

Subject: Biology	Year 8	Ability : Mixed
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Topic	Breathing	Digestion	Respiration 2	Photosynthesis 2	Plant Reproduction	Evolution	Inheritance
<p>Topic overview</p> <p>Students will learn...</p>	<p>How oxygen is brought into the body and subsequently moves into cells, and how carbon dioxide is removed.</p> <p>To investigate a link between height and lung volume.</p> <p>To evaluate the effects of health and disease on lung function.</p>	<p>That the body needs a balanced diet to maintain a healthy life.</p> <p>How the organs of the digestive system work together to break down and then absorb useful nutrients from food.</p> <p>To calculate food requirements for different people using information provided.</p>	<p>To use word equations to describe anaerobic respiration.</p> <p>To explain how specific activities involve aerobic or anaerobic respiration.</p>	<p>Describe ways in which plants obtain resources for photosynthesis.</p> <p>Explain why other organisms are dependent on photosynthesis.</p>	<p>Describe the main steps that take place when a plant reproduces successfully.</p> <p>Identify parts of the flower and link their structure to their function.</p>	<p>Natural selection is a theory that explains how species evolve and why extinction occurs.</p> <p>Biodiversity is vital to maintaining populations.</p>	<p>To understand the inherited characteristics are the result of genetic information (genes) being transferred from parents to offspring during reproduction.</p> <p>Chromosomes are long piece of DNA which may contain many genes. Gametes, carrying half the number of chromosomes of each parent, combine during fertilisation.</p>
<p>What Golden Knowledge will pupils learn and remember?</p>	<p>Students will be able to label the organs involved in breathing to be able to describe the pathway of air into and out of the lungs.</p> <p>Student will know which gases are needed and wasted by the body to be able to explain how cells carry out respiration.</p> <p>Students will be able to describe diffusion in order to be able to explain how gases move into and out of the body cells</p> <p>Students will investigate how muscles work to pull air into and out of the lungs in order to be able to explain how lung volume can be increased during exercise.</p> <p>Students will link the movement of air into and out of the lungs to the pressure within the chest cavity in order</p>	<p>Students will learn the main food groups and their uses they will understand what a balanced diet is and why it is needed so that they can make recommendations on food choices including, for the most able, where dietary changes can be designed to meet the needs of different people.</p> <p>Students will be able to predict the possible effects of an unbalanced diet from data provided in order to recognise the consequences of imbalances, including obesity, starvation and deficiency diseases</p> <p>Students will learn how to test for the main food groups in order to be able to identify the main food groups in a substance.</p> <p>Students will learn the pathway of food through the digestive</p>	<p>Students will learn to address the misconception that breathing and respiration are the same so that they can distinguish between the two.</p> <p>Students will learn the meaning of 'anaerobic' in the context of respiration and understand that anaerobic respiration provides less energy than aerobic respiration so that they can compare the two processes.</p> <p>Students will learn that the air we inhale is composed differently to the air we exhale in order to understand the reactants and products of a chemical reaction.</p>	<p>Students will know that plants and algae do not eat, but use energy from light, carbon dioxide and water in order to make the glucose required for respiration.</p> <p>Students will learn that glucose produced in photosynthesis is either used to build new tissue, or stored to be used later, in order to describe growth.</p> <p>Students will learn that plants have specially-adapted cells that allow them to obtain the resources needed for photosynthesis in order to explain the structure of a leaf.</p> <p>Students will learn how to test for the presence of starch so that they can</p>	<p>Students will learn how to identify and give the function of the different parts of a flower in order to be able to describe pollination.</p> <p>Students will learn how a plant is fertilised in order to describe how a new plant is made.</p> <p>Students will learn the processes involved in germination in order to describe how a plant grows and develops into an adult plant.</p> <p>Students will learn, and use models to represent, methods of seed and fruit formation and seed dispersal in order to explain the features of different seeds.</p>	<p>Students will learn the process of natural selection and survival of the fittest so that they can add depth to their understanding of evolution.</p> <p>Students will learn to apply their knowledge of variation within a species variation so that they can explain how variation helps protect a species against environment changes, avoiding extinction.