

Subject Vision

The study of Biology plays a key role in ensuring our young people leave school being able to confidently lead healthy, purposeful lives and make rational, sound and well-informed decisions about their own health and bodies as well as the world around them. Biology is necessary for students so that they can engage with conclusions and developments presented to them through media and in their workplace, evaluate their validity and importance and base their beliefs and thinking around a sound understanding and appreciation of the subject. The study of Biology should develop analytical skills that make students valuable members of society, willing to ask challenging questions of the systems around them and of themselves.

End Points: by the end of year 11 students will

EP1. Demonstrate a deep understanding of science and how it relates to the world around us.

EP2. Conduct practical science safely and accurately

EP3. Visualise physical, chemical and biological processes

EP4. Solve problems, communicate ideas, Enquire and Analyse information

EP5. Numeracy and manipulation of mathematical equations

Subject Domains of Knowledge

- D1. Cells
- D2. Organisation
- D3. Disease and Pathogens
- D4. Homeostasis
- D5. Genetics
- D6. Bioenergetics
- D7. Biodiversity
- D8. How Science works

Subject Key Concepts

- C1. Cell structure and function
- C2. Cell transportation
- C3. Cell division

- C4. Levels of organisation
- C5. Human systems structure and function
- C6. Enzymes
- C7. Plant transport systems

- C8. Communicable and non-communicable disease
- C9. Acquired and innate immunity

- C10. Drug development and resistance
- C11. Plant disease

- C12. Nervous system
- C13. Endocrine system
- C14. Negative feedback
- C15. Thermo, osmo and glucose regulation
- C16. Promoting and inhibiting fertility

- C17. Genetic and inherited variation
- C18. Patterns of inheritance
- C19. Evolution, adaptation and classification

- C20. Photosynthesis
- C21. Respiration
- C22. Metabolism

- C23. Ecosystems and interdependence
- C24. Climate change
- C25. The role of decay
- C26. Feeding relationships
- C27. Food production

- C28. Microscopy
- C29. Accurate collection of data, recording and analysis
- C.30 Interpretation of numerical and graphical data
- C.31 General numeracy

Units	Genes 2	
Unit Section	Evolution	Inheritance
Unit overview	In this unit students will learn about the theory of Natural Selection and how this gives rise to evolution of species. Students will also learn about the importance of biodiversity and the need to live sustainably in order to preserve this.	In this unit students will learn about the organisation of the human genetic material and how patterns of inheritance can explain the similarities and differences between parents and offspring. Students will also learn about the implications of genetic mutations.
Lesson Sequence	<ol style="list-style-type: none"> Competition – in this lesson students will learn how and why living things compete for resources Natural Selection - in this lesson students will learn the stages of natural selection leading to evolution of species Evolution in action - in this lesson students will learn about the evidence supporting the theory of evolution Biodiversity – in this lesson students will learn about the importance of biodiversity and some of the current threats to biodiversity on Earth Seed banks – in this lesson students will learn about the importance of seed banks in securing future biodiversity 	<ol style="list-style-type: none"> The magic of DNA – in this lesson students will learn definitions for the key terms of inheritance Chromosomes – in this lesson students will learn what chromosomes are and how they fit into the organisation of genetic material Genetic variation – in this lesson students will learn how to interpret genetic diagrams of patterns of inheritance Inherited disorders – in this lesson students will learn about some inherited genetic disorders Genetic engineering – in this lesson students will learn about the process of genetic modification and some advantages and disadvantages of the process.
Key Domains and Concepts taught in this Unit / Term	D5. Genetics D6. Bioenergetics D7. Biodiversity D8. How Science works C17. Genetic and inherited variation C18. Patterns of inheritance C19. Evolution, adaptation and classification	D1. Cells D2. Organisation D3. Disease D5. Genetics D6. Bioenergetics D7. Biodiversity D8. How Science works

