity. • I can identify pollution levels using indicator species. • I can explain how indicator species measure pollution. • I can compare different methods of measuring pollution. • I can describe some conservation measures. • I can describe the impact of breeding programmes. • I can explain how habitats are regenerated. • I can identify factors affecting food security. • I can describe how different factors affect food security. • I can interpret data to evaluate food security. • I can describe some intensive farming methods.	

• I can explain ethical issues related to intensive farming. • • I can evaluate modern farming techniques. • • I can describe methods to maintain sustainable fisheries. • • I can describe some uses of biotechnology. • • I can explain the advantages of some uses of biotechnology. • • I can evaluate some uses of biotechnology. • • I can recognise direct proportionality in a graph. • • I can calculate reaction rates in linear graphs. • • I can use the gradient of a graph to calculate the rate.		

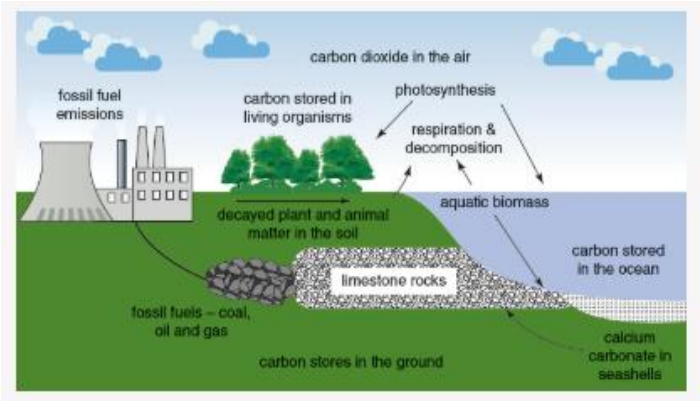
Core Questions

Lesson No (if applicable)	Question	Answer	Probable misconceptions (if applicable)
	1) I can describe what an ecosystem is.	An ecosystem is the relationship between a community of organisms and their non-living environment.	

	2) I can explain the importance of high biodiversity.	Biodiversity is the range of living organisms in an eco-system. A high biodiversity means there are a range of food sources and lowers the chance of an organism becoming too reliant on only one other type of organism.	
	3) I can explain what is meant by a self-supporting ecosystem	If an ecosystem is self-supporting it means that all the elements for the inhabitant organisms are there.	
	4) I can identify abiotic factors that affect ecosystems.	Abiotic factors mean the non-living factors that affect an ecosystem. These include height above sea level, temperature, air quality etc	
	5) I can explain changes in the distribution of species in an ecosystem.	Different species will specialise in being able to exploit particular areas of an ecosystem.	
	6) I can describe how changes in one population affect another.	If there are grazers in an area, they eat the plants. Without grazers the biodiversity of plants suffers because the dominant plants outcompete some of the other species. Introducing predators will keep down the number of grazers, which will in turn affect the diversity of grazed plants.	
	7) I can explain interdependent relationships.	As species specialise they are more likely to become interdependent on another species. If the main food source for a predator increases, so a larger predator population can be supported. Should the population of the prey population fall, so the predator population falls	

		because there is not enough food for all the predators anymore.	
	8) I can explain trophic levels.	A trophic level is a description of an organism's position in a food chain.	
	9) I can explain and construct pyramids of biomass.	A pyramid of biomass is a calculation of the mass of the organisms at each level. 	
	10) I can explain the difficulties in constructing pyramids.	A biomass pyramid is a judgement of the 'dry' biomass of each tier. If the 'WET' figures were included the mass totals would vary too much. All the organisms in an area need to be killed to establish their biomass. Drying out the biomass is difficult.	
	11) I can identify how biomass is lost.	Biomass is lost from the system as some biomass goes into excretion. Some biomass leaves the body as the biproducts of respiration and some biomass is lost between levels as each creature will have some parts of it that cannot be digested and used by the predator e.g., bone, hooves etc.	
	12) I can explain the impact of biomass loss on the numbers of organisms.	Biomass transfer efficiency runs at about 10% between trophic levels. Because so much energy is lost between levels a pyramid cannot sustain too many levels as there is insufficient energy coming into the system to power a higher one.	