</p> <p>Students will learn biodiversity across an ecosystem ensures resources are available for other populations so that they can understand the effect of this on humans and conversely how a lack of biodiversity can affect an ecosystem in order to assess biodiversity preservation.</p> <p>Students can describe how environmental changes can affect adaptations so that they are able</p>	<p>Students can use a diagram to show the relationship between DNA, chromosomes and genes in order to understand hierarchy</p> <p>Students will describe and use diagrams to explain how genes are transferred from parents to their offspring during reproduction in order to explain how inherited characteristics are obtained.</p> <p>Students can describe the structure and number of chromosomes in order to link this to link this to mutations and genetic diseases.</p> <p>Students can explain how a change in DNA may cause mutations in order to describe the affects of mutations on organisms and future offspring</p> <p>Students can link their prior knowledge of specialised sex cells to describe gametes in order to explain how chromosome combine during fertilisation.</p>

<p>to be able to explain how air moves in and out.</p> <p>Students will link the energy demands of the body to oxygen need to be able to explain why breathing rate and lung volume change during exercise</p> <p>Students will investigate the effects of exercise on breathing rate and volume in order to be able to describe how these change, linking it to oxygen demand.</p> <p>Students will investigate the effects of asthma on lung capacity in order to understand why this is a condition that must be fully controlled.</p> <p>Students will investigate different lung conditions such as COPD to be able to evaluate methods of treating them</p> <p>Students will carry out observations into breathing rate and volume in order to be able to evaluate a claim that height is linked to lung volume.</p> <p>Students will develop a model for breathing in order to demonstrate how this occurs and then evaluate the effectiveness of the model.</p> <p>Students will compare gas exchange in humans to that in plants in order to be able to understand the role of stomata in plant gas exchange</p>	<p>system in order to understand how the key organs work together to carry out digestion.</p> <p>Students will be able to investigate a model of the digestive system in order to be able to understand how the different organs work together.</p> <p>Students will know that enzymes are released into the digestive system in order to be able to explain how the large molecules are broken down enough to be absorbed into the blood stream.</p> <p>Students will be able to describe how the organs involved in digestion are adapted in order to be able to understand how they carry out their role effectively.</p> <p>Students will be able to explain how the important nutrients reach the cells in order to be able to link this with respiration and growth and maintenance.</p> <p>Students will investigate the presence of bacteria in the gut in order to be able to explain why healthy gut bacteria is so important.</p> <p>Students will be able to investigate the energy released from different foods in order to be able to make comparisons and recommendations.</p> <p>Students will be able to evaluate the claims made for certain foods in order to be able to critique them according to their nutritional value</p> <p>Students will be able to assess different medical conditions in order to be able to suggest</p>	<p>Students will learn that most living things use aerobic respiration but switch to anaerobic respiration, which provides less energy, when oxygen is unavailable.</p> <p>Students will gain knowledge of anaerobic respiration by yeast so that they can explain the use of fermentation in the food and drink industry.</p>	<p>investigate the rate of photosynthesis in plants.</p>	<p>Students will learn the importance of seed dispersal to the parent plant in order to know the importance of survival within a species to maintain biodiversity.</p>	<p>to link this to why extinction occurs.</p> <p>Students can define biodiversity and how it can be preserved in order to explain its importance to interdependence and link this to human resources (products and services).</p>	
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What prior knowledge should pupils already know?	<p>Students should be able to name the main body organs and link these to their role in keeping us alive</p> <p>Students will be able to explain why multicellular organisms need organ systems to keep their cells alive</p> <p>Students will have planned and carried out investigations into the way the body works, they can collect and record data to come to a simple conclusion</p> <p>Students will have an understanding of how health can be affected if our body organs become harmed and will have investigated how some conditions affect multiple organs adversely.