

Physics

KS1 Working Scientifically:	
1.	asking simple questions and recognising that they can be answered in different ways
2.	observing closely, using simple equipment
3.	performing simple tests
4.	identifying and classifying
5.	using their observations and ideas to suggest answers to questions
6.	gathering and recording data to help in answering questions

Year 1	Knowledge	Vocabulary	Skills
All terms – incidental teaching	<u>Seasonal Change:</u> - observe changes across the 4 seasons - observe and describe weather associated with the seasons and how day length varies	Autumn, Spring, Summer, Winter, seasons, weather, temperature, thermometer, deciduous, coniferous	<i>e.g. what types of weather are common in the season we are in?</i> <i>e.g. to use a rain catcher to monitor if it has rained over a specified time. Or, using chalk, draw a shadow and monitor how it changes between specific times</i> <i>e.g. why do the colours of leaves change? Why do they fall from the trees? Why do some trees lose leaves and others don't?</i> <i>e.g. rain catcher</i>
Year 2	Knowledge	Vocabulary	Skills
Spring term	<u>Everyday materials</u> - identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses (<i>chemistry objective</i>) - find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching	Metal, plastic, wood, glass, brick, rock, paper, cardboard, squash, bend, twist, stretch, object, material	<i>e.g. which materials would be suitable for a roof? Why?</i> <i>e.g. does a material return to its original shape after bending/twisting/stretching?</i> <i>e.g. does a material return to its original shape after bending/twisting/stretching?</i> <i>e.g. what objects are made from different everyday materials?</i> <i>e.g. why are specific objects made from certain materials?</i> <i>e.g. test stretch-ability of a range of materials using a ruler to measure before and after</i>



LKS2 Working Scientifically:
1. asking relevant questions and using different types of scientific enquiries to answer them
2. setting up simple practical enquiries, comparative and fair tests
3. making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
4. gathering, recording, classifying and presenting data in a variety of ways to help in answering questions
5. recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
6. reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
7. using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
8. identifying differences, similarities or changes related to simple scientific ideas and processes
9. using straightforward scientific evidence to answer questions or to support their findings



Year 3	Knowledge	Vocabulary	Skills
Autumn term	<u>Rocks</u> - compare and group together different kinds of rocks on the basis of their appearance and simple physical properties - describe in simple terms how fossils are formed when things that have lived are trapped within rock - recognise that soils are made from rocks and organic matter	Fossil, soil, sedimentary, igneous, metamorphic, organic matter, layers, permeable, impermeable	1. 2. 3. 4. 5. 6. 7. 8. 9. <i>e.g. classify a range of different rock samples based on their physical properties, including testing water permeability and hardness</i> <i>e.g. observe a soil sample and record what is found. Look at and draw a soil profile, using research from secondary sources.</i>
Spring term	<u>Light</u> - recognise that they need light in order to see things and that dark is the absence of light - notice that light is reflected from surfaces - recognise that light from the sun can be dangerous and that there are ways to protect their eyes - recognise that shadows are formed when the light from a light source is blocked by an opaque object - find patterns in the way that the size of shadows change	Reflection, shadow, light source, opaque, transparent, translucent, orbit	1. 2. 3. 5. 6. 7. 8. 9. <i>e.g. set up a fair test to investigate shining light sources onto a range of materials, checking for transparency, translucence and opaque</i> <i>e.g. on a sunny day, draw around shadows to investigate what happens to shadow position and length throughout the day. Present findings in a graph.</i>
Summer term	<u>Forces and Magnets</u> - compare how things move on different surfaces - notice that some forces need contact between 2 objects, but magnetic forces can act at a distance - observe how magnets attract or repel each other and attract some materials and not others - compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials - describe magnets as having 2 poles - predict whether 2 magnets will attract or repel each other, depending on which poles are facing	Attract, repel, magnetic pole, friction, Newton, Newton meter, magnet, magnetic	1. 2. 3. 4. 5. 6. 7. 8. 9. <i>e.g. predict and test how magnets interact with each other, when having different combinations of poles facing</i> <i>e.g. sort and classify materials based on their magneticity, addressing misconceptions around 'metals being magnetic'</i> <i>e.g. use newton meters to measure the force required to move an object on a variety of surfaces (friction)</i>

