

Science at Almond Hill Junior School 2023-2024



Subject Intent Statement

By the end of Key Stage 2, children at Almond Hill will understand that science is everywhere in the world around them.

As stated in the National Curriculum, children will have a secure knowledge in a broad range of scientific fields including biological, chemical and physical processes in addition to the environmental influences of our world.

Children will learn to work scientifically, which includes: applying ideas, raising questions and planning investigations. Children will also use the enquiry skills which are: fair testing, research, observation over time, pattern seeking and classification.

At Almond Hill we intend to develop children's natural curiosity so they follow their own lines of enquiry and furthermore foster a love and appreciation for science.

Implementation

Science is taught regularly with a view to 2 hours of input some of which may be cross curricular. A range of topics are taught and many are re-visited in both the lower and upper key stage with a focus on different content within a unit and developing skills in line with the progression document. The school has developed scientific principles that are referred to and discussed in every lesson (via the Pink Slips).

These are:

- Let's investigate
- I've seen this before
- Children ask questions
- Science is fun
- Teamwork
- My teacher loves science

Curriculum Development

This year we have focused on continuing to embed 'Post-it Planning' to support our scientific investigation skills (see Appendix 2 for resources). The process helps the children to:

- Creatively think about **variables** they could explore and measure in relation to the topic area.
- The importance of **fair testing** and understanding why some variables need to be kept the same to help them explore their research question.
- Understand how the **prediction** links to the variables they are testing and their broader subject knowledge relating to the topic.

The resources have been shared across the school and trialled in various parts of the Science curriculum. We have also started to create differentiated versions of the 'Post-it Planning' planner to support children with additional needs and have trialled different types of scaffolds to support the 'writing up' stage of an investigation.

Topics/Units Across the Key Stage

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
3	Forces: Push/pull, friction & magnets	Rocks, fossils & soil formation	Animals including Humans: Diet, skeletons & muscles	<i>British Science Week</i>	Plants: Parts of a plant & their functions	Light: Light & dark, the sun & shadows
4	Sound: Vibration, pitch and volume.	Electricity: Simple circuits, conductors & insulators	States of Matter: Solids, liquids & gases	<i>British Science Week</i>	Animals including Humans: Teeth & digestion	Living things and their Habitats: Classification & food chains
5	Forces: Gravity, resistance/ friction & mechanisms	Earth and Space: Movement & the solar system <i>(links to School Trip to the Space Centre)</i>	Materials and their properties (including changes to properties)	<i>British Science Week</i>	Living things and their Habitats/Animals including Humans: Life cycles of plants and animals including reproduction	
6	Evolution and Inheritance, including fossils & adaptations		Animals including Humans: Circulatory system & the impact of diet/lifestyle on its function	Living things and their Habitats: Classification & micro- organisms <i>British Science Week</i>	Light: How light travels & reflection	Electricity: Circuit diagrams, circuit components & voltage

Progression of skills

Part 1 – Working Scientifically*

Whole School Skills		
Working Scientifically	Year 3/4	
	Asking Questions	<ul style="list-style-type: none"> Ask relevant questions and use different types of scientific enquiries to answer them Set up simple practical enquiries, comparative and fair tests
	Measuring and recording	<ul style="list-style-type: none"> Make systematic and careful observations and, where appropriate, take accurate measurements using standard units, using a range of equipment, including thermometers and data loggers Record findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables Gather, record, classify and present data in a variety of ways to help in answering questions
	Concluding	<ul style="list-style-type: none"> Identify differences, similarities or changes related to simple scientific ideas and processes Report on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions Use straightforward scientific evidence to answer questions or to support their findings
	Evaluating	<ul style="list-style-type: none"> Use results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
		Year 5/6
		Year 3 / 4 plus: <ul style="list-style-type: none"> Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
		Year 3 / 4 plus: <ul style="list-style-type: none"> Take measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate Record data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
		Year 3 / 4 plus: <ul style="list-style-type: none"> Identify scientific evidence that has been used to support or refute ideas or arguments Report and present 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
		Year 3 / 4 plus: <ul style="list-style-type: none"> Use test results to make predictions to set up further comparative and fair tests

* Adapted from HfL Assessment Criteria for Working Scientifically Skills Overview (2016) / National Curriculum

Part 2 – Scientific Knowledge*

Red statements are National Curriculum Objectives or key expectations for Scientific Knowledge in the specific area of study.

