

STEM - Physics

		National Curriculum Objectives	Substantive Concepts	Skills	Knowledge	Key Vocabulary	When
R	Year B	Children know about similarities and differences in relation to places, objects, materials and living things.	That there are things which happen every year/all the time.	Talk about weather, birthdays, summer holidays etc...	Daily/weekly routines	Weather Time Day Month year	
YR 1	Year B	<p>Seasonal changes observe changes across the four seasons</p> <ul style="list-style-type: none"> observe and describe weather associated with the seasons and how day length varies. 	Seasons are cyclic and have distinct characteristics. Seasons are linked to the sun.	<p>Ask simple questions about the world Explore information about the world Observe the natural world carefully Observe changes over time Use simple rain gauges and thermometers. Compare daily temperatures Record and communicate findings – weather diary. Use charts- record rainfall over time.</p>	<p>Know the names of the seasons. Know typical weather associated with the seasons and key things that happen.</p> <p>Know that Christmas is in Winter Know that much new life begins in the spring Know about safety in the sun Know that the days are shorter in the winter and longer in the summer. Know that seasonal change is gradual (year 2)</p>	<p>Winter Summer Spring Autumn Day Night Longer Shorter Gauge Thermometer Measurement Clouds Sun Rain Hail Windy</p>	
Yr 2	Year						
YR 3	Year B	<p>Light recognise that they need light in order to see things and that dark is the absence of light</p> <p>notice that light is reflected from surfaces</p> <p>recognise that light from the sun can be dangerous and that there are ways to protect their eyes</p> <p>recognise that shadows are formed when the light from a light source is blocked by a solid object</p> <p>find patterns in the way that the size of shadows change.</p> <p>Forces and magnets</p> <ul style="list-style-type: none"> compare how things move on different surfaces 	<p>We need a light source to see.</p> <p>Light waves travel in straight lines.</p> <p>Shadow and dark are the absence of light.</p> <p>The sun is our main source of light and life.</p> <p>Not all forces can be seen</p>	<p>Make systematic and careful observations</p> <p>Observe and record changes over time</p> <p>Ask questions</p> <p>Take measurements</p> <p>Present data in a variety of ways</p> <p>Record findings using scientific language.</p> <p>Use labelled diagrams, keys, bar charts and tables.</p> <p>Make predictions and Draw simple conclusions.</p> <p>Talk about, then write about things they have found out.</p> <p>Make links between their won science results and other scientific evidence.</p> <p>Use secondary sources.</p> <p>Make systematic and careful observations</p> <p>Ask their own questions about what they observe</p> <p>Talk about criteria for grouping, sorting and classifying</p> <p>Collect data from observations and record findings using drawings, labelled diagrams, keys, bar charts etc..</p>	<p>We need a source of light to be able to see.</p> <p>Identify a range of light sources.</p> <p>Light travels in straight lines</p> <p>We can stop or change the path of light.</p> <p>Light moves incredibly quickly 300,000 kn per second.</p> <p>Know how a shadow is formed.</p> <p>Know how shadows change during the day and begin to relate that to what we know about night and day and the earths movement around the sun.</p> <p>Know that a magnetic force can push or pull.</p> <p>Know that magnets have a north and a south pole</p> <p>Know how magnets will attract and repel</p> <p>Know that some materials will be attracted to a magnet and some wont.</p>	<p>Light source Light See Dark Reflect Surface Natural Star Sun Moon Shadow Blocked Solid Transparent Artificial Torch Candle Lamp Sunlight Dangerous Shine.</p> <p>Force Push Pull Open Surface Magnet Attract</p>	

