Dashwood Banbury Academy
an Aspirations Academy
Growing together; succeeding together

Long Term Scheme of Work for Science: Physics

Curriculum Intent: At Dashwood, an exciting and engaging Science curriculum will both develop awe and wonder and will equip the children with an essential understanding of the world in which they live. A clear understanding of the three areas of Science (Chemistry, Physics and Biology) will allow children, as they are, as well as the adults they will become, to have a positive impact on the world; they will learn how to ask questions and solve problems.

Whole School thread:

i) Children using different enquiry types to answer scientific questions about the world around them.

ii) Children develop independence in asking questions, planning how to investigate them, carrying out and evaluating investigations

iii) Children develop an understanding of key scientific concepts.

iv) Children having the opportunity to understand the implications of science today and in the future.

Year group	'Need to knows' *Including: safety and programming*	Skills	Key Vocabulary
N	Working Scientifically ➔ That tests help us find out new things ➔ We can make observations and compare to find out new things ➔ Questions help us to find out new information	➔ Carry out simple tests ➔ Use observations ➔ Make comparisons ➔ Ask simple questions	

	<u>Theme: Floating and sinking</u> ➔ That some materials float (wood, cardboard, polystyrene) and some sink (stones, some metals)	➔ Talks about why things happen and how things work.	Float Sink Material Wood Metal Plastic Air
R	<u>Working Scientifically</u> ➔ That tests help us find out new things ➔ We can make observations and compare to find out new things ➔ Questions help us to find out new information <u>Theme: Space and planets</u> (linked to environments) ➔ That other planets may have a different environment to Earth	➔ Carry out simple tests ➔ Use observations ➔ Make comparisons ➔ Ask simple questions ➔ To discuss the features of their own immediate environment and how environments might vary from one another.	Planet Solar system Earth
1	<u>Working Scientifically</u> <u>Seasonal Changes</u> ➔ To know that the year is divided into four seasons: Spring, Summer, Autumn, Winter ➔ To know the weather associated with each season. **Spring**: Early spring can be quite cool;	➔ I can ask simple scientific questions ➔ I can use simple equipment to make observations. ➔ I can carry out simple tests. ➔ I can identify and classify things. ➔ I can suggest what I have found out. ➔ I can use simple data to answer questions ➔ I can **observe and comment** on changes in the weather and the seasons including how day length varies. ➔ I can **suggest** the type of weather in each season.	question answer observe observing equipment identify sort diagram chart compare contrast describe group Record Classify

	average of 13 hours of daylight. **Summer**: the warmest of seasons; average 16 hours of daylight. **Autumn**: temperatures are progressively colder; weather is changeable; 12 hours of light on average. **Winter**: temperatures are at their coldest; weather generally wet, cold and sometimes snows. ➔ To know that in Summer it is hot so we should wear shorts and T-shirts but in Winter it is cold so we need to wrap up warm. ➔ To know that it is not safe to look directly at the sun <u>Tree changes over time</u> ➔ Spring: new leaves and buds begin to grow ➔ Summer: Trees appear full of leaves ➔ Autumn: Leaves being to change colours: oranges, reds, browns and fall from the tree ➔ Winter: trees are bare without leaves; branches and twigs are most visible		Season Summer Spring Autumn Winter Day Daytime Wind Rain Snow Hail Sleet Fog Sun Hot Warm Cold Freezing
	<u>Light</u> ➔ Know that if a source of light is blocked, a shadow is formed ➔ Know that there are different sources of light - sun, flames, torches, electric lights.	➔ I can **observe** and name sources of light including electric lights, flames and the sun ➔ I can associate shadows with a light source being blocked by something ➔ To form a shadow and experiment with changing the size and shape of it.	Source Shadow Sun Light

