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UK National Curriculum - Science Programme of Study

Science: Key stages 2

Subject area - Primary skills

	Primary goal: content is didactic Content/features are instructional and didactic: Learning of these skills is constantly present in the core usage.	**Secondary goal:** content is facilitative Content/features are partly instructional, partly facilitative: Learning of these skills is present in the core usage, but require help from teacher or use of lesson plan.	**Requires external hardware**
Science - UK National Curriculum 2013 - Upper key stage 2 - Working Scientifically			
Taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate.	■		
Recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs.	■		
Planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary.	■		
Using test results to make predictions to set up further comparative and fair tests.		■	
Reporting and presenting findings from enquiries, including conclusions, causal relationships and explanations of and degree of trust in results, in oral and written forms such as displays and other		■	
Identifying scientific evidence that has been used to support or refute ideas or arguments		■	

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UK National Curriculum - Science Programme of Study

Science: Key stages 3

Subject area - Primary skills

	Primary goal: content is didactic Content/features are instructional and didactic: Learning of these skills is constantly present in the core usage.	**Secondary goal:** content is facilitative Content/features are partly instructional, partly facilitative: Learning of these skills is present in the core usage, but require help from teacher or use of lesson plan.	**Requires external hardware**
Science - UK National Curriculum 2013 - Key stage 3 - General aims			
Develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them	■		
Are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.		■	
Develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics		■	
Science - Working scientifically - UK National Curriculum 2013 - Key stage 3			
Use and derive simple equations and carry out appropriate calculations	■		
Present reasoned explanations, including explaining data in relation to predictions and hypotheses	■		
Present observations and data using appropriate methods, including tables and graphs	■		
Apply mathematical concepts and calculate results.	■		
Apply sampling techniques	■		
Make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements.	■		
Select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate.	■		
Make predictions using scientific knowledge and understanding.	■		
Ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience.			
Pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility		■	
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 evaluate risks		■	
Use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety.		■	
Interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions.		■	
Evaluate data, showing awareness of potential sources of random and systematic error.		■	
Identify further questions arising from their results		■	
Understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature.		■	
Undertake basic data analysis including simple statistical techniques.		■	
Understanding the ways in which scientific methods and theories develop over time		■	
Science - Chemistry - UK National Curriculum 2013 - Key stage 3			
The varying physical and chemical properties of different elements.		■	
How patterns in reactions can be predicted with reference to the Periodic Table		■	
The properties of metals and non-metals.		■	
Properties of ceramics, polymers and composites (qualitative)		■	
The composition of the Earth.		■	
The structure of the Earth		■	
Mixtures, including dissolving.		■	
Simple techniques for separating mixtures: filtration, evaporation, distillation and chromatography.			■

Science - Physics - UK National Curriculum 2013 - Key stage 3			
The magnetic effect of a current, electromagnets, D.C. motors (principles only).	■		
Magnetic fields by plotting with compass, representation by field lines.	■		
Magnetic poles, attraction and repulsion.	■		
Separation of positive or negative charges when objects are rubbed together: transfer of electrons, forces between charged objects.	■		
Differences in resistance between conducting and insulating components (quantitative)	■		
Potential difference, measured in volts, battery and bulb ratings; resistance, measured in ohms, as the ratio of potential difference (p.d.) to current.	■		
Electric current, measured in amperes, in circuits, series and parallel circuits, currents add where branches meet and current as flow of charge.	■		
Colours and the different frequencies of light, white light and prisms (qualitative only); differential colour effects in absorption and diffuse reflection.	■		
Light transferring energy from source to absorber leading to chemical and electrical effects; photo-sensitive material in the retina and in cameras.	■		
The transmission of light through materials: absorption, diffuse scattering and specular reflection at a surface use of ray model to explain imaging in mirrors, the pinhole camera, the refraction of light	■		
and action of convex lens in focusing (qualitative); the human eye.	■		
Light waves travelling through a vacuum; speed of light.	■		
Auditory range of humans and animals.	■		
Sound produced by vibrations of objects, in loud speakers, detected by their effects on microphone	■		
diaphragm and the ear drum; sound waves are longitudinal.	■		
Sound needs a medium to travel, the speed of sound in air, in water, in solids.	■		
Other processes that involve energy transfer: changing motion, dropping an object, completing an electrical circuit, stretching a spring, metabolism of food, burning fuels.		■	
Energy as a quantity that can be quantified and calculated; the total energy has the same value before and after a change.		■	
Comparing the starting with the final conditions of a system and describing increases and decreases in the amounts of energy associated with movements, temperatures, changes in positions in a field,		■	
Using physical processes and mechanisms, rather than energy, to explain the intermediate steps that bring about such changes.		■	
Speed and the quantitative relationship between average speed, distance and time (speed = distance ÷ time).		■	
The representation of a journey on a distance-time graph.		■	
Relative motion: trains and cars passing one another.		■	
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.		■	
Moment as the turning effect of a force.		■	
Forces: associated with deforming objects; stretching and squashing – springs; with rubbing and friction between surfaces, with pushing things out of the way; resistance to motion of air and water.		■	
Forces measured in newtons, measurements of stretch or compression as force is changed.		■	
Force-extension linear relation; Hooke's Law as a special case		■	
Work done and energy changes on deformation non-contact forces: gravity forces acting at a distance on Earth and in space, forces between magnets and forces due to static electricity.		■	
Atmospheric pressure, decreases with increase of height as weight of air above decreases with height.			■
Forces being needed to cause objects to stop or start moving, or to change their speed or direction of motion (qualitative only).		■	
Frequencies of sound waves, measured in hertz (Hz); echoes, reflection and absorption of sound.		■	
The similarities and differences between light waves and waves in matter		■	
Internal energy stored in materials		■	
Gravity force, weight = mass x gravitational field strength (g), on Earth g=10 N/kg, different on other planets and stars; gravity forces between Earth and Moon, and between Earth and Sun (qualitative only).		■	
Pressure measured by ratio of force over area – acting normal to any surface.			■
Opposing forces and equilibrium: weight held by stretched spring or supported on a compressed surface.			■
Heating and thermal equilibrium: temperature difference between two objects leading to energy transfer from the hotter to the cooler one, through contact (conduction) or radiation; such transfers tending to reduce the temperature difference: use of insulators.			