	13) I can describe how competition impacts on populations.	An organism can only survive if it receives all it needs from its environment. Food, water, territory mates and for plants, light, minerals and ions, enough carbon dioxide.	
	14) I can explain interspecific and intraspecific competition.	Interspecific competition is competition between different species. Intraspecific competition is competition between one species. This may result in competition for territory or access to mates.	
	15) I can explain how a representative sample was taken.	A representative sample is often achieved by randomly throwing a quadrat around in a target environment and recording in detail the species found in several separate tries.	
	16) I can recall why animals have adaptations.	Adaptations are important so an organism can best exploit their environment.	
	17) I can explain the importance of plant adaptations.	A plant must adapt so it can improve the chances of it surviving in that environment and reproducing successfully.	
	18) I can recall that many materials are recycled in nature.	Water, carbon, oxygen and nitrogen are all substances that get re-cycled. Animals breathe in oxygen and breathe out carbon dioxide as part of gaseous exchange. Plants' respiration does the same but gaseous exchange in plants draws in large volumes of Carbon Dioxide and expels Oxygen as a waste product. Plants need nitrogen to make	

		amino acids. This is released back into the spoil when they die.	
	19) I can interpret a diagram of the carbon cycle.	The carbon cycle describes how carbon dioxide in taken into plants, forms glucose and then wood. This is converted into petrochemicals, burnt by industry and released back into the air where the plants need it again. 	
	20) I can recall the factors needed for decay.	There must be micro-organisms to breakdown the organic matter. There must be oxygen so the micro-organisms can respire, the micro-organisms will work at an optimum temperature and there must be some moisture.	
	21) I can explain extracellular digestion.	Extracellular digestion is when digestive enzymes are secreted onto the matter to be decayed. As this decomposition occurs outside of the body it is called extracellular.	
	22) I can recall causes of environmental change.	The environment may change, seasonally or there may be a geographic change. Humans have accelerated climate changes which have rapidly changed ecosystems.	

	23) I can explain the impact of an environmental change.	If the temperature rises certain types of plants and animals will no longer be able to survive under the new conditions. As the sea's waters heat up, animals like corals that cannot live in waters that are too hot will die out.	
	24) I can describe the effects of changing land use.	The effects of changing land use might be the cutting down of forests to either financially benefit from selling these resources or clearing land to graze cows upon. More people make more waste and so need more room for landfill. As human populations grow, so there is a growing need for more habitable land.	
	25) I can describe the impact of peat bog destruction and deforestation.	The destruction of peat bogs and deforestation means valuable carbon dioxide stores are lost. These are also important habitats. If the habitat is lost, the animals cannot survive, and biodiversity shrinks.	
	26) I can recall what global warming is.	Gases like carbon dioxide and methane enter the atmosphere as a result of combustion. These gases get trapped in the atmosphere and do not allow heat at the Earth's surface to escape to space. The cumulative effect is the Earth's average temperature is rising.	
	27) I can describe how waste production is linked to human population growth.	The more people there are and especially the growth of the mega cities means poorly planned communities have no provision for rubbish collection and disposal. Rubbish is just thrown into the natural world. In the Western World, even when rubbish is collected it is dumped into huge waste reclamation points called landfill.	

	28) I can explain how habitats are regenerated.	There are many different measures that are being tried. Sometimes areas are protected so they will not be destroyed. Farms might start to add an extra edge of wildflowers around the side of fields, to encourage biodiversity. Animals may become the target fd breeding programmes and to being reintroduced to habitats they may have been hunted to extinction from in the past.	
	29) I can identify factors affecting food security.	There are many factors surrounding food security. How can we feed the whole of the world's population? To produce more meat, more efficiently animals can be factory farmed. This can be making animals live in very closed conditions eating a proscribed about of food, being fed antibiotics, so they don't get ill. These are not nice conditions for an animal to exist in. To keep down pests, farmers may use high volumes of pesticides, that poison insects. These insecticides kill all insects, lowering the biodiversity of an area. The added fertilizers can end up poisoning existing water courses and killing off the organisms.	
	• 30) I can explain the advantages of some uses of biotechnology.	Biotechnology is using technology to improve some facet of the natural world to benefit humans. Genetically Modified or (GM) crops are one such example. These crops have been engineered to produce more food in less time. They may be resistant to insect attack and pesticides. Human insulin can be grown and harvested on mold, super protein enriched food is being grown –that means people can ingest more life-giving nutrients and calories with less food.	