2	No physics content.		
3	<u>Working Scientifically - Key Investigations</u> <u>Light</u> ➔ To know that light is needed in order to see things and dark is the absence of light. ➔ To know that that light is reflected from surfaces. ➔ Recognise that light from the sun (as well as very bright lights) 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 a solid object. The shadow is the same shape as the object being blocked by the light. ➔ Shadows can be affected by the movement of a light source (the sun low in the sky will produce long shadows whereas the sun directly overhead nearly eliminates shadows) ➔ The distance between a light source and an object affects its size (a shadow will become smaller and clearer in a shadow puppet show the closer the torch is to the puppet) <u>Forces and Magnets</u> ➔ To know that things can be compared depending on how they move on different surfaces. ➔ To know that some forces need contact between two objects ➔ Magnetic forces can act at a distance. ➔ To know that magnets attract and repel each	➔ I can ask relevant scientific questions. ➔ I can use observations and knowledge to answer scientific questions. ➔ I can set up a simple enquiry to explore a scientific question. ➔ I can set up a test to compare two things. ➔ I can set up a fair test and explain why it is fair. ➔ I can make careful and accurate observations, including the use of standard units. ➔ I can use equipment, including thermometers and data loggers to make measurements. ➔ I can gather, record, classify and present data in different ways to answer scientific questions. ➔ I can use diagrams, keys, bar charts and tables; using scientific language. ➔ I can use findings to report in different ways, including oral and written explanations, presentation. ➔ I can draw conclusions and suggest improvements. ➔ I can make a prediction with a reason. ➔ I can identify differences, similarities and changes related to an enquiry. ➔ I can **describe** what dark is (the absence of light). ➔ I can **explain** that light is needed in order to see. ➔ I can **explain** that light is reflected from a surface. ➔ I can **explain and demonstrate** how a shadow is formed. ➔ I can **explore** shadow size and explain. ➔ I can **explain** the danger of direct sunlight and	experiment fair test prediction observation thermometer temperature microscope accuracy results diagram conclusion enquiry Light See Dark Reflect Surface Natural Star

	other depending on which poles are facing each other ➔ To know that magnets have two poles - a North and a South pole ➔ Opposite poles attract (N and S), like poles will repel each other (N and N or S and S). ➔ Know that magnets attract some materials but not others ➔ To know that a variety of everyday materials can be compared and grouped together on the basis of whether they are attracted to a magnet ➔ To know that the way s magnet behaves can also depend on size, type and strength	describe how to keep protected. ➔ Find patterns in the way the size of shadows change. ➔ To predict whether two magnets will attract or repel each other, depending on which poles are facing. ➔ I can **explore and describe** how objects move on different surfaces. ➔ I can **explain** how some forces require contact and some do not, giving examples. ➔ I can **explore** and **explain** how magnets attract and repel in relation to objects and other magnets. ➔ I can **predict** whether objects will be magnetic and carry out an enquiry to test this out. ➔ I can **describe** how magnets work. ➔ I can **predict** whether magnets will attract or repel and **give a reason**.	Sun Moon Shadow Blocked Solid Artificial Torch Candle Lamp Sunlight Dangerous Protect eyes Force Push Pull Surface Magnet Magnetic Attact Repel Magnetic poles North South