	<p>C20. Photosynthesis C21. Respiration C23. Ecosystems and interdependence C24. Climate change C26. Feeding relationships C29. Accurate collection of data, recording and analysis C.30 Interpretation of numerical and graphical data C.31 General numeracy</p>	<p>C1. Cell structure and function C3. Cell division C4. Levels of organisation C8. Communicable and non-communicable disease C10. Drug development and resistance C11. Plant disease C16. Promoting and inhibiting fertility C17. Genetic and inherited variation C18. Patterns of inheritance C26. Feeding relationships C27. Food production C28. Microscopy C29. Accurate collection of data, recording and analysis C.30 Interpretation of numerical and graphical data C.31 General numeracy</p>
KS4 End Points	<p>EP1. Demonstrate a deep understanding of science and how it relates to the world around us. EP3. Visualise physical, chemical and biological processes EP4. Solve problems, communicate ideas, Enquire and Analyse information</p>	<p>EP1. Demonstrate a deep understanding of science and how it relates to the world around us. EP3. Visualise physical, chemical and biological processes EP4. Solve problems, communicate ideas, Enquire and Analyse information EP5. Numeracy and manipulation of mathematical equations</p>
Declarative Knowledge (Students should know)	<p>Natural selection is a theory that explains how species evolve and why extinction occurs.</p> <p>Biodiversity is vital to maintaining populations. Within a species variation helps against environment changes, avoiding extinction.</p>	<p>Inherited characteristics are the result of genetic information, in the form of sections of DNA called genes, being transferred from parents to offspring during reproduction.</p> <p>Chromosomes are long pieces of DNA which contain many genes. Gametes, carrying half the total number of chromosomes of each parent, combine during fertilisation.</p>

	<p>Within an ecosystem, having many different species ensures resources are available for other populations, like humans</p>	<p>Facts The DNA of every individual is different, except for identical twins. There is more than one version of each gene eg different blood groups. Use a diagram to show the relationship between DNA, chromosomes and genes. Use a diagram to show how genes are inherited.</p>
<p>Procedural Knowledge (Students should be able to do)</p>	<p>Use evidence to explain why a species has become extinct or adapted to changing conditions. Evaluate whether evidence for a species changing over time supports natural selection. Explain how a lack of biodiversity can affect an ecosystem. Describe how preserving biodiversity can provide useful products and services for humans Predict and explain the changes in a population over time due to natural selection. Suggest an explanation, based on data, for how a particular evolutionary change occurred. Evaluate ways of preserving plant or animal material for future generations</p>	<p>Explain how a change in the DNA (mutation) may affect an organism and its future offspring. Explain why offspring from the same parents look similar but are not usually identical. Suggest arguments for and against genetic modification. Suggest benefits from scientists knowing all the genes in the human genome. Determine how the number of chromosomes changes during cell division, production of sex cells and fertilisation. Find out why scientists Watson, Crick and Franklin were so important.</p>
<p>Developing T3 Literacy and Numeracy</p>	<p>Keywords Population: Group of organisms of the same kind living in the same place. Natural selection: Process by which species change over time in response to environmental changes and competition for resources. Extinct: When no more individuals of a species remain. Biodiversity: The variety of living things. It is measured as the differences between individuals of</p>	<p>Keywords Inherited characteristics: Features that are passed from parents to their offspring. DNA: A molecule found in the nucleus of cells that contains genetic information. Chromosomes: Thread-like structures containing tightly coiled DNA. Gene: A section of DNA that determines an inherited characteristic.</p>

	<p>the same species, or the number of different species in an ecosystem.</p> <p>Competition: When two or more living things struggle against each other to get the same resource.</p> <p>Evolution: Theory that the animal and plant species living today descended from species that existed in the past</p>	
Assessment (Summative and Formative)	<p>Formative – questioning in class, live marking and MS Forms online homework</p> <p>Summative – End of unit test</p>	<p>Formative – questioning in class, live marking and MS Forms online homework</p> <p>Summative – End of unit test</p>
Links to Prior Learning	In Year 7, students learn about interdependence between organisms	In Year 7 students have learned about cell structure and where the genetic material is stored
Next steps in learning	At GCSE students learn about different aspects of ecology and interdependence	At GCSE students learn about patterns of inheritance and inherited genetic disorders
Common Barriers to learning in this unit	Students religious beliefs may be in contrast to the concepts taught	Sensitivity needs to be applied during discussion of inherited disorders