Whole School Skills				
	Year 3	Year 4	Year 5	Year 6
Animals including Humans	<p>WTS:</p> <ol style="list-style-type: none"> 1. <i>Identify some foods needed for a healthy and varied diet</i> 2. Know they have bones and muscles in their body 3. State that they and other animals have skeletons 4. <i>Identify animals that do not have an internal skeleton (invertebrates)</i> 5. Group animals with and without an internal skeleton 6. Recognise that their skeletons grow as they grow. <p>ARE:</p> <ol style="list-style-type: none"> 1. Name the components of a healthy and varied diet. 2. Describe how their diet is balanced 3. <i>Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat</i> 4. Describe some observable characteristics of bones 5. <i>Describe the main functions of their skeletons</i> 6. State that movement depends on both skeleton and muscles 7. state that when one muscle 	<p>WTS:</p> <ol style="list-style-type: none"> 1. <i>Identify a wider range of body parts, including some internal organs (large intestine, small intestine, brain, lungs, heart, stomach, oesophagus)</i> 2. Locate and name the different organs in the digestive system 3. Recognise they need to take care of their teeth 4. <i>Name the different types of teeth</i> <p>ARE:</p> <ol style="list-style-type: none"> 1. <i>Describe the role of each organ in the digestive system</i> 2. <i>Describe the simple functions of the basic parts of the digestive system in humans</i> 3. Describe the role of each type of teeth in digestion 4. <i>Identify the different types of teeth in humans and their simple functions</i> 5. Explain how they should look after their teeth and recognise why they need to do so 5. State that animals have different diets and may have different kinds of teeth <p>GDS:</p> <ol style="list-style-type: none"> 1. Explain why humans do not have a full set of adult teeth at birth 2. Explain why food needs to be broken down 	<p>WTS:</p> <ol style="list-style-type: none"> 1. Identify ways in which the appearance of humans changes as they get older 2. Identify some characteristics that will not change with age 3. Recognise stages in growth and development of humans including puberty <p>ARE:</p> <ol style="list-style-type: none"> 1. <i>Describe the changes as humans develop to old age</i> <p>GDS:</p> <ol style="list-style-type: none"> 1. Describe and give reasons for changes in humans as they develop into old age. <p><i>Note. Taught in conjunction with “Living things and their habitats”.</i></p>	<p>WTS:</p> <ol style="list-style-type: none"> 1. Identify and name the parts of the circulatory system 2. Know that the heart is made of muscle 3. State how to measure pulse rate 4. Recognise that pulse rate is a measure of how fast the heart is beating 5. Identify some of the harmful effects of smoking 6. Identify food as a fuel for the body <p>ARE:</p> <ol style="list-style-type: none"> 1. <i>Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</i> 2. <i>Describe what the heart and blood vessels do</i> 3, Discover that during exercise the heart beats faster to take blood more rapidly to the muscles 4. Make careful measurements of pulse rate 5. Describe the different functions of the blood (e.g. transporting and protecting)

	<p>contracts another relaxes</p> <p><u>8. Identify that humans and some other animals have skeletons and muscles for support, protection and movement</u></p> <p>GDS:</p> <ol style="list-style-type: none"> 1. Describe an adequate and varied diet for humans, recognising that there are many ways of achieving this. 2. Describe problems associated with broken bones or bone diseases. 3. Describe some advantages of having an internal skeleton over no skeleton or an exoskeleton. 4. Describe the role of different food groups. 5. Compare and contrast diets of animals including pets. 	<ol style="list-style-type: none"> 3. Explain why dentists are concerned about the amount of sugar children have. 4. Explain how fossilised teeth give us clues about an animals' diet 5. Explain why the teeth of certain types of animals need to be different 	<p><u>6. Know that the blood comes from the heart in arteries and returns to the heart in veins</u></p> <p>7. Know that blood carries oxygen and other essential materials around the body</p> <p><u>8. Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.</u></p> <p><u>9. Describe the ways in which nutrients and water are transported within animals, including humans</u></p> <ol style="list-style-type: none"> 10. Recognise that care needs to be taken with medicines and that they can be dangerous 11. Give several reasons why it is sometimes necessary to take medicines 12. Identify some harmful effects of drugs. 13. Name the major groups into which food is categorised and identify sources for each group describe the main function of organs of the human body <p>GDS:</p> <ol style="list-style-type: none"> 1. Explain the effect of diet on particular organs of the body / aspects of health 2. Explain the effect of exercise on particular organs of the body/aspects of health 3. Explain how ideas about the circulatory system have
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				<p>changed over time</p> <p>4. Explain how ideas about smoking have changed over time</p> <p>5. Explain why advice on diet changes (e.g. butter vs margarine, five a day, tax on sugary drinks)</p>
Living things and their Habitats		<p>WTS:</p> <ol style="list-style-type: none"> 1. Recognise that animals can be grouped into vertebrates and invertebrates 2. Identify that some animals feed on other animals and some on plants 3. Explore ways of grouping living things including animals and plants (flowering and non-flowering) 4. Represent feeding relationships with simple food chains <p>ARE:</p> <ol style="list-style-type: none"> 1. <u>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment</u> 2. <u>Recognise that living things can be grouped in a variety of ways</u> 3. Describe some of the characteristics of the vertebrate (fish, mammals, amphibians, reptiles and birds) groups (e.g. warm-blooded, have fur, lay eggs) 4. Group animals into vertebrate (fish, mammals, amphibians, reptiles and birds) and invertebrates groups (snails, slugs, spiders, worms and insects) 5. Recognise that green plants are the 	<p>WTS:</p> <ol style="list-style-type: none"> 1. <u>sequence the life cycles of a variety of plants and animals</u> 2. name the parts of a flower 3. name the parts of the human reproductive system <p>ARE:</p> <ol style="list-style-type: none"> 1. Recognise the similarities in the life cycles of plants, animals and humans 2. <u>Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird</u> 3. Describe the functions of some parts of a flower 4. Describe the main functions of parts of a plant involved in reproduction 5. Describe the processes of sexual and asexual reproduction in plants 6. Describe the simple functions of parts of the human reproductive system 7. <u>Describe the life process of reproduction in some plants and animals</u> 8. Compare methods of seed dispersal 9. Know that most animals reproduce 	<p>WTS:</p> <ol style="list-style-type: none"> 1. Recognise that there is a wide variety of living things 2. Identify vertebrates and invertebrates 3. Name and describe the five vertebrate groups 4. Understand there are living things that are too small to be seen and these can affect our lives 5. Recognise that there are many micro-organisms, some which can cause illness or decay <p>ARE:</p> <ol style="list-style-type: none"> 1. understand why classification is important 2. <u>Describe how living things are classified into broad groups according to common observable characteristics and based on similarities and differences, including micro-organisms, plants and animals</u>