</p> <p>Students will have designed and built models for body systems and can explain why the model is effective or not</p>	<p>Students should be able to name the main organs involved in digestion and the path food takes through these. (Biology, Yr 7, Movement)</p> <p>Students will be aware that cells are specialised to be able to carry out particular functions. (Biology, Yr 7, Cells)</p> <p>Students will have designed and built models for body systems and can explain why the model is effective or not</p> <p>Students will know that energy is released during cellular respiration and that the blood carries the needed substances to the cells (Biology, Yr 7, Respiration I, Y8, Breathing)</p>	<p>Students will know what aerobic respiration is, where it takes place and be able to represent it with the word equation (Biology, Yr 7, Respiration)</p> <p>Students will know how and why we breathe (Biology, Yr 8, Breathing)</p>	<p>This unit builds on unit 7D 'Variation and classification' and unit 7C 'Environment and feeding relationships'.</p> <p>It relates to unit 7I 'Energy resources', unit 8A 'Food and digestion', unit 8B 'Respiration', unit 8D 'Ecological relationships', unit 8F 'Compounds and mixtures', unit 9G 'Environmental chemistry' and unit 9H 'Using chemistry'.</p> <p>Students will know that plants need water, sunlight and carbon dioxide in order to grow and stay healthy.</p> <p>Students will know how to do a basic word equation for respiration</p>	<p>It builds on unit 5B 'Life cycles' in the key stage 2 scheme of work and on unit 7A 'Cells'. This unit relates to:</p> <ul style="list-style-type: none"> sex education <p>Students should know the basic parts of a plant and flower and should be able to identify these parts. Students should be able to name some flowering plants.</p> <p>Students should know that reproduction needs to occur in order to make a new organism.</p> <p>Students should have observed a seed and bulb growing into a mature plant.</p> <p>Students should have knowledge that plants need water, light and warmth to grow into a healthy plant.</p>	<p>Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago (KS2 NC, Evolution and inheritance)</p> <p>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. (KS2 NC, Evolution and inheritance)</p>	<p>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</p>
What skills will pupils learn and apply? (disciplinary knowledge)	<p>Describe the gas exchange system and know which gases are needed by cells and which released as waste in order to understand the more detailed explanations of aerobic and anaerobic respiration.</p> <p>Students will develop their skills in planning and carrying out an investigation to collect reliable data to justify a hypothesis.</p> <p>Students will practice designing and evaluating a model in order to be able to explain</p>	<p>Explain how these organs are adapted to allow for the efficient breakdown and absorption of nutrients so the need for specialisation is understood</p> <p>Design and evaluate a model in order to be able to explain complex process that cannot be directly seen.</p>	<p>Know what the reactants and products of a reaction are in order to be able to write word equations for chemical reactions.</p> <p>Students will know the word equations for aerobic and anaerobic respiration in humans and yeast, these equations will form the foundations of the bioenergetics topic in KS4.</p>	<p>Students will know that photosynthesis is how a plant makes its own food, therefore making them producers in food chains.</p> <p>Students will know that plants use energy from light, carbon dioxide and water so they can describe the law of conservation of energy.</p> <p>Students will know what is required for photosynthesis, so will be able to describe adaptation</p>	<p>Investigate the structure of a flower to be able to identify the different structures, gaining skills that can be used in other dissections.</p> <p>Know how to construct scientific diagrams in order to use diagrams across all aspects of science.</p> <p>Students will be able to describe the processes involved in fertilising a flower in order to describe how a new organism is</p>	<p>Students will be able to use evidence to explain why a species has become extinct or adapted to changing conditions.</p> <p>Students will be able to evaluate whether the evidence for a species changing over time supports the theory of natural selection.</p> <p>Students will be able to evaluate data to explain how an evolutionary change has occurred.</p>	<p>Students can think critically to suggest arguments for and against genetic modification.</p> <p>Students will be able to develop independent research skills in order to explain the importance of Watson, Crick and Franklin.</p> <p>Students will be able to predict how the number of chromosomes will change during cell division, production of gametes and fertilisation.</p> <p>Students will be able to evaluate the benefits and possible negative of scientists knowing all the genes</p>

	complex process that cannot be directly seen			in plants that enable them to obtain different levels of each resource and how they travel through the plant.	made. This relates to sex education. Students will have an understanding of seed dispersal in order to describe intraspecific competition between other organisms.	Students will be able to make predictions and explain the changes in a population over time	in the human genome and be able to think ethically.