Units / Term	Organisms	
Unit Sections	Breathing	Digestion

Unit overview	In this unit students will learn about how the body is adapted to allow for efficient gas exchange in the lungs and which lifestyle and health factors may affect this. Students will also learn about the differences between aerobic and anaerobic respiration	In this unit students will learn about the importance of a healthy balanced diet and the processes that occur in our body to digest the large food molecules into smaller, soluble ones
Lesson sequence	<ol style="list-style-type: none"> Gas exchange – in this lesson students will learn about the main structures of the human respiratory system 2 / 3. Are height and lung volume linked? - in this lesson students will learn how to collect valid data and analyse it using numerical and graphical methods 4. How does exercise affect breathing rate? - in this lesson students will learn how to collect valid data and analyse it using numerical and graphical methods then construct a conclusion linked to prior learning 5. How does lung disease affect the rest of the body? - in this lesson students will learn about how lung disease can impact on overall health 	<ol style="list-style-type: none"> What is a healthy diet? - in this lesson students will learn about the components of a healthy balanced diet How can an unbalanced diet be unhealthy? - in this lesson students will learn about the lifestyle diseases that an unbalanced diet can lead to The digestive system - in this lesson students will learn about the components of the digestive system and their role in the digestion of food Enzymes and bacteria in digestion - in this lesson students will learn about the role of bacteria and enzymes in the chemical digestion of food Plant nutrition - in this lesson students will learn about the need for different minerals along with the products of photosynthesis to promote healthy plant growth Food tests - in this lesson students will learn how to test for protein, fat, sugar and starch in a range of foods.
Key Domains and Concepts taught in this Unit / Term	<ul style="list-style-type: none"> D1. Cells D2. Organisation D3. Disease and Pathogens D4. Homeostasis D6. Bioenergetics C1. Cell structure and function C2. Cell transportation C4. Levels of organisation C5. Human systems structure and function 	<ul style="list-style-type: none"> D1. Cells D2. Organisation D3. Disease and Pathogens D4. Homeostasis C1. Cell structure and function C2. Cell transportation C4. Levels of organisation C5. Human systems structure and function C6. Enzymes

	<p>C21. Respiration C29. Accurate collection of data, recording and analysis C.30 Interpretation of numerical and graphical data C.31 General numeracy</p>	<p>C22. Metabolism C27. Food production C29. Accurate collection of data, recording and analysis</p>
KS4 End Points	<p><u>End Points: by the end of year 8 students will:</u></p> <p>EP1. Demonstrate a deep understanding of science and how it relates to the world around us. EP2. Conduct practical science safely and accurately EP3. Visualise physical, chemical and biological processes EP4. Solve problems, communicate ideas, Enquire and Analyse information EP5. Numeracy and manipulation of mathematical equations</p>	<p><u>End Points: by the end of year 11 students will</u></p> <p>EP1. Demonstrate a deep understanding of science and how it relates to the world around us. EP2. Conduct practical science safely and accurately EP3. Visualise physical, chemical and biological processes EP4. Solve problems, communicate ideas, Enquire and Analyse information</p>
Declarative Knowledge (Students should know)	<p>In gas exchange, oxygen and carbon dioxide move between alveoli and the blood.</p> <p>Oxygen is transported to cells for aerobic respiration and carbon dioxide, a waste product of respiration, is removed from the body.</p> <p>Breathing occurs through the action of muscles in the ribcage and diaphragm.</p> <p>The amount of oxygen required by body cells determines the rate of breathing.</p>	<p>The body needs a balanced diet with carbohydrates, lipids, proteins, vitamins, minerals, dietary fibre and water, for its cells' energy, growth and maintenance.</p> <p>Organs of the digestive system are adapted to break large food molecules into small ones which can travel in the blood to cells and are used for life processes.</p> <p>Iron is a mineral important for red blood cells.</p> <p>Calcium is a mineral needed for strong teeth and bones.</p> <p>Vitamins and minerals are needed in small amounts to keep the body healthy.</p>



