



# Knowledge & Understanding

# Working Scientifically

# Vocabulary

# Scientist

## THE EARTH

<b>EYFS</b>	<p><b>I will be able to:</b>  <i>ELG 14:</i> Know that there are similarities and differences between places, times of the day and times of the year.</p> <p><i>ELG 14:</i> Talk about what I can see in my local home and school environment at different times of the day and year.</p> <p><i>ELG 14:</i> Talk about the changes that I see happening in my local home and school environment.</p>	<p><b>I will have the opportunity to:</b>          Develop ideas around sequencing and cause and effect.</p> <p>Make predictions about what I think will happen.</p> <p>Closely observe patterns and changes in the world around me.</p> <p>Record my ideas and findings in different ways e.g. by drawing, writing, taking photographs or model making.</p>		<p>Neil Armstrong</p> <p>Helen Sharman/Tim Peak</p>																																				
<b>Year 1</b>	<p><b><u>SEASONAL CHANGES</u></b>  <b>I will be able to:</b>          Name the four different seasons.</p> <p>Identify which months are associated with different seasons.</p> <p>Describe the weather in different seasons over a year.</p> <p>Describe different features of seasonal change throughout the year, such as temperature, amount of light and length of days.</p>	<p><b><u>SEASONAL CHANGES</u></b>  <b>I will have the opportunity to:</b>          Observe seasonal changes throughout the year.</p> <p>Record simple weather information on a chart or in a diary, at different times throughout the year.</p> <p>Collect information, regularly throughout the year, about features that change with the seasons (<i>plants, animals, humans</i>).</p> <p>Compare and contrast the seasons of the year using observations to explain ideas.</p>	<table border="0"> <tr> <td><i>autumn</i></td> <td><i>freezing</i></td> </tr> <tr> <td><i>winter</i></td> <td><i>frost</i></td> </tr> <tr> <td><i>spring</i></td> <td><i>ice</i></td> </tr> <tr> <td><i>summer</i></td> <td><i>rain</i></td> </tr> <tr> <td><i>seasons</i></td> <td><i>mist</i></td> </tr> <tr> <td><i>sun</i></td> <td><i>fog</i></td> </tr> <tr> <td><i>light</i></td> <td><i>temperature</i></td> </tr> <tr> <td><i>day</i></td> <td><i>hot</i></td> </tr> <tr> <td><i>night</i></td> <td><i>cool</i></td> </tr> <tr> <td><i>environment</i></td> <td><i>weather</i></td> </tr> <tr> <td><i>rain</i></td> <td><i>forecast</i></td> </tr> <tr> <td><i>sleet</i></td> <td><i>clouds</i></td> </tr> <tr> <td><i>snow</i></td> <td><i>thunder</i></td> </tr> <tr> <td><i>blizzard</i></td> <td><i>lightning</i></td> </tr> </table>	<i>autumn</i>	<i>freezing</i>	<i>winter</i>	<i>frost</i>	<i>spring</i>	<i>ice</i>	<i>summer</i>	<i>rain</i>	<i>seasons</i>	<i>mist</i>	<i>sun</i>	<i>fog</i>	<i>light</i>	<i>temperature</i>	<i>day</i>	<i>hot</i>	<i>night</i>	<i>cool</i>	<i>environment</i>	<i>weather</i>	<i>rain</i>	<i>forecast</i>	<i>sleet</i>	<i>clouds</i>	<i>snow</i>	<i>thunder</i>	<i>blizzard</i>	<i>lightning</i>	<p>Dr Steve Lyons</p> <p>Holly Green</p>								
