

Science Unit Overview Year 7

The National Curriculum that should be covered in primary school is recorded below.

Prior knowledge is always assessed before a topic is started so the teacher can plan accordingly. This is done by using questioning, quick quizzes, group activities and low stakes testing. End of topic tests will give a clear indication of knowledge that still needs to be embedded and then targeted tasks will be issued to students as and when required. Homework will occasionally be based on previous topics and not current topics, so that additional judgements can be made on student's progress.

Science lends itself to interleaved learning (a process where students mix, or interleave, multiple subjects or topics while they study in order to improve their learning) and many concepts and topics are often naturally revisited in our Science learning journey.

Key concepts & knowledge from Key Stage 2

Biology

Living things and their habitats Year 5

Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird

Describe the life process of reproduction in some plants and animals

Living things and their habitats Year 6

Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals.

Give reasons for classifying plants and animals based on specific characteristics

Animals including humans Year 5

Describe the changes as humans develop to old age. **Animals**

including humans Year 6

Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.

Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function

Describe the ways in which nutrients and water are transported within animals, including humans

Evolution and Inheritance Year 6

Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago

Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents

Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution.

Chemistry

Properties & Changes in Materials Year 5

Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets

Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution

Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating

Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic Demonstrate that dissolving, mixing and changes of state are reversible changes

Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda

Physics

Earth & Space Year 5

Describe the movement of the Earth and other planets relative to the sun in the solar system. Describe the movement of the moon relative to the Earth. Describe the sun, Earth and moon as approximately spherical bodies. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky

Forces Year 5

Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object. Identify the effects of air resistance, water resistance and friction, that act between moving surfaces. Recognise that some mechanisms including levers, pulleys and gears allow a smaller force to have a greater effect

Light Year 6

Recognise that light appears to travel in straight lines. Use the idea that light travels in straight lines to explain that objects are seen because they give out or reflect light into the eye. Explain that we see things because light travels from light sources to our eyes or from light sources to objects and then to our eyes

Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

Electricity Year 6

Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. Use recognised symbols when representing a simple circuit in a diagram.

Science - Year 7 Unit 7A Cells. Tissues, Organs and Systems

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Life processes</p> <p>Organs</p> <p>Tissues</p> <p>Microscopes</p> <p>Cells</p> <p>Organ systems</p>	<p>Knowledge: Define what is living or non-living (recall from KS2). Describe structure and function of plant and animal cells, tissues and organs and organ systems, how to set up and use a light microscope and the mechanisms behind the transplantation of organs in humans.</p> <p>Understanding: identify and name the features of cells and describe some differences between plant and animal cells. Set up a simple light microscope, prepare slides and make observations using a microscope and record in simple drawings. Describe how cells are grouped to form tissues. Recognise that all organisms are made from cells and name some parts of a cell. Describe how some cells in an organism are specialised to carry out particular functions.</p> <p>Skills: Learn how scientists look at evidence from which to draw conclusions (7Aa). Develop communication skills, with a focus on using conventions in some different forms of writing and writing lists (7Ab). Develop practical skills, which covers using a microscope. It also introduces various skills involved with making slides for microscopic examination (7Ac)</p> <p>Literacy & Communication skills: Use conventions in writing (such as ordered subheadings, ordered lists).</p>	<p>Knowing cells as the fundamental unit of living organisms, including how to observe, interpret and record cell structure using a light microscope, the functions of the cell wall, cell membrane, cytoplasm, nucleus, vacuole, mitochondria and chloroplasts, the similarities and differences between plant and animal cells, the hierarchical organisation of multicellular organisms: from cells to tissues to organs to systems to organisms.</p> <p>Working Scientifically Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety (using a light microscope and preparing light microscope slides).</p>	<p>From KS2 most students will be able to: Identify and describe the functions of different parts of flowering plants: roots, stem, leaves and flowers (Year 3) Describe the simple functions of the basic parts of the digestive system in humans (Year 4) Describe the life cycles common to a variety of animals, including humans (birth, growth, development, reproduction and death), and to a variety of plants (growth, reproduction and death) (Year 5) Identify and name the main parts of the human circulatory system, and explain the functions of the heart, blood vessels and blood (including the pulse and clotting) (Year 5) Describe the life process of reproduction in some plants and animals (Year 6) Use results from experiments as evidence (Years 5 and 6).</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7B – Sexual Reproduction in Animals