4	<u>Working Scientifically - Key Investigations</u> <u>Electricity</u> ➔ To know and name common appliances that run on electricity. ➔ To know how to make a simple series electrical circuit, identifying and naming its basic parts, including cells (a battery), wires, bulbs, switches and buzzers. ➔ To know whether or not a bulb will light in a simple series circuit (a full loop/unbroken circuit) based on whether or not the bulb is part of a complete loop with a battery. ➔ To know that a switch opens and closes a circuit and associate this with whether or not a bulb lights in a simple series circuit. ➔ Recognise some common conductors and insulators, and associate metals with being good conductors. <u>Sound</u> ➔ To know how sounds are made, associating some of them with something vibrating (something moves from side to side at different rates). ➔ To know that vibrations from sound travel through a medium to the ear. ➔ To know that are patterns between the pitch of a sound and features of the object that produced it.	➔ I can ask relevant scientific questions. ➔ I can use observations and knowledge to answer scientific questions. ➔ I can set up a simple enquiry to explore a scientific question. ➔ I can set up a test to compare two things. ➔ I can set up a fair test and explain why it is fair. ➔ I can make careful and accurate observations, including the use of standard units. ➔ I can use equipment, including thermometers and data loggers to make measurements. ➔ I can gather, record, classify and present data in different ways to answer scientific questions. ➔ I can use diagrams, keys, bar charts and tables; using scientific language. ➔ I can use findings to report in different ways, including oral and written explanations, presentation. ➔ I can draw conclusions and suggest improvements. ➔ I can make a prediction with a reason. ➔ I can identify differences, similarities and changes related to an enquiry. ➔ I can **identify and name** appliances that require electricity to function. ➔ I can **construct** a series circuit. ➔ I can **identify and name** the components in a series circuit (including cells, wires, bulbs, switches and buzzers). ➔ I can **draw** a circuit diagram. ➔ I can **predict and test** whether a lamp will light within a circuit. ➔ I can **describe** the function of a switch in a circuit.	experiment fair test prediction observation thermometer temperature microscope accuracy results diagram conclusion enquiry Appliances Electricity Electrical circuit Cell Wire Battery Bulb Buzzer Danger Electrical safety

	➔ 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.	➔ I can **describe** the difference between a conductor and insulators; giving examples of each. ➔ I can associate metals as being good conductors ➔ To find patterns between the pitch of a sound and features of the object that produced it. ➔ I can describe how sound is made. ➔ I can explain how sound travels from a source to our ears. ➔ I can explain the place of vibration in hearing. ➔ I can find patterns between pitch and the object producing a sound. ➔ I can find patterns between the volume of a sound and the strength of the vibrations that produced it. ➔ I can describe what happens to a sound as it travels away from its source.	Sign Insulators Wood Rubber Plastic Glass Conductors Metal Water Switch Open Closed Vibrate Vibration Vibrating Air Medium Ear Hear Sound Volume Pitch Faint Fainter Loud Louder Sring Percussion Woodwind Brass Insulate

5	<u>Working Scientifically - Key investigations</u> <u>Air resistance</u> To know that the weight and size of an object affects the speed it falls at Q: Does the weight/size of a paper helicopter affect how fast it falls? <u>Gravity</u> To know the link between weight and mass Q: What is the link between weight and mass? (linked to newton metres and gravity) <u>Water resistance</u> To know that water resistance will affect an object Q:How can you design and make a boat which will minimise the effects of water resistance? <u>Friction</u> To know that materials have different properties Q: Which material is best to make the sole of a shoe? <u>Forces</u> ➔ To know that unsupported objects fall towards the Earth because of the force of gravity acting between Earth and the falling object. ➔ To know the effects of air resistance, water resistance and friction that act between moving surfaces. ➔ To know that friction can slow down or stop a moving object ➔ To know that a lack of friction can be useful in many circumstances too eg: ice skates, roller	➔ I can plan different types of scientific enquiry. ➔ I can control variables in an enquiry. ➔ I can measure accurately and precisely using a range of equipment ➔ I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. ➔ I can use the outcome of test results to make predictions and set up a further comparative fair test. ➔ I can report findings from enquiries in a range of ways. ➔ I can explain a conclusion from an enquiry. ➔ I can explain causal relationships in an enquiry. ➔ I can relate the outcome from an enquiry to scientific knowledge in order to state whether evidence supports or refutes an argument or theory. ➔ I can read, spell and pronounce scientific vocabulary accurately. ➔ I can **explain** what gravity is and its impact on our lives. ➔ I can explain that Galileo Galilei and Isaac Newton helped to develop theories on gravity. ➔ I can **identify and explain** the effect of air resistance. ➔ I can **identify and explain** the effect of water resistance. ➔ I can **identify and explain** the effect of friction. ➔ I can **explain** how levers, pulleys and gears allow a smaller force to have a greater effect. (Term 5 linked to WW1 wheeled field guns in DT)	fair test dependent variable independent variable control variables prediction observation accurate average reliable pattern relationship rogue conclusion improvement comparative test trend causal precision Gravity Air resistance Water resistance Friction Surface Force Effect Move Accelerate Decelerate Stop Change direction