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<b>Year 5</b>	<p><b><u>EARTH AND SPACE</u></b>  <b>I will be able to:</b>          Explain that the Earth and other planets orbit the Sun.</p> <p>Explain that the Sun, Earth and Moon are spherical bodies.</p> <p>Name, place and describe features of the planets in the Solar system.</p> <p>Understand that gravitational forces ensure that the orbits of planets are consistent and time taken to orbit the sun is dependent on distance from the sun.</p> <p>Describe the different stages of the lunar cycle in relation to the Earth.</p> <p>Describe how day and night is caused.</p> <p>Describe how our seasons are caused by the position of the Earth's orbit in relation to the Sun.</p> <p>Explain the apparent movement of the Sun during the day linking to its effect on shadow length.</p>	<p><b><u>EARTH AND SPACE</u></b>  <b>I will have the opportunity to:</b>          Describe the arguments and evidence, about the Earth's shape and movement, used by scientists in the past.</p> <p>Create a scaled model to demonstrate how the Earth moves in relation to the Sun and how the Moon moves in relation to the Earth.</p> <p>Use secondary sources to research facts about planets in our solar system and choose how to present findings.</p> <p>Identify scientific evidence to support or challenge ideas about the movement of bodies within in the solar system - Geocentric / Heliocentric</p> <p>Research different time zones.</p> <p>Make first-hand observations and take accurate measurements of how shadows caused by the sun change throughout the day.</p> <p>Record findings using a line graph to show patterns of cause and effect.</p>	<table border="0"> <tr> <td><i>Sun</i></td> <td><i>sphere</i></td> </tr> <tr> <td><i>Moon</i></td> <td><i>spherical</i></td> </tr> <tr> <td><i>Earth</i></td> <td><i>geocentric</i></td> </tr> <tr> <td><i>orbit</i></td> <td><i>heliocentric</i></td> </tr> <tr> <td><i>planet</i></td> <td><i>constellation</i></td> </tr> <tr> <td><i>celestial</i></td> <td><i>lunar cycle</i></td> </tr> <tr> <td><i>Mercury</i></td> <td><i>full moon</i></td> </tr> <tr> <td><i>Venus</i></td> <td><i>gibbous</i></td> </tr> <tr> <td><i>Mars</i></td> <td><i>half moon</i></td> </tr> <tr> <td><i>Jupiter</i></td> <td><i>crescent</i></td> </tr> <tr> <td><i>Saturn</i></td> <td><i>new moon</i></td> </tr> <tr> <td><i>Uranus</i></td> <td><i>waxing</i></td> </tr> <tr> <td><i>Neptune</i></td> <td><i>waning</i></td> </tr> <tr> <td><i>phases</i></td> <td><i>astronaut</i></td> </tr> <tr> <td><i>gravity</i></td> <td><i>comet</i></td> </tr> <tr> <td><i>axis</i></td> <td><i>Universe</i></td> </tr> <tr> <td><i>revolve</i></td> <td><i>Solar System</i></td> </tr> <tr> <td><i>rotate</i></td> <td></td> </tr> </table>	<i>Sun</i>	<i>sphere</i>	<i>Moon</i>	<i>spherical</i>	<i>Earth</i>	<i>geocentric</i>	<i>orbit</i>	<i>heliocentric</i>	<i>planet</i>	<i>constellation</i>	<i>celestial</i>	<i>lunar cycle</i>	<i>Mercury</i>	<i>full moon</i>	<i>Venus</i>	<i>gibbous</i>	<i>Mars</i>	<i>half moon</i>	<i>Jupiter</i>	<i>crescent</i>	<i>Saturn</i>	<i>new moon</i>	<i>Uranus</i>	<i>waxing</i>	<i>Neptune</i>	<i>waning</i>	<i>phases</i>	<i>astronaut</i>	<i>gravity</i>	<i>comet</i>	<i>axis</i>	<i>Universe</i>	<i>revolve</i>	<i>Solar System</i>	<i>rotate</i>		<p>Claudius Ptolemy and Nicolaus Copernicus</p> <p>Brian Cox</p> <p>Mae Jemison</p>
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# ENERGY: LIGHT