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Animal sexual reproduction</p> <p>Reproductive organs</p> <p>Becoming pregnant</p> <p>Gestation and birth</p> <p>Growing up</p>	<p>Knowledge: Explain breeding programmes in zoos. Describe the structure and function of humans, reproductive organs and gametes, sexual reproduction, fertilisation and inheritance of characteristics, pregnancy (foetus and placenta), gestation and birth. Puberty and Adolescence.</p> <p>Understanding: Understand the process of sexual reproduction and the concept of gametes and fertilisation. Describe how sexual intercourse leads to the formation of an embryo and implantation in the uterus lining. Describe development of the embryo during gestation and birth, Recognise the stages of maturing during puberty. How breeding programmes work in zoos, successes and difficulties</p> <p>Skills: Develop the idea of the scientific method (7Ba) Learn how to make notes, looks at IVF, with a specific focus on different ways of taking and organising notes from long pieces of text. (7Bc)</p> <p>Literacy & Communication skills: making effective notes from text, including different ways of organising notes depending on purpose.</p>	<p>Knowing reproduction in humans (as an example of a mammal), including the structure and function of the male and female reproductive systems, menstrual cycle (without details of hormones), gametes, fertilisation, gestation and birth, to include the effect of maternal lifestyle on the foetus through the placenta.</p> <p>Working Scientifically Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience. Make predictions using scientific knowledge and understanding. Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.</p>	<p>Describe the life process of reproduction in some plants and animals (Year 5) Describe the changes as humans develop to old age (Year 5) Understand the concept of the cell (7A) Recall that some cells are specialised (7A).</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7C Muscles and Bone

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Muscles and breathing</p> <p>Muscles and blood</p> <p>The skeleton</p> <p>Muscles and moving</p> <p>Drugs</p>	<p>Knowledge: Human gas exchange system, breathing and ventilation, structure of blood vessels, circulatory system, blood composition, bones and joints, human nervous system, alcohol and drugs</p> <p>Understanding: Why inhaled and exhaled air differ, how muscles are involved in gas exchange, how blood vessel structure is related to function, how a red blood cell is adapted to its function, why locomotor problems occur, how antagonistic muscle pairs contribute to movement, how drugs cause short- and long-term effects.</p> <p>Skills: How to setup and take accurate measurements from laboratory apparatus. How to draw and interpret graphs. How to follow a methodology. How to stay safe in a laboratory environment. How information can be presented in different ways to communicate scientific ideas clearly. This includes understanding sentence construction in order to develop sentences that can be used as part of a fluid writing style that communicates information clearly</p>	<p>Students will be able to explain: the structure and functions of the gas exchange system in humans the mechanism of breathing to move air in and out of the lungs, including simple measurements of lung volume; the structure and functions of the human skeleton, to include support, protection, movement and making blood cells; biomechanics – the interaction between skeleton and muscles, including the measurement of force exerted by different muscles; the function of muscles and examples of antagonistic muscles the impact of exercise on the human gas exchange system; the effects of recreational drugs (including substance misuse) on behaviour, health, and life processes.</p> <p>Working Scientifically Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review; ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience</p>	<p>From KS2 most students will be able to:</p> <p>Identify that human and some other animals have skeletons and muscles for support, protection and movement (Year 3)</p> <p>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood (Year 6).</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science Year 7 Unit 7D Ecosystems.