		<ul style="list-style-type: none"> notice that some forces need contact between two 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 two poles <p>predict whether two magnets will attract or repel each other, depending on which poles are facing.</p>		<p>Make predictions and draw simple conclusions.</p> <p>Talk about and write about what they have found out.</p> <p>Use secondary sources</p>	<p>Know that any material which contains iron or is a alloy of iron will be attracted to a magnet to some extent.</p>	<p>Repel Poles North South Alloy Iron</p>	
YR 4	Year B	<h2>Sound</h2> <p>identify how sounds are made, associating some of them with something vibrating</p> <p>recognise that vibrations from sounds travel through a medium to the ear</p> <p>find patterns between the pitch of a sound and features of the object that produced it</p> <p>find patterns between the volume of a sound and the strength of the vibrations that produced it</p> <p>recognise that sounds get fainter as the distance from the sound source increases.</p>	<p>Sound is made by vibrations which travel through the air.</p> <p>Soundwaves travel in straight lines (note: not true in water)</p>	<p>Use a decibel meter</p> <p>Observe and record readings</p> <p>Ask their own questions</p> <p>Collect and present data.</p> <p>Make predictions and record results.</p> <p>Draw simple conclusions</p> <p>Talk about and write about what they have found out.</p> <p>Use secondary sources</p>	<p>Sound is caused by vibrations</p> <p>We can alter the volume and pitch of sound.</p> <p>Know the difference between pitch and volume and the corresponding wave patterns. That the higher the sound wave the louder it is and that the higher the frequency the higher the pitch.</p> <p>Know how sound travels and how the brain interprets it.</p> <p>Know that sound is measured in decibels.</p> <p>Know that distance from source will affect how we hear the sound.</p>	<p>Sound Sound source Vibrations Ear canal Sound wave Pitch Frequency Decibel Faint Loud Quiet High Low Insulate Barrier</p>	
	B	<h2>Electricity</h2>			<p>Identify electrical and nonelectrical appliances.</p> <p>Be able to explain, with support, how a circuit works.</p> <p>Name at least two electrical conductors and insulators.</p> <p>Create a simple series circuit both with and without a switch.</p>		

		<p>identify common appliances that run on electricity</p> <p>construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</p> <p>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</p> <p>recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</p> <p>recognise some common conductors and insulators, and associate metals with being good conductors.</p>				
YR 5	Year B	<p>Forces</p> <p>explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</p> <p>identify the effects of air resistance, water resistance and friction, that act between moving surfaces</p> <p>recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.</p>	<p>That gravity is a force which is exerted on all objects on earth.</p> <p>Air, water and friction can exert a force which hinders movement.</p> <p>Pulleys and levers magnify the force applied.</p>	<p>With growing confidence, and increasingly scientific language, they ask their own relevant questions about the world around them.</p> <p>With increasing independence, make their own decisions about scientific enquiry and what they might need to do to answer their questions.</p> <p>Think about and talk about scientific phenomena</p> <p>Make their own decisions about what to record</p> <p>Begin to plan, set up and carry out scientific experiments</p> <p>Use their tests to draw conclusions and be able to say if more testing is needed. Know the importance of repeat testing.</p> <p>Choose appropriate equipment within boundaries.</p> <p>Begin to take accurate measurements with increasing accuracy and precision.</p> <p>Record data and results of increasing complexity.</p> <p>explain their findings using relevant and accurate scientific vocabulary.</p> <p>Identify patterns</p> <p>Begin to look for different causal relationships in their data.</p> <p>Discuss the degree of trust they can have in their results.</p>	<p>Identify forces acting on objects</p> <p>Gravity has an effect on objects</p> <p>How the first theory of gravity was developed – the role Isaac Newton had in this.</p> <p>The effects of air resistance on an object</p> <p>The effects of water resistance on an object</p> <p>The effects of friction on an object</p> <p>How pulleys and levers work to minimize the effects of gravity (links with DT)</p>	<p>Force</p> <p>Motion</p> <p>Push</p> <p>Pull</p> <p>Friction</p> <p>Drag</p> <p>Resistance</p> <p>Streamlined</p> <p>Rough</p> <p>Smooth</p> <p>Downward</p> <p>Isaac Newton</p> <p>Newtons</p> <p>Theory</p> <p>Gravity</p> <p>Mass</p> <p>Equal and unequal</p> <p>Float</p> <p>Sink</p> <p>Submerge</p> <p>Displacement</p> <p>Up thrust.</p> <p>Variables</p> <p>Acceleration</p> <p>Deceleration</p> <p>Earth</p>