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Year 4	Knowledge	Vocabulary	Skills
Autumn term	Sound - identify how sounds are made, associating some of them with something vibrating - recognise that vibrations from sounds travel through a medium to the ear - find patterns between the pitch of a sound and features of the object that produced it - find patterns between the volume of a sound and the strength of the vibrations that produced it - recognise that sounds get fainter as the distance from the sound source increases	Vibrate, pitch, volume, insulation, outer/middle/inner ear, cochlea, hammer, frequency	1. 2. 3. 4. 5. 6. 7. 8. 9. <i>e.g. investigate how a range of musical instruments produce sound (through vibrations) and how the sound travels to our ears</i> <i>e.g. Use an online sound wave detector to investigate how different volumes and pitches are created, and the differences in appearance of the sound waves produced</i> <i>e.g. investigate which mediums allow sound to travel through them (soundproofing investigation)</i>
Autumn term	Electricity - 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 or not a lamp will light in a simple series circuit, based on whether or not 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 or not a lamp lights in a simple series circuit - recognise some common conductors and insulators, and associate metals with being good conductors	Circuit, buzzer, cell, conductor, battery, switch, socket, appliance, series circuit, insulator	1. 2. 3. 4. 5. 6. 7. 8. 9. <i>e.g. predict and practically test circuit diagrams as to whether they would make a complete circuit, recording and using component diagrams</i> <i>e.g. predict and investigate whether a range of materials make good electrical insulators or conductors</i>

UKS2 Working Scientifically:	
1.	planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
2.	taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
3.	recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
4.	using test results to make predictions to set up further comparative and fair tests
5.	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 presentations
6.	identifying scientific evidence that has been used to support or refute ideas or arguments.

Year 5	Knowledge	Vocabulary	Skills
Autumn Term	Forces - 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	Friction, gravity, air resistance, water resistance, lever, pulley, gear, parachute, Newton	1. 2. 3. 4. 5. 6. <i>e.g. create a series of parachutes with varying surface area, to test air resistance. Children measure the time it takes for the parachute to fall.</i> <i>e.g. test the speed 2 balls of plasticine (equal mass) fall, one through the air, one through a clear container of water (water resistance)</i> <i>e.g. build a lever system and measure the distance from the centre of balance (fulcrum) and the weight which is needed to be applied. Establish that if the weight it doubled, the distance from the fulcrum can be halved.</i>
Spring term	Earth and Space - 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	Orbit, solar system, astronomy, astronomical, planet, rotation, spherical, moon, waxing, waning, lunar, eclipse, spherical body, axis, sunrise, sunset	5. 6. <i>e.g. create a scale model/ representation of the solar system on the school playground or field</i> <i>e.g. create model of the moon orbiting the Earth, showing light source to explain the phases of the moon</i>

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Year 6	Knowledge	Vocabulary	Skills
Spring term	Light - 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	Light wave, light source, absorb, reflection, lens, refraction, retina, cornea, iris, pupil	1. 2. 3. 4. 5. 6. <i>e.g. plan and conduct a fair test experimenting the effect on the shadows cast, of moving an object nearer and further from a light source. Measure and record the findings.</i> <i>e.g. plan and investigate how the beam from a light source can be bounced off mirrors to hit a target surface</i>
Summer term	Electricity - 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	Conductor, insulator, circuit, cells, volts, fuses, Thomas Edison	1. 4. 5. 6. <i>e.g. predict and investigate the impact of changing the number of batteries/cells to the brightness of a bulb or the volume of a buzzer</i> <i>e.g. predict and investigate the difference in thickness/length of wire in how bright a bulb will glow</i>



GLOSSARY

Absorb – take in/soak up energy or a liquid

Aim – what you're trying to find out in an experiment

Air resistance – also known as 'drag'. A force caused by air that pushes back against you when you move through it

Appliance – an object that runs on electricity

Astronomical – relating to astronomy

Astronomy – the area of science that deals with celestial objects and space

Autumn – the season following summer (known in the US as 'Fall')

Axis (Earth and Space Y5) - an imaginary line drawn through the centre of the Earth from the North Pole to the South Pole

Buzzer – an electrical component that creates a noise

Cell - a unit in an appliance, for converting chemical into electricity

Circuit – a path that allows an electrical current to flow

Cochlea – the spiral cavity of the inner ear that supports hearing

Conclusion – a simple sentence that sums up what you found in an investigation

Conductor - a material that conducts or transmits heat or electricity

Coniferous - a tree that bears cones and needle-like leaves that are typically evergreen

