

# Y11 Biology Curriculum 2023-2024

(v)

## B6 Inheritance, Variation and Evolution

### 6.1 Reproduction

Describe sexual and asexual reproduction.

Name the sex cells in plants and animals.

Explain meiosis to form gametes.

Recall that gametes join at fertilisation to restore the normal number of chromosomes.

Explain how cells divide by mitosis.

List some advantages and disadvantages of sexual and asexual reproduction.

Recall that some organisms reproduce by both methods, depending on the circumstances.

Define a gene.

Define the term genome.

Discuss the importance of understanding the human genome.

Recall the four bases and their complimentary pairing.

Explain how the bases code for proteins.

Describe the DNA polymer.

Explain how a change in DNA structure results in a change in the protein synthesised.

Explain how proteins are synthesised on ribosomes, according to a template.

Recall that when the protein chain is complete, it folds up to form a unique shape which enables the proteins to do their job as enzymes, hormones or forming structure.

Recall that mutations occur continuously and most do not alter the protein.

Recall that not all parts of DNA code for proteins. Non-coding parts of DNA can switch genes on and off, so variations in these areas of DNA may affect how genes are expressed.

Explain the difference between genotype and phenotype.

Explain dominant and recessive alleles.

Define homozygous and heterozygous.

Recall that most characteristics are a result of multiple genes interacting.

Understand family trees.

Use a Punnett square diagram to predict the outcome of a monohybrid cross.

Name an inherited disorder caused by a dominant allele.

Name an inherited disorder caused by a recessive allele.

Recall the number of pairs of chromosomes in an ordinary human body.

State the pairs of chromosomes that carry the genes that determine sex.

Explain single gene inheritance and carry out a genetic cross to show sex inheritance.

### HALF TERM

### 6.2 Variation and Evolution

Describe variation.

Give causes of variation.

Explain how evolution occurs through natural selection.

Describe selective breeding.

Define some chosen characteristics for selective breeding.

Explain the problems with 'inbreeding'.

Describe genetic engineering.

Give examples of uses of genetic engineering.

Define GM crop and give examples.

State some concerns about GM crops.

Sept/Oct Half Term 1

Nov/Dec Half Term 2

Nov/Dec Half Term 2	Recall the possibility of genetic modification to overcome some inherited diseases.	
	Explain plant cloning by tissue culture and cuttings.	
	Explain animal cloning by embryo transplants and adult cell cloning.	
	<b>6.3 The Development of Understanding of Genetics and Evolution</b>	
	Explain the theory of evolution by natural selection proposed by Charles Darwin.	
	State the reason why the theory of evolution by natural selection was only gradually	
	Recall the theory of Jean-Baptiste Lamarck.	
	Summarise the work of Alfred Russel Wallace into speciation.	
	State some causes for new species to arise.	
	Recall some history of the understanding of genetics, including:	
	<i>In the mid-19th century, Gregor Mendel carried out breeding experiments on plants.</i>	
	<i>In the late 19th century, behaviour of chromosomes during cell division was observed.</i>	
	<i>The structure of DNA was determined in the mid-20th century.</i>	
	Understand why the importance of Mendel's discovery was not recognised until after his death.	
	State evidence for evolution by natural selection.	
	Define fossils and explain how they are formed.	
	Explain why there are no fossils of many early forms of life.	
	Recall that we can learn from fossils how much or how organisms have changed.	
	List some possible causes of extinction.	
	Explain the emergence of antibiotic resistant bacteria.	
	Recall that MRSA is resistant to antibiotics.	
	Describe how to reduce the rate of development of antibiotic resistant strains.	
	<b>6.4 Classification of Living Organisms</b>	
	Describe the Linnaeus system to classify living things, and name the levels.	
	State that organisms are named by the binomial system of genus and species.	
	Know that new models of classification have been proposed based on improved analysis.	
	Define the 'three-domain system' developed by Carl Woese.	
Understand that evolutionary trees are a method used by scientists to show how they believe organisms are related.		
<b>CHRISTMAS HOLIDAY</b>		
Jan/Feb Half Term 3	<b>B7 Ecology</b>	
	<b>7.1 Adaptations, Interdependence and Competition</b>	
	Suggest the factors for which organisms are competing in a given habitat.	
	Suggest how organisms are adapted to the conditions in which they live.	
	Define an ecosystem.	
	Define interdependence.	
	Explain what is meant by a "stable community".	
	Explain how a change in an abiotic factor would affect a given community. List abiotic	
	Explain how a change in a biotic factor might affect a given community. List biotic factors.	
	Explain how organisms are adapted to live in their natural environment.	
	Define an extremophile.	
	<b>7.2 Organisation of an Ecosystem</b>	
	Define a producer, primary consumers, secondary consumers and tertiary consumers.	
	Construct food chains.	
	Explain the use of transects and quadrats.	
	<b>Required Practical 10: Measuring the distribution of plants</b>	
	Explain why, in a stable community, the numbers of predators and prey rise and fall in	

	Recall the carbon cycle and the water cycle.	
	Explain the role of microorganisms in cycling materials through an ecosystem.	
	State factors which affect the rate of decay.	
	Recall that biogas generators can be used to produce methane gas as a fuel.	
	<b>Required Practical 9: Examining the rate of decomposition</b>	
	Evaluate the impact of environmental changes on the distribution of species in an ecosystem given appropriate information.	
	State some environmental changes.	
	<b>HALF TERM</b>	
<b>March/April Half Term 4</b>	<b>7.3 Biodiversity and the Effect of Human Interaction on Ecosystems</b>	
	Define biodiversity.	
	State the benefit of ensuring a great biodiversity.	
	Explain how human activities are reducing biodiversity.	
	Understand that rapid growth in the human population and an increase in the standard of living mean that increasingly more resources are used and more waste is produced. Unless waste and chemical materials are properly handled, more pollution will be caused.	
	Explain how pollution can occur on land, in air and in water.	
	State how humans reduce the amount of land available for other animals.	
	Explain the destruction of peat bogs.	
	State why large-scale deforestation in tropical areas has occurred.	
	List the consequences of deforestation.	
	Describe global warming.	
	State the biological consequences of global warming.	
	Explain how humans are trying to reduce these negative effects.	
	<b>7.4 Trophic Levels in an Ecosystem</b>	
	List the trophic levels.	
	State the role of decomposers.	
	Construct a pyramid of biomass.	
	Explain how the loss of biomass at each trophic level affects the number of organisms at each level.	
	Recall that only approximately 10% of the biomass from each trophic level is transferred to the level above it.	
	State reason for losses of biomass.	
	<b>7.5 Food Production</b>	
	List some factors affecting food security.	
	Explain 'factory farming' to restrict energy transfer from food animals to the environment.	
Explain sustainable fishing security.		
Understand that modern biotechnology techniques enable large quantities of microorganisms to be cultured in industrially controlled vats for food.		
State that the fungus <i>Fusarium</i> is useful for producing mycoprotein.		
Recall that GM bacterium produces human insulin.		
	<b>EASTER HOLIDAY</b>	
<b>Key Skills This Year</b>	Selecting appropriate techniques, apparatus, and materials for fieldwork and for experiments	
	Applying a knowledge of sampling techniques to ensure any samples collected are representative	
	Appreciating how scientific methods and theories develop over time	
	Interacting with scientific research - case studies	
	Evaluating human impacts on the environment, and causes and effects of climate change	