Key vocabulary pupil will know and learn	Breathing Trachea Bronchi Bronchioles Alveoli Diaphragm	Enzymes Fibre Carbohydrate Lipid Protein	Aerobic respiration Anaerobic respiration Fermentation	Fertilisers Photosynthesis Chlorophyll Stomata	Pollen Ovules Pollination Fertilisation Carpel	Population Natural selection Extinct Biodiversity Competition Evolution	Inherited characteristics DNA Chromosomes Gene
How will pupil understanding be checked &/or assessed?	Each school in the Trust follows the same assessment cycle process. All students will complete an informal key piece assessment every half term (at least) which take a variety of formats to assess golden knowledge learnt over the previous lessons. The key piece assessments are either retrieval-based questions to help students retrieve their prior golden knowledge, scientific literacy questions where students have to practice applying their golden knowledge to exam style questions in different contexts or exam style questions using a variety of command words such as describe, explain and evaluate. Students will then complete a short improvement activity based on gaps identified in the informal key piece and teachers will check these to ensure gaps have closed. In addition to these informal key piece assessments, all students complete a formal assessment at least every term which synoptically assess their retention and application of key golden knowledge learnt in Biology, Chemistry and Physics. Teachers will then use the Science Trust QLA tracker to identify gaps in knowledge; reteach accordingly and then students will complete a range of improvement style activities to close those gaps which are then checked by the teacher either through live marking or collection of books. Further details of the Science SHARE Assessment and Feedback policy can be found here: Q of E						
Resources available	<p>Each school has their own shared area for each year group in each key stage. Lessons are planned to follow the SHARE Science lesson structure guidance document which can be found here: SCIENCE SHARE MAT lesson structure guidance.docx</p> <p>In summary:</p> <ol style="list-style-type: none"> 1. First 5/Do Now to retrieve prior learning needed for the foundations of new learning. 2. I do/explicit instruction/guided explanation/teacher input through expert curriculum delivery. 3. We do/modelling where appropriate to show students how to remember and apply the key golden knowledge to different contexts. 4. You do/Independent practice to retrieve and practice applying the key golden knowledge to a variety of contexts. 5. Final 5 to retrieve key golden knowledge learnt in the lesson. <p>All schools have these SHARE Science curriculum plans, delivery plans which sit underneath these to guide staff on when to deliver each section of the curriculum and then schemes of learning and lesson resource folders to adapt in order to meet the unique needs of the students and classes they teach. All shared resources which are common across all schools can be found in the SHARE Science folder here: Home (click on the documents tab at the top of the page)</p> <p>All QA including lesson visits, work scrutiny and student voice will prioritise the SHARE Science Q of E Non-Negotiables Checklist which can be found here: SCIENCE SHARE MAT Non negotiables Q of E QA check list.docx</p> <p>All lesson resources are focussed on retrieval (through the Retrieve to Remember strategy) and practice, and this is built into these curriculum plan through effective sequencing of golden knowledge components.</p> <p>There are also KS3 and KS4 Golden Knowledge booklets for staff which outline the key golden knowledge linked to the exam specifications and National Curriculum at KS3 and KS4. These can be found here: Golden Knowledge</p> <p>If staff can't get access to any of the folders above, please request access through joanna.richards@sharemat.co.uk</p>						
Notes Why this topic is important...	This topic explains how gases move into and out of the body in order to release energy for life. Knowing this will help students understand how	This topic begins to investigate the breakdown of food types into molecules small enough to be absorbed into the blood. This requires students to use their understanding of body	An understanding of the respiration chemical equation will allow students to see the presence of carbon and	An understanding of photosynthesis will lead students to be able to understand how plants compete with each other for limited resources and	This topic introduces students to the concept of fertilisation and the structures of a flower that are involved in fertilisation. This will lead students to	In this topic students will use their recall of the variation topic to apply ideas to evolution.	In this topic students will be able to understand why they look similar to their family but not usually identical.