SOUTH DOWNS

LEARNING TRUST

Biology Year 8

<p>Procedural Knowledge (Students should be able to do)</p>	<p>Explain how exercise, smoking and asthma affect the gas exchange system.</p> <p>Explain how the parts of the gas exchange system are adapted to their function.</p> <p>Explain observations about changes to breathing rate and volume.</p> <p>Explain how changes in volume and pressure inside the chest move gases in and out of the lungs.</p> <p>Observe the effects of exercise on heart rate and breathing rate.</p> <p>Calculate lung capacity.</p> <p>EXTEND - Evaluate a possible treatment for a lung disease.</p> <p>EXTEND - Predict how a change in the gas exchange system could affect other processes in the body.</p> <p>EXTEND - Evaluate a model for showing the mechanism of breathing.</p>	<p>Describe possible health effects of unbalanced diets from data provided.</p> <p>Calculate food requirements for a healthy diet, using information provided.</p> <p>Describe how organs and tissues involved in digestion are adapted for their role.</p> <p>Describe the events that take place in order to turn a meal into simple food molecules inside a cell.</p> <p>Test foods for the presence of starch, glucose, protein and fat</p> <p>EXTEND - Design a diet for a person with specific dietary needs.</p> <p>EXTEND - Critique claims for a food product or diet by analysing nutritional information.</p> <p>EXTEND - Make deductions from medical symptoms showing problems with the digestive system.</p>
<p>Developing T3 Literacy and Numeracy</p>	<p><u>Use the following Keywords correctly:</u></p> <p>Breathing: The movement of air in and out of the lungs.</p> <p>Trachea (windpipe): Carries air from the mouth and nose to the lungs.</p>	<p><u>Use the following Keywords correctly:</u></p> <p>Enzymes: Substances that speed up the chemical reactions of digestion.</p>

	<p>Bronchi: Two tubes which carry air to the lungs.</p> <p>Bronchioles: Small tubes in the lung.</p> <p>Alveoli: Small air sacs found at the end of each bronchiole.</p> <p>Ribs: Bones which surround the lungs to form the ribcage.</p> <p>Diaphragm: A sheet of muscle found underneath the lungs.</p> <p>Lung volume: Measure of the amount of air breathed in or out</p> <p><u>Numeracy:</u></p> <p>Calculate lung capacity</p>	<p>Dietary fibre: Parts of plants that cannot be digested, which helps the body eliminate waste.</p> <p>Carbohydrates: The body's main source of energy. There are two types: simple (sugars) and complex (starch).</p> <p>Lipids (fats and oils): A source of energy. Found in butter, milk, eggs, nuts.</p> <p>Protein: Nutrient your body uses to build new tissue for growth and repair. Sources are meat, fish, eggs, dairy products, beans, nuts, and seeds.</p> <p>Stomach: A sac where food is mixed with acidic juices to start the digestion of protein and kill microorganisms.</p> <p>Small intestine: Upper part of the intestine where digestion is completed, and nutrients are absorbed by the blood.</p> <p>Large intestine: Lower part of the intestine from which water is absorbed and where faeces are formed.</p> <p>Gut bacteria: Microorganisms that naturally live in the intestine and help food break down.</p>
<p>Assessment (Summative and Formative)</p>	<p>Formative – questioning in class, live marking and MS Forms online homework</p> <p>Summative – End of unit test</p>	<p>Formative – questioning in class, live marking and MS Forms online homework</p> <p>Summative – End of unit test</p>

Links to Prior Learning	Students have learned about the process of diffusion and red blood cells as a specialised cell	Students have learned about the organisation of organisms based on cells, tissues and organs
Next steps in learning	At GCSE students learn in greater detail about the respiratory and circulatory system	At GCSE students learn in greater detail about the digestive system
Common Barriers to learning in this unit	Sensitivity needs to be applied during discussion of lung disorders	Sensitivity needs to be applied during discussion of lifestyle diseases linked to unhealthy diet