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Variation</p> <p>Adaptations</p> <p>Effects of the environment</p> <p>Effects on the environment</p> <p>Transfers in Food Chains</p>	<p>Knowledge: What is an ecosystem - (A Community of living organisms interacting with each other and their physical environment.) Types of Habitat. Variation – continuous and discontinuous. Types of adaptations. Environmental changes. Organismal effects on habitats. Persistent pesticide accumulation.</p> <p>Understanding: What are the factors that affect ecosystems? including: What are the differences between organisms? What is continuous and discontinuous variation?</p> <p>How do organisms use adaptations to live in specific environments? How can changes in environment affect the organisms living in a habitat? Including: <i>daily changes</i>; <i>seasonal changes</i>; migration; hibernation; evergreen & deciduous tree; nocturnal animals. What are the resources needed by organisms in a habitat? How do organisms affect their habitats? What are food webs, food chains and pyramids of numbers? How is energy flow affected?</p> <p>Skills: Develop skills in scientific investigation, communication, analysis, comparing and evaluating. Developing confidence in carrying out scientific investigations.</p> <p>Literacy & Communication skills Information can be presented in different ways to communicate scientific ideas clearly. This includes understanding paragraph construction in order to develop logical and fluid text that communicates information clearly.</p> <p>Maths skills: Data can be presented in bar charts; data can be presented in scatter graphs; data can be presented in frequency diagrams.</p>	<p>Know the interdependence of organisms in an ecosystem, including food webs and insect pollinated crops.</p> <p>Know how organisms affect, and are affected by, their environment, including the accumulation of toxic materials.</p> <p>Know differences between species.</p> <p>Know the variation between individuals within a species as being continuous or discontinuous.</p> <p>Know that the variation between species and between individuals of the same species means some organisms compete more successfully, which can drive natural selection.</p> <p>The importance of maintaining biodiversity and the use of gene banks to preserve hereditary material.</p> <p>Working Scientifically: Present observations and data using appropriate methods, including tables and graphs. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.</p>	<p>From KS2 most students will be able to: identify that most living things live in habitats to which they are suited. Describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other; construct and interpret a variety of food chains, identifying producers, predators and prey (Year 4); describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including microorganisms, plants and animals (Year 6). From previous units, most students will be able to: recall that plants need light to make food by photosynthesis (7A); describe how organisms need a male and a female for sexual reproduction (7B); describe how energy is released from food by respiration, which usually needs oxygen from the air and releases carbon dioxide as a waste gas (7A, 7C).</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7E Mixtures & Separation				
What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Mixtures and Separation</p> <p>Solutions</p> <p>Evaporation</p> <p>Chromatography</p> <p>Distillation</p> <p>Safe Drinking Water</p>	<p>Knowledge: How do we provide clean drinking water – desalination. States of matter Types of mixtures and separation methods of sieving and filtration. Suspensions and colloids. Solutions. Hazards, risks and safety in a lab. Evaporation. Introduction of boiling points. Chromatography. Distillation.</p> <p>Understanding: How the solubility of salts is affected by the temperature of the solution? How to manage risks and hazards during a practical? How do we get salt form brine? How do we identify the substances within mixtures?</p> <p>Skills: Develop communication skills in terms of writing a method, both in presenting a clear written text and in the use of apparatus diagrams to convey information clearly.</p> <p>Literacy & Communication skills Use flow charts to present sequences. Appreciate that the way in which scientific ideas are presented is determined by the purpose and format of the communication. Use conventions and symbols when communicating science.</p>	<p>Knowing what a mixture is, including dissolving.</p> <p>Carrying out simple techniques for separating mixtures: filtration, evaporation, distillation, chromatography.</p> <p>Working Scientifically Use appropriate techniques, apparatus, and materials during laboratory work, paying attention to health and safety.</p>	<p>From KS2 most students will: Observe that some materials change state when they are heated or cooled, and measure the temperature at which this happens in degrees Celsius (°C) (Year 4) Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature (Year 4) Understand how some materials dissolve in liquid to form a solution (Year 5) Describe how to recover a substance from a solution (Year 5) Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating (Year 5) Demonstrate that dissolving, mixing and changes of state are reversible changes (Year 5)</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7F Acids & Alkalis

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Hazards</p> <p>Indicators</p> <p>Acidity & Alkalinity</p> <p>Neutralisation</p> <p>Neutralisation in daily life</p>	<p>Knowledge: Chemical reactions, acids, alkalis, indicators, pH scale, neutral, neutralisation, chemical salt</p> <p>Understanding: How do we deal with hazardous chemicals? How can we reduce risks when carrying out experiments? How can we use indicators to classify solutions? How can we measure how acidic or alkaline a solution is? What happens when an acid is added to an alkali? How can we make use of neutralisation? How dangerous are chemicals in the home?</p> <p>Literacy & Communication skills: Identify nouns and noun phrases • identify key points in text, pictures, charts and graphs to create titles • develop titles for text, diagrams, charts and graphs in order to present ideas and opinions clearly.</p> <p>Maths skills: Reading and plotting line graphs Drawing bar charts</p>	<p>Knowing chemical reactions as the rearrangement of atoms.</p> <p>Representing chemical reactions using formulae and using equations.</p> <p>Defining acids and alkalis in terms of neutralisation reactions. Knowing the pH scale is used for measuring acidity/alkalinity; and how indicators play a part in this. Knowing how to react acids with alkalis to produce a salt plus water. Working Scientifically this unit has a focus on evaluating risks.</p>	<p>From KS2 most students will be able to: Recall some examples of reversible and irreversible changes (Year 5) Recall what happens when acids are mixed with bicarbonate of soda (Year 5). If these units have been studied previously, most students will be able to: Describe how a solution is formed from a solute and a solvent (7E) Describe how to obtain soluble solids from a solution (7E)</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7G The Particle Model