	B	<p>Earth and Space</p> <p>describe the movement of the Earth, and other planets, relative to the Sun in the solar system</p> <p>describe the movement of the Moon relative to the Earth</p> <p>describe the Sun, Earth and Moon as approximately spherical bodies</p> <p>use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.</p>	<p>That the earth moves around the sun in an ellipses.</p> <p>Day, night and the seasons are a direct result of the proximity of earth to the sun because of the earth's tilt.</p> <p>The moon is always there but is occluded or partly occluded by the earth.</p>	<p>Raise their own relevant questions about the world around them.</p> <p>Research and present information in a clear, scientific way.</p> <p>Ask their own questions about scientific phenomena</p> <p>Explore and talk about their ideas and make their own decisions about the most appropriate for of scientific enquiry.</p> <p>Notice patterns</p> <p>Draw conclusions based on their data and observations.</p> <p>Look for different causal relationships in their data.</p> <p>Independently report and present their conclusions to others in both oral and written forms.</p> <p>Use primary and secondary source evidence to justify ideas</p> <p>Identify evidence which supports their ideas.</p> <p>Communicate and justify scientific ideas.</p>	<p>The solar system and how it works.</p> <p>Know the 8 planets (plus dwarf planets) and some of their distinctive characteristics</p> <p>Know about the movement of the earth on its axis</p> <p>Know how daylight tracks throughout the day with the movement of the earth</p> <p>Time zones</p> <p>Lunar months</p>	<p>Sun</p> <p>Moon</p> <p>Planets</p> <p>Star</p> <p>Solar system</p> <p>Mercury</p> <p>Venus</p> <p>Mars</p> <p>Jupiter</p> <p>Saturn</p> <p>Uranus</p> <p>Neptune (Pluto)</p> <p>Dwarf planet</p> <p>Rotate</p> <p>Orbit</p> <p>Axis</p> <p>Celestial body</p> <p>Spherical</p> <p>Sphere</p> <p>Eclipse</p> <p>Satellite</p> <p>Univers</p>
YR 6	Year B	<p>Light</p> <p>recognise that light appears to travel in straight lines</p> <p>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</p> <p>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</p> <p>use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them.</p>	<p>Light waves travel in straight lines unless their pathway is disturbed</p>	<p>Confidently and using relevant scientific language, they ask their own relevant questions about the world around them.</p> <p>Independently, make their own decisions about scientific enquiry and what they might need to do to answer their questions.</p> <p>Think about and talk about scientific phenomena – begin to explain using scientific reasoning.</p> <p>Make their own decisions about what to record and do so clearly with attention to detail.</p> <p>Plan, set up and carry out scientific experiments</p> <p>Use their tests to draw conclusions and be able to say if more testing is needed. Know the importance of repeat testing.</p> <p>Choose appropriate equipment</p> <p>Take accurate measurements with increasing accuracy and precision.</p> <p>Record data and results of increasing complexity.</p> <p>explain their findings using relevant and accurate scientific vocabulary.</p> <p>Identify patterns</p> <p>Look for different causal relationships in their data.</p> <p>Discuss the degree of trust they can have in their results.</p> <p>Record data of increasing complexity using scientific diagrams and labels,</p>	<p>Light travels in straight lines (year 4)</p> <p>Reflection is light bouncing off a surface</p> <p>Identify some effects of refraction</p> <p>Identify the visible spectrum</p> <p>Recognize Isaac Newton's experiments about light and colour</p> <p>Know that filters absorb different colour wvelengths.</p> <p>Remember that a shadow is cause by an object blocking the light source.</p> <p>Make predictions about shadows</p> <p>Know the main circuit symbols and use these to draw circuit diagrams</p> <p>Explain how our understanding of electricity has changed over time</p> <p>Label the voltage correctly</p> <p>Use variables</p>	<p>Light, light source, names of light sources, dark, reflect, reflective, mirror, shadow, block, absorb, direct/ direction, transparent, opaque, translucent, straight, rainbow, colours refraction.</p> <p>Voltage</p> <p>Brightness</p> <p>Volume</p> <p>Switch</p> <p>Danger</p>
	A	<p>Electricity</p> <ul style="list-style-type: none"> associate the brightness of a lamp or the volume of a buzzer with the 				

		<p>number and voltage of cells used in the circuit</p> <ul style="list-style-type: none"> ▪ 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 <p>use recognised symbols when representing a simple circuit in a diagram.</p>		<p>Talk about the function of components with increasingly scientific vocabulary,</p>	<p>Decide which variables to use Explain the effect of increasing or decreasing voltage Identify variations in component function</p>	<p>Series circuit Circuit diagram Bulb Buzzer Motor Symbol Variable</p>	
<p>YR 6+</p>							