Cornea – the transparent layer forming the front of

the eye

Deciduous – a plant that sheds its leaves annually

Eclipse – when light is obscured from the sun, by another celestial body (e.g. moon)

Fossil - the remains or impression of a prehistoric plant or animal embedded in rock

Frequency – the measure of vibration that determines the pitch of a sound

Friction – the resistance that one moving object encounters with another

Gear – a toothed wheel that interacts with others

Glass - a hard, brittle substance, typically transparent or translucent

Gravity – a force that pulls things towards the centre of the Earth

Hammer – also known as the 'malleus'. One of the small bones of the inner ear

Igneous – a rock having solidified from lava or magma

Impermeable – does not allow water to soak through

Insulation – the properties of an insulator

Insulator - a material that will not let heat or electricity pass through it

Iris - a flat, coloured, ring-shaped membrane behind the cornea of the eye

Lens - a transparent structure behind the iris of the eye that focuses light entering the eye on the retina

Lever – a bar that rests on a pivot, that supports the

movement of large or heavy objects

Light source – An object that omits its own light

Light wave – the electromagnetic wave by which light travels

Lunar – linked to the moon

Magnet – a metallic material that omits a magnetic force on other magnetic materials

Magnetic attraction – the force that a magnet can apply to another magnetic material

Magnetic pole – two opposite ends to a magnet. Can also relate to the north and south magnetic pole of the Earth

Material – the matter from which an object is made

Metal – a solid material which is typically hard, shiny and malleable and is a good thermal and electrical conductor

Metamorphic – a rock type that has been formed under heat/pressure

Moon – the celestial body that orbits the Earth

Newton – unit of measure that records force. Named after Isaac Newton

Newton meter – a scientific instrument that measures force. Also known as a force meter

Object – a 'thing' made from one or more materials

GLOSSARY

Opaque – does not allow light to travel through it

Orbit – the curved path of a celestial object around a planet

Organic matter – naturally formed material

Outer/middle/inner ear – parts of the human ear that allows the ability to hear

Paper – material that is manufactured into thin sheets from the pulp of wood

Parachute – a canopy that fills with air that allows a heavier object to drop more slowly

Permeable – allows water to soak through **Pitch** – the highness or lowness of a sound **Planet** – a celestial body that orbits a star

Plastic – a man-made material made from organic polymers

Prediction – what you think will happen in an investigation

Pulley – a wheeled system that allows force to be changed in direction

Pupil – the dark circular centre of the eye

Reflection – when light (or heat) is bounced off an object

Refraction – the ‘bending’ of white light, separating into the different wavelengths of light (rainbow appearance)

Repel – the magnetic force that ‘pushes’ away

Retina – the layer at the back of the eyeball that contains cells that are sensitive to light

Rock – a naturally formed mineral found in the Earth’s crust

Rotation – The action of moving around an axis

Seasons – The 4 different periods of the year caused by the tilt of the Earth’s axis (Spring, Summer, Autumn, Winter)

Sedimentary – a type of rock crated from organic matter, that forms in layers under the Earth’s surface

Series circuit - a path along which the whole current flows through each component

Shadow – a dark area made when light is blocked by an object

Socket – an electrical socket where appliances can be plugged in

Soil – decomposed organic matter mixed with clay and rock particles

Solar system – the collection of 8 planets which orbit around the sun

Spherical – a solid, 3D figure that has a single face

Spring - the season that follows Winter. Associated with new life

Squash – to crush or squeeze something with force

Stretch – to elongate an object without breaking or tearing

Summer – the season that follows Spring.

Switch – an electronic device that allows a current to be prevented from flowing by creating a break in a circuit

Temperature – the measure of heat/cool (usually

measured in degrees centigrade or Fahrenheit)

Thermometer – allows the measurement of temperature

Translucent – allows some light to pass through an object but appears distorted

Transparent – see-through

Twist – to bend a material/object in 2 different, opposite directions simultaneously

Variable – a factor of an investigation that you will change or measure

Vibrate – move continuously and rapidly to and from

Volume – how loud a sound is

Waning – (of the moon) the visible section of the moon gets progressively smaller

Water resistance – property of a material that measures how water is prevented from passing through it

Waxing - of the moon) the visible section of the moon gets progressively larger

Weather – the description of the state of the atmosphere e.g. rainy, windy or cloudy

Winter - the season that follows Autumn.

Wood – a naturally occurring material formed from trees