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Solid, liquids and gases</p> <p>Particles</p> <p>Brownian Motion</p> <p>Diffusion</p> <p>Air Pressure</p>	<p>Knowledge Recall, identify and describe the three states of matter in shape, volume, compressibility. Recognise that all matter consists of particles. State the meaning of vacuum, particle, diffusion, kinetic theory, gas pressure. Recall some effects of diffusion. Recall some effects of gas pressure.</p> <p>Understanding Describe what the three states of matter are like. Identify a solid, liquid or gas from the arrangement of particles, how those particles move and change movement with changes in temperature. Use the kinetic theory to explain diffusion in liquids and gases and to describe the cause of gas pressure Explain why diffusion is a physical change. Explain how Brownian motion supports the kinetic theory. Describe how the pressure of gases in containers can be increased or decreased.</p> <p>Literacy & Communication skills How scientists use language to measure and compare by applying adjectives, comparatives and superlatives.</p> <p>Maths skills Converting between metres and nanometres Calculating volumes using simple formulae.</p>	<p>Know the properties of the different states of matter in terms of the particle model, including gas pressure</p> <p>Know the similarities and differences, including density differences, between solids, liquids and gases What is Brownian motion in gases and know the differences in arrangements, in motion and in closeness of particles explaining changes of state, shape and density, the anomaly of ice–water transition.</p> <p>Working Scientifically Understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review Make predictions using scientific knowledge and understanding. Present observations and data using appropriate methods, including tables and graphs.</p>	<p>From KS2 most students will be able to: Compare and group materials together, according to whether they are solids, liquids or gases (Year4) Understand that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution (Year 5) Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating (Year 5).</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7H – Atoms, elements and molecules

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>About the air we breathe</p> <p>Earth's elements</p> <p>Metals and non-metals</p> <p>Making compounds</p> <p>Chemical Reactions</p>	<p>Knowledge State: what is meant by: element (recall some uses), atom and a molecule, that all materials are made from atoms, what is meant by an element, a compound, and a mixture. Describe examples of reactions which form compounds from elements, examples of chemical and physical change and examples of changes that can be reversed and those that cannot. Recall the most important gases found in the Earth's atmosphere and their relative amounts. Identify the chemical symbols for some common elements and simple examples – record two-letter symbols correctly. List some typical properties of metals and non-metals and identify them on the periodic table. Identify or name some everyday items that are attracted to a magnet. Recall examples of energy being used to start a chemical reaction and that temperature changes during those reactions. Identify the products and reactants using a word equation. State the meaning of thermal decomposition and describe the ease of thermal decomposition for different metal carbonates. Describe the gas tests for hydrogen, carbon dioxide, chlorine, oxygen.</p> <p>Understanding Explain the difference between an atom and a molecule Explain why a substance is a compound and not a mixture. Name the compound formed by a reaction between two</p>	<p>Know the concept of a pure substance, mixtures, including dissolving, the differences between atoms, elements, and compounds. Know the chemical symbols and formulae for elements, and what thermal decomposition, oxidation and displacement reactions are. Know the varying physical and chemical properties of different elements, the difference between chemical and physical changes. Know atoms and molecules as particles.</p> <p>Working Scientifically Present observations and data using appropriate methods, including tables and graphs Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature.</p> <p>Literacy & Communication skills Use of facts and opinions to inform and persuade.</p> <p>Maths skills Qualitative and quantitative data. The use of tables; line graphs; scatter graphs; pie charts; and bar charts.</p>	<p>From KS2 most students will be able to: Compare and group materials together, according to whether they are solids, liquids or gases (Year 4) Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C) (Year 4) Demonstrate that dissolving, mixing and changes of state are reversible changes (Year 5) Compare and group together everyday materials on the basis of their properties, including their hardness, solubility, transparency, conductivity (electrical and thermal), and response to magnets (Year 5) Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda (Year 5).</p> <p>From previous units, most students will be able to:</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