Year 3

**I will be able to:**

Describe how we see objects in light and understand that need light in order to see things and that darkness is the absence of light.

Identify surfaces that are reflective.

Explain that light from the sun can be dangerous, giving examples of how we can protect our eyes when looking at the Sun.

Define transparent, translucent and opaque and find objects with these properties.

Describe how shadows are formed.

**I will have the opportunity to:**

Predict, describe and observe patterns of shadows changing throughout the day.

Seek patterns between visibility of objects and levels of lighting.

Record careful observations using scientific language, diagrams and bar charts.

Group objects using their properties.

Use equipment to accurately measure shadow length.

Set up simple, practical enquiries to answer my own question about light and sight.

*light  
light source  
dark  
absence of light  
transparent  
translucent  
opaque  
shiny  
matt  
surface  
shadow  
reflect  
mirror  
sunlight  
UV  
ray  
visible  
glare  
travel  
sight*

James Clerk  
Maxwell

Year 6

**I will be able to:**

Explain how light travels from a light source

Describe the process of light travelling and being reflected to explain how we can see objects.

Name the parts of an eye and discuss the role each part has in enabling us to see.

Describe why we see colour.

Describe how light is reflected by mirrors – plane; concave; convex.

Explain why a shadow has the same shape as the object casting.

Explain how the position of a light source affects shadow length.

Explain how simple optical instruments work.

**I will have the opportunity to:**

Plan and carry out a practical demonstration to show that light travels in straight lines.

Draw and label a diagram to show the parts of an eye.

Make and test predictions to explore the relationship between the transparency or opaque properties of an object and the clarity of the shadow that we see.

Use diagrams and models to predict and explain how the path of light rays can be directed by reflection.

*reflection  
reflective  
refraction  
straight  
prism  
spectrum  
optic  
nerve  
retina  
iris  
lens  
rods  
cones  
pupil  
inverse  
cornea  
plane  
mirror  
convex  
concave  
illusion  
filament  
focus  
optician  
luminescence  
bioluminescence  
incandescent  
nocturnal  
infrared  
light metre  
lumens  
invisible  
telescope  
microscope  
short sighted  
long sighted  
absorbed*

Sir David  
Brewster

Anna Jane  
Harrison



# Knowledge & Understanding

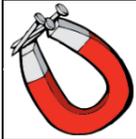
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## ENERGY: SOUND

<b>EYFS</b>	<p><b>I will be able to:</b>  <i>ELG 14:</i> Talk about the sounds I can hear in my own environment.</p> <p><i>ELG 14:</i> Make observations about the sounds made by animals.</p> <p><i>ELG 14:</i> Talk about similarities and differences in relation to sounds made by objects, materials and living things.</p> <p><i>ELG 16:</i> Experiment with different ways of making sounds, including singing songs and making music.</p>	<p><b>I will have the opportunity to:</b>          Explore how sounds are made using different objects and materials.</p> <p>'Collect' sounds in our school environment.</p> <p>Test how to make changes to sounds e.g. <i>What will happen if I hit the drum harder?</i></p> <p>Group objects and animals depending on sounds and be able to explain my ideas.</p> <p>Match sounds heard with sound sources.</p>		
	<b>Year 4</b>	<p><b>I will be able to:</b>          Describe how sound is made.</p> <p>Explain why sound becomes fainter the further you move from the sound source.</p> <p>Explain how sound travels from a sound source to our ears.</p> <p>Explain that sound travels at different speeds through different media and suggest real-life examples of how this is used in sound insulation.</p> <p>Describe how to change the pitch of a sound.</p> <p>Describe how the volume of a sound can be changed.</p>	<p><b>I will have the opportunity to:</b></p> <p>Label a simple diagram of the ear to show how sound is heard.</p> <p>Use a diagrams to show how sound travels.</p> <p>Predict and test which material is the most effective sound insulator.</p> <p>Use technology to measure volume and pitch.</p> <p>Classify sound sources.</p> <p>Explore making sounds with a range of objects and use key vocabulary to explain findings.</p> <p>Use data to identify patterns in pitch and volume.</p> <p>Explore altering the pitch or volume of objects, making links between findings and scientific ideas.</p>	<p><i>sound</i>  <i>volume</i>  <i>pitch</i>  <i>vibration</i>  <i>medium</i>  <i>conductor</i>  <i>insulator</i>  <i>amplify</i>  <i>tuning fork</i>  <i>decibel</i>  <i>high</i>  <i>low</i>  <i>natural</i>  <i>man-made</i>  <i>echo</i>  <i>vacuum</i>  <i>sound</i>  <i>wave</i>  <i>sonar</i>  <i>sound</i>  <i>proof</i>  <i>outer ear</i></p> <p><i>auditory canal</i>  <i>ear drum</i>  <i>cochlea</i>  <i>auditory nerve</i>  <i>voice box</i>  <i>vocal chord</i>  <i>larynx</i>  <i>hammer</i>  <i>anvil</i>  <i>stirrup</i>  <i>wave</i>  <i>ripple</i></p>