<p>different organs respond to exercise</p> <p>The topic is the first to differentiate between breathing and respiration and so will ensure there are no misconceptions arising from the use of the everyday words in science.</p> <p>An understanding of the importance of the rapid movement of gases into and out of the body will help students explain how other organs such as the heart respond during exercise or stress.</p> <p>Knowledge of how asthma affects breathing will allow students to explain the importance of maintaining healthy lungs and monitoring such lifelong conditions carefully</p> <p>Investigating how to measure changes in the human body will allow students to develop an ethical approach to study and an understanding of how to work safely with a subject, taking into account other factors that might influence a person</p>	<p>systems and then focus on the detail at cellular level.</p> <p>This is the first introduction to enzymes and allows students to appreciate the chemical nature of digestion as well as the physical processes they should already be aware of</p> <p>Using tests to identify chemical substances builds the scientific skills of students and will allow them to understand more of the action of scientists in the real world</p> <p>Focussing on the action of structures such as villi in the small intestine will develop the students understanding of the need for specialisation of cells and organs.</p> <p>Whilst this topic doesn't investigate the processes of diffusion and osmosis, and understanding of the movement of nutrient molecules into the blood and then into cells will link to these ideas in both further biology and chemistry units</p> <p>Investigating the effects of an unbalanced diet will allow students to make healthy lifestyle choices themselves as well as make recommendations for other specific groups of people.</p>	<p>then link that with the carbon cycle.</p> <p>An understanding of aerobic respiration will lead students to learning about anaerobic respiration and the benefits and drawbacks of each type. Students will also learn where anaerobic respiration is used in different organisms.</p> <p>Students' knowledge on the composition of the air will lead students to understand the history of the Earth's atmosphere and how it has changed from the Earth's early atmosphere to today's atmosphere.</p>	<p>how plants have adapted in order to out compete other plants, as well as ensure that their offspring survive too.</p> <p>An understanding of the photosynthesis chemical equation will allow students to see the presence of carbon and then link that with the carbon cycle.</p> <p>Students' knowledge of how plants make their own food will enable students to understand the role of plants in food webs/chains and will lead students to understand how living organisms are interdependent on each other within a habitat.</p> <p>Students' knowledge of the photosynthesis chemical equation will help students understand how and why chemical equations need to be balanced.</p>	<p>understand sexual reproduction in both plants and animal and understand that both male and female sex cells are required.</p> <p>Knowledge of reproduction will help students understand cell division and how an organism develops after fertilisation.</p> <p>Students' knowledge of fertilisation can be used with growing crops and the importance of insect pollinators to global food supply.</p> <p>Researching methods of seed dispersal students will gain skills on information gathering and analysing key information in order to present information in a succinct manner.</p>	<p>Students will think critically about evidence for evolution or what has led to an extinction.</p> <p>This topic will also allow students to analyse data about extinction and draw conclusions.</p> <p>Students will link their prior knowledge of biodiversity and ecosystems to allow them to describe how a lack of biodiversity can lead to extinction.</p>	<p>Students will be able to link how a mutation may affect an organism and lead to variation within a species.</p> <p>Students will understand how genetic diseases can be passed through families which links to SMSC.</p>
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