	<p>elements. Explain why a compound has different properties from its elements Explain how chemical change reactions are different from physical changes. Explain why air is classified as a mixture. Relate the uses of different elements to their properties. Use the periodic table to look up symbols. Describe the evidence needed to decide whether an element is a metal or non-metal and relate the uses of different elements to their properties. Explain why energy input may be needed to start some reactions and what temperature changes indicate. Supply missing reactants or products to complete a word equation. Describe the thermal decomposition of calcium carbonate. Classify reactions as reversible or irreversible.</p>		<p>Identify different kinds of mixtures, including solutions, and describe ways of separating mixtures (7E) Describe the difference between chemical and physical changes (7F) Recognise differences between solids, liquids and gases, in terms of ease of flow and maintenance of shape and volume (7G) Describe the properties of the different states of matter in terms of particle kinetics, including gas pressure and diffusion (7G).</p>	
--	---	--	---	--

Science - Year 7 Unit 7I Energy

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Energy from Food</p> <p>Energy Transfers and Stores</p> <p>Fuels</p> <p>Other Energy Resources</p> <p>Using Resources</p>	<p>Knowledge: Food as source of energy for the body; stores and transfers of energy; conservation of energy; biofuel; formation of fossil fuels; renewable and non-renewable energy sources; the Sun as original source of energy; advantages and disadvantages of energy resources; causes and impacts of climate change; ways to reduce carbon emissions.</p> <p>Understanding: How do our bodies use energy? How can you compare the energy stored in different foods? How is energy stored and moved? Where do fuels come from? How can we summarise information? What other energy resources are available? Which energy resources should we use? How can we use less fossil fuel?</p> <p>Skills: Mathematical skills: using ratios to compare experimental results Literacy and communication skills: use of summarising text for scientific abstracts and general purposes</p>	<p>Comparing energy values of different foods (from labels) (kJ) Comparing amounts of energy transferred (J, kJ, kW hour) Understanding of fuels and energy resources Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels Understanding energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change.</p> <p>Working scientifically: Using ratios to compare</p>	<p>From KS2 most students will: Recall that temperature is a measure of how hot or cold something is and be able to use thermometers to measure temperature Be able to describe some materials as thermal conductors and some as thermal insulators Have seen materials burning and understand that burning is an irreversible change Recall that plants need sunlight to grow and that animals, including humans, need food.</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7J Current electricity

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like? ²	How does this build on prior learning? ³	What additional resources are available?
<p>Circuit symbols</p> <p>Current and switches</p> <p>Models for circuits</p> <p>Series and parallel circuits</p> <p>Using electricity</p>	<p>Knowledge Circuit symbols; series and parallel circuits; use of components; uses of electricity; dangers of electricity; static electricity; electrical current; resistance.</p> <p>Understanding Current is a flow of charge; how symbols are used to represent components in circuits; how to construct series and parallel circuits; resistance changes current; current carries energy; correct connection of ammeter and voltmeter; differences between series and parallel circuits; appliances use electricity; electricity is dangerous and can kill; safety in the home; fuses and circuit breakers</p> <p>Skills Construct series and parallel circuits; use models to represent circuits; measure current, measure voltage; use of circuit symbols; presenting data in tables;</p>	<p>Students will be able to: Construct circuits independently and without mistakes. Effectively find and fix faults in circuits. Recall a range of circuit symbols. Describe the correct connection of ammeters and voltmeters to make measurements. Explain the term resistance. Explain the differences between series and parallel circuits. Describe the dangers of electricity. Describe the various safety features found in domestic electricity supplies.</p>	<p>From KS2 most students will be able to: Identify common appliances that run on electricity. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers. Identify whether a lamp will light in a simple series circuit, based on whether the lamp is part of a complete loop with a battery. Recognise that a switch opens and closes a circuit and associate this with whether a lamp lights in a simple series circuit. Recognise some common conductors and insulators, and associate metals with being good conductors. Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit. Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the position of switches. Use recognised symbols when representing a simple circuit in a diagram.</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7K Forces