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# FORCES AND MAGNETS

**Year 3**

**I will be able to:**

Describe how objects move on different surfaces if they are pushed or pulled.  
 Identify a force as a push or a pull and explain the effect of the force on an object.  
 Describe how magnets can make some objects move over surfaces without touching the object.  
 Explain that a magnet has different poles which can repel or attract each other.  
 Explain some possible everyday uses for magnets.

**I will have the opportunity to:**

Investigate how objects move on different surfaces and record data to draw conclusions.  
 Use results to make predictions for further tests.  
 Use simple drawings to explain the effect of a push or pull on an object.  
 Group materials as either magnetic or non-magnetic.  
 Predict whether magnets will repel or attract each other.  
 Plan and carry out an investigation to explore the strength of different magnets.

<i>force</i>	<i>strength</i>
<i>push</i>	<i>pattern</i>
<i>pull</i>	<i>resistance</i>
<i>friction</i>	<i>direct</i>
<i>magnet</i>	<i>contact</i>
<i>magnetic</i>	<i>compass</i>
<i>non-</i>	<i>bar magnet</i>
<i>magnetic</i>	<i>ring magnet</i>
<i>magnetic</i>	<i>button</i>
<i>field</i>	<i>magnet</i>
<i>North pole</i>	<i>horseshoe</i>
<i>South pole</i>	<i>magnet</i>
<i>repel</i>	<i>metal</i>
<i>attract</i>	<i>iron</i>
<i>surface</i>	<i>steel</i>

William Gilbert

Andre Marie  
Apere

**Year 5**

**I will be able to:**

Explain the effect of gravity on objects falling towards the earth.  
 Identify the effects of air resistance, water resistance and friction, which act between moving surfaces.  
 Give real-life examples of when it is useful to have high or low friction, water resistance and air resistance.  
 Describe how levers, pulleys and gears work.  
 Explain how some mechanisms can use a small force to create a big effect.

**I will have the opportunity to:**

Explore the effects of friction, water resistance and air resistance in a range of contexts.  
 Pose questions to inform planning and carrying out enquiries to explore the effects of forces on an object.  
 Use scientific ideas to explain the results of investigations.  
 Draw and label force diagrams to show strength, direction and effect of forces on objects.  
 Use a Newton Meter to measure forces.  
 Research the work of key scientists in developing the theory of gravitation.

<i>Gravity</i>	<i>lever</i>
<i>gravitational</i>	<i>pulley</i>
<i>pull</i>	<i>gears</i>
<i>friction</i>	<i>spring</i>
<i>force</i>	<i>fulcrum</i>
<i>upthrust</i>	<i>pivot</i>
<i>air resistance</i>	<i>hinge</i>
<i>water</i>	<i>motion</i>
<i>resistance</i>	<i>accelerate</i>
<i>buoyancy</i>	<i>decelerate</i>
<i>push</i>	<i>drag</i>
<i>pull</i>	<i>surface area</i>
<i>balanced</i>	<i>mass</i>
<i>unbalanced</i>	<i>weight</i>
<i>stationary</i>	
<i>motion</i>	