	skates on a flat surface or a child on a slide. ➔ To know that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.		Brake Mechanism Pulley Lever Gear Spring Galileo Galilei Isaac Newton
	<u>Earth and Space</u> ➔ To know the movement of the Earth, and other planets, relative to the sun in the Solar System ➔ To know that planets orbit the Sun on orbit paths. ➔ To know about the movement of the moon relative to Earth. ➔ To know that the moon is a celestial body which orbits the Earth every 28 days. ➔ To know that the Sun, Earth and moon are approximately spherical ➔ To know that the Earth's rotation can explain day and night and the apparent movement of the Sun across the sky.	➔ I can describe and explain the movement of the Earth and other planets relative to the Sun. ➔ I can **describe** and explain the movement of the Moon relative to the Earth. ➔ I can **explain and demonstrate** how night and day are created. ➔ I can **describe** the Sun, Earth and Moon (using the term spherical). ➔ I can compare the geocentric theory of Ptolomy (Earth at the centre of the Solar System) and the later Heliocentric theory (Sun at the centre of the Solar System) supported by Copernius, Galileo and Newton. ➔ I can describe why when it is daytime in the UK it is nighttime in Australia	Earth Sun Moon Planets Orbit Day Night rotate Space Planet Solar system Gravity Mass Sphere Axis Mercury Venus Mars Jupiter Saturn Uranus Neptune Pluto Ptolemy Copernicus Newton Galileo

			Heliocentric Geocentric Hemisphere Tilt Season
6	Working Scientifically - Key Investigations. <u>Light</u> ➔ To know that light appears to travel in straight lines. ➔ To know that shadows have the same shape as the objects that cast them. ➔ To know that the shadow is smaller and clearer if the light source is close but larger and less clear if the light source is further away.	➔ I can plan different types of scientific enquiry. ➔ I can control variables in an enquiry. ➔ I can measure accurately and precisely using a range of equipment. ➔ I can record data and results using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs. ➔ I can use the outcome of test results to make predictions and set up a further comparative fair test. ➔ I can report findings from enquiries in a range of ways. ➔ I can explain a conclusion from an enquiry. ➔ I can explain causal relationships in an enquiry. ➔ I can relate the outcome from an enquiry to scientific knowledge in order to state whether evidence supports or refutes an argument or theory. ➔ I can read, spell and pronounce scientific vocabulary accurately. ➔ I can **explain** how light appears to travel in straight lines. ➔ I can **explain and demonstrate** how we see objects because the give out or reflect light into the eye. ➔ I can **explain** why shadows have the same shape as the object that casts them. ➔ I can **explain** how simple optical instruments work, e.g. periscope, telescope, binoculars, mirror,	fair test dependent variable independent variable control variables prediction observation accurate average reliable pattern relationship rogue conclusion improvement comparative test trend causal precision Light Light Travels Straight Reflect Reflection Light source Objects

	➔ To know that longer shadows are cast with a lower light source. <u>Electricity – circuits</u> ➔ To know that the brightness of a lamp or the volume of a buzzer is associated with the number and voltage of cells used in a circuit. ➔ To know that more cells or voltage will give a brighter light or a louder buzz. ➔ To know reasons for the variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches. ➔ To know that symbols represent a simple circuit in a diagram	magnifying glass etc. ➔ I can explain that shadows are affected by the direction of the light source as well as the distance between the object and the light source. ➔ I can **explain** how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer. ➔ I can **compare and give reasons** for why components work and do not work in a circuit. ➔ I can **draw** circuit diagrams using the correct symbols. ➔ Use recognised symbols when representing a simple circuit in a diagram	Shadows Mirrors Periscopes Rainbows Filters . Voltage Brightness Volume Switches Danger Series Circuits Working safely Electrical safety Sign Circuit diagrams Switch Bulb Buzzer Motor Recognised Symbols