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UK National Curriculum - Science Programme of Study

Science: Key stages 4

Subject area - Primary skills

	Primary goal: content is didactic Content/features are instructional and didactic: Learning of these skills is constantly present in the core usage.	**Secondary goal:** content is facilitative Content/features are partly instructional, partly facilitative: Learning of these skills is present in the core usage, but require help from teacher or use of lesson plan.	**Requires external hardware**
Science - UK National Curriculum 2013 - Key stage 4 - General aims			
Develop understanding of the nature, processes and methods of science, through different types of scientific enquiry that help them to answer scientific questions about the world around them.	■		
Develop and learn to apply observational, practical, modelling, enquiry, problem-solving skills and mathematical skills, both in the laboratory, in the field and in other environments;		■	
Develop and learn to apply observational, practical, modelling, enquiry, problem-solving skills and mathematical skills, both in the laboratory, in the field and in other environments		■	
Develop their ability to evaluate claims based on science through critical analysis of the methodology, evidence and conclusions, both qualitatively and quantitatively.		■	
Science - Working scientifically - UK National Curriculum 2013 - Key stage 4			
Developing their use of scientific vocabulary and nomenclature	■		
Presenting observations and other data using appropriate methods	■		
Applying a knowledge of a range of techniques, apparatus, and materials to select those appropriate both for fieldwork and for experiments	■		
Planning experiments to make observations, test hypotheses or explore phenomena.	■		
The ways in which scientific methods and theories develop over time		■	
Using a variety of concepts and models to develop scientific explanations and understanding.		■	
Appreciating the power and limitations of science and considering ethical issues which may arise		■	
Explaining everyday and technological applications of science; evaluating associated personal, social, economic and environmental implications; and making decisions based on the evaluation of evidence and arguments.		■	
Evaluating risks both in practical science and the wider societal context, including perception of risk		■	
Recognising the importance of peer review of results and of communication of results to a range of audiences.		■	
Using scientific theories and explanations to develop hypotheses.		■	
Evaluating methods and suggesting possible improvements and further investigations.		■	
Translating data from one form to another		■	
Carrying out and representing mathematical and statistical analysis		■	
Representing distributions of results and making estimations of uncertainty		■	
Interpreting observations and other data, including identifying patterns and trends, making inferences and drawing conclusions.		■	
Presenting reasoned explanations, including relating data to hypotheses		■	
Being objective, evaluating data in terms of accuracy, precision, repeatability and reproducibility and identifying potential sources of random and systematic error		■	
Communicating the scientific rationale for investigations, including the methods used, the findings and reasoned conclusions, using paper-based and electronic reports and presentations.		■	
Recognising the importance of scientific quantities and understanding how they are determined.		■	
Using SI units and IUPAC chemical nomenclature unless inappropriate.		■	
Using prefixes and powers of ten for orders of magnitude (e.g. tera, giga, mega, kilo, centi, milli, micro and nano).		■	
Interconverting units Using an appropriate number of significant figures in calculations. Making and recording observations and measurements using a range of apparatus and methods.		■	

Recognising when to apply a knowledge of sampling techniques to ensure any samples collected are representative.		■	
Carrying out experiments appropriately, having due regard to the correct manipulation of apparatus, the accuracy of measurements and health and safety considerations.		■	

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UK National Curriculum - Science Programme of Study *Science: Key stages 5* *Subject area - Primary skills*	**Primary goal:** content is didactic Content/features are instructional and didactic: Learning of these skills is constantly present in the core usage.	**Secondary goal:** content is facilitative Content/features are partly instructional, partly facilitative: Learning of these skills is present in the core usage, but require help from teacher or use of lesson plan.	**Requires external hardware**
Science - UK National Curriculum 2013 - Year 5			
Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.		■	
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.		■	
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.		■	

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UK National Curriculum - Science Programme of Study *Science: Key stages 6* *Subject area - Primary skills*	**Primary goal:** content is didactic Content/features are instructional and didactic: Learning of these skills is constantly present in the core usage.	**Secondary goal:** content is facilitative Content/features are partly instructional, partly facilitative: Learning of these skills is present in the core usage, but require help from teacher or use of lesson plan.	**Requires external hardware**
Science - UK National Curriculum 2013 - 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.		■	
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.		■	