Isaac Newton

Galileo Galilei



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# ELECTRICITY

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>EYFS</b></p>	<p><b>I will be able to:</b>  <i>ELG 14:</i> Talk about similarities and differences in relation to objects and materials.   <i>ELG 15:</i> Identify and use a range of technology at school and at home.</p>	<p><b>I will have the opportunity to:</b>            Ask questions about objects that use electricity.             Sort objects into those that use electricity and those that do not.             Use a range of technology and electronic devices.             Explore how to use electricity safely.             Explore the effects of turning a switch on or off.</p>		
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 4</b></p>	<p><b>I will be able to:</b>            Give examples of appliances that use either mains or battery powered electricity.             Explain how to keep safe when using electricity.             Name the different components of an electrical circuit.             Identify if a circuit is complete or incomplete and explain why.             Recognise some common electrical insulators and conductors.             Explain how a switch works in a simple circuit.             Explain what happens to the brightness of a bulb if more bulbs are placed in the circuit or if additional cells added.</p>	<p><b>I will have the opportunity to:</b>            Construct a simple series circuit with multiple components, including a switch.             Devise investigations to classify materials as electrical conductors or insulators.             Draw simple diagrams to show the sequence of components in the circuit.             Classify materials based on their conductivity properties and record findings in a table.             Select and test switches to add to a circuit to solve particular problems.             Design a switch, using findings to give reasoned choices about which materials to use.</p>	<p><i>electricity</i>  <i>appliance</i>  <i>device</i>  <i>plug</i>  <i>circuit</i>  <i>complete</i>  <i>incomplete</i>  <i>component</i>  <i>battery</i>  <i>switch</i>  <i>bulb</i>  <i>buzzer</i>  <i>motor</i>  <i>crocodile clip</i>  <i>wire</i>  <i>positive</i>  <i>negative</i></p> <p><i>connections</i>  <i>short circuit</i>  <i>conductor</i>  <i>insulator</i>  <i>metal</i>  <i>non-metal</i>  <i>symbol</i>  <i>safety</i>  <i>electrocute</i>  <i>current</i>  <i>open</i>  <i>closed</i></p>	<p>Thomas Edison</p> <p>Joseph Swan</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Year 6</b></p>	<p><b>I will be able to:</b>            Recognise symbols to represent components in circuit diagrams.             Explain what will happen to other components in a circuit extra bulbs or buzzers are added.             Explain what will happen to components in a circuit if the number of cells/batteries is increased or reduced.             Explain why some metals are electrical conductors and others are insulators.             Explain how current flows in a circuit.             Identify the dangers of working with electricity.             Identify the safety features in electrical appliances and explain why these are used.</p>	<p><b>I will have the opportunity to:</b>            Draw a circuit diagram using recognised symbols.             Create an accurate series circuit.             Plan and carry out investigations, where variables are controlled, to test a prediction about what might happen if additional components or batteries are added to a circuit.             Identify and comment on patterns, using findings and scientific ideas to support.             Demonstrate safe and careful use of electrical equipment.             Select equipment to make circuits to solve particular problems.             Devise a system to measure brightness of bulbs, speed of motors or volume of a buzzer during a fair test, taking repeat readings where appropriate.             Use findings to pose further questions.</p>	<p><i>current</i>  <i>circuit</i>  <i>series circuit</i>  <i>cell</i>  <i>battery</i>  <i>bulb</i>  <i>buzzer</i>  <i>motor</i>  <i>switches</i>  <i>conductor</i>  <i>insulator</i>  <i>static</i>  <i>electricity</i>  <i>safety</i>  <i>precaution</i>  <i>electrocution</i>  <i>electric shock</i>  <i>defibrillator</i>  <i>open switch</i>  <i>closed switch</i></p> <p><i>positive terminal</i>  <i>negative terminal</i>  <i>electrons</i>  <i>protons</i>  <i>volts</i>  <i>voltage</i>  <i>watts</i>  <i>Ohms</i>  <i>resistance</i>  <i>amps</i>  <i>fuse</i>  <i>live</i></p>	<p>Alessandro Volta</p> <p>Nikola Tesla</p>