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Forces</p> <p>Different forces</p> <p>Springs</p> <p>Friction</p> <p>Pressure</p>	<p>Knowledge • Describe what a force is. • State what is meant by: contact force, non-contact force. • State what is meant by: mass and weight • State the direction in which gravity acts. • Recall the names of simple forces, including the frictional forces. • Recall the units for measuring forces and pressure • Recall the effects of forces on an object. • State what is meant by elastic and plastic. • State what is meant by pressure. • State balanced forces are equal in size AND opposite in direction that act on the same body but can be of different types • State action and reaction pairs of forces are equal in size AND opposite in direction that act on the different bodies but are always of the same type Understanding • Explain the difference between mass and weight. • Use gravitational field strength to calculate weights. • Describe how friction forces affect movement. • ways in which drag forces can be increased and reduced. • Represent sizes and directions of forces using arrows. • Measure forces and extensions with appropriate apparatus • Explain how forces cause effects on objects: • how a spring's extension depends on force applied • using the formula relating force and extension (Hooke's Law) in calculations • using ideas of elastic limit and the limit of proportionality • Classify forces as contact and noncontact: • how gravity and forces from the earth interact • Identify where different forces are likely to be found, their types, effects and directions • Describe how pressure links force and area • Calculate pressure using the formula $P=F/A$ • Describe effects of high and low pressures in simple situations • Explain applications of pressure in different situations • Explain different types of motion in terms of balanced and unbalanced forces • Explain phenomena in terms of action and reaction forces Skills Literacy and Communication skills • the use of conventions when communicating science • taking notes from presentations and videos (including the ordering of notes). Numeracy and Mathematical Skills • the SI system. • calculations as listed under "Understanding"</p>	<p>Describe forces as pushes or pulls, arising from the interaction between two objects • using force arrows in diagrams, adding forces in one dimension, balanced and unbalanced forces • Identify different forces associated with: • deforming objects; stretching and squashing – springs; • rubbing and friction between surfaces; • pushing things out of the way; resistance to motion of air and water • measure accurately: • forces in newtons, • stretch or compression as force is changed • explain the force–extension linear relation; Hooke's Law as a special case • explain pressure measured by ratio of force over area – acting normal to any surface AND calculate pressure • use opposing forces and equilibrium in explanations: • weight held by stretched spring • supported on a compressed surface • explain the role of forces in affecting motion: • to cause objects to stop or start moving, • to change their speed • to change direction of motion • change depending on direction of force and its size. Working Scientifically • Use standard units of measurement (including the SI system, its basic units and prefixes).</p>	<p>From KS2 most students will: Describe different kinds of forces, including magnetism, gravity, upthrust and friction, and be able to classify these as contact or non-contact forces Identify the effect of drag forces that act between moving surfaces Describe why moving objects that are not driven tend to slow down.</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>

Science - Year 7 Unit 7L Sound

What are we learning?	What knowledge, understanding and skills will we gain?	What does mastery look like?	How does this build on prior learning?	What additional resources are available?
<p>Making sounds</p> <p>Moving sounds</p> <p>Detecting sounds</p> <p>Using sound</p> <p>Comparing waves</p>	<p>Knowledge: Different types of waves, pitch, volume and intensity, sources of sound, energy and matter, animals and hearing range, frequency and amplitude, movement through different materials, sound meters and microphones, the ear, ultrasound, superposition, seismic waves.</p> <p>Understanding: How to make sounds louder, softer, higher, lower, how vibrations are related to sound, how energy dissipates with distance, how material affects wave speed, how we hear sounds, comparing the ear with other transducers, hearing damage, how sonar and echolocation work, what causes constructive and destructive interference.</p> <p>Skills: Ways of recalling information, how to setup and take accurate, measurements from laboratory apparatus, how to draw and interpret graphs, how to follow a methodology, how to stay safe in a laboratory environment, how information can be presented in different ways to communicate scientific ideas clearly. This includes understanding sentence construction in order to develop sentences that can be used as part of a fluid writing style that communicates information clearly.</p>	<p>Students will be able to explain: Waves on water as undulations which travel through water with transverse motion; these waves can be reflected, and add or cancel – superposition Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound Sound needs a medium to travel, the speed of sound in air, in water, in solids. Sound produced by vibrations of objects, in loudspeakers, detected by their effects on microphone diaphragm and the ear drum; sound waves are longitudinal. Auditory range of humans and animals. Pressure waves transferring energy; use for cleaning and physiotherapy by ultrasound; waves transferring information for conversion to electrical signals by microphone</p> <p>Working Scientifically Present observations and data using appropriate methods, including tables and graphs. Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.</p>	<p>From KS2 most students will be able to: name a variety of sound sources (Year 3); recall that sounds get fainter with distance explain that sounds are made by vibrations; link the size of an object with the pitch of the sound it produces (Year 6); link the volume of a sound with the size of the vibrations producing it (Year 6).</p>	<p>Exploring Science 7 Textbook</p> <p>BBC Bitesize</p> <p>KS3 Revision Guide</p> <p>KS3 Knowledge Organiser and Retrieval Book</p>