		<p>ultimate source of food for all animals</p> <p>6. Recognise that a food chain must always start with a green plant (a producer)</p> <p>7. Represent feeding relationships within a habitat with food chains beginning with a green plant which 'produces' food for the other organisms</p> <p>8. Use and understand the terms: producer, predator and prey</p> <p><u>9. Construct and interpret a variety of food chains, identifying producers, predators and prey</u></p> <p>10. Know the function of some of the more complex features which aid survival in specific habitats (e.g. gills, blubber, camouflage)</p> <p>11. Describe why different animals and plants live in different habitats</p> <p><u>12. Recognise that environments can change and that this can sometimes pose dangers to living things</u></p> <p>13. Describe how humans can cause changes to environments explain that different organisms are found in different habitats because of differences in environmental factors</p> <p>GDS:</p> <p>1. Use food chains to predict what might happen to the numbers of an organism if there are suddenly more predators or less prey</p> <p>2. Explain why it is necessary to use a reasonably large sample when investigating the preferences of small invertebrates</p>	<p>by sexual reproduction</p> <p>GDS:</p> <p>1. Compare internal and external fertilisation in animals</p> <p>2. Explain that living things need to reproduce if the species is to survive</p> <p>3. Compare gestation periods (pregnancy) of different animals</p> <p>4. Explain what is unusual about the life cycle of a kangaroo or koala</p>	<p><u>3. Give reasons for classifying plants and animals based on specific characteristics</u></p> <p><u>4. Recognise that there are useful micro-organisms which can be used in food production</u></p> <p>5. Describe how micro-organisms feed, grow and reproduce like other organisms</p> <p><u>6. Describe evidence, from investigations, that yeast is living</u></p> <p>7. Explain how micro-organisms can move from one food source to another or from one animal to another</p> <p>GDS:</p> <p>1. Devise own keys to classify organisms and objects</p> <p>2. Describe early ideas about classification (e.g. Aristotle)</p> <p>3. Compare the rate of reproduction in microorganisms to other animals</p> <p>4. Describe how the development of the microscope has contributed to our understanding of microorganisms describe how ideas about hygiene have changed over time (e.g. Semmelweis)</p>
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		<p>3. Describe how humans have negatively impacted environments (e.g. pollution, deforestation, introduction of invasive species)</p> <p>4. Explain why some animals are hard to classify (e.g. platypus, echidna, bat, flightless birds)</p>		
Plants	<p>WTS:</p> <p><i>1. Identify parts of flowering plants</i></p> <p><i>2. Recognise that plants need light, water and warmth and healthy leaves, roots and stems in order to grow well</i></p> <p>3. Know that plants make their own food</p> <p>4. Know that water travels from the roots up the stem</p> <p>5. Sequence pictures to show the life cycle of a plant</p> <p>ARE:</p> <p><i>1. <u>Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers</u></i></p> <p>2. Describe why healthy roots and a healthy stem are needed for plants</p>			

	<p>to grow</p> <p>3. Recognise that the leaves of a plant are associated with healthy growth and more specifically nutrition</p> <p>4. Know that fertilisers contain minerals</p> <p>5. Understand that plants absorb minerals from the soil (Teacher Note: plants create their own food using sunlight, water and carbon dioxide, they do not absorb food from the soil)</p> <p>6. Describe how changes to light and fertiliser affect plant growth</p> <p><u>7. Explore the requirements of plants for life and growth (air, light, water, nutrients from soil, and room to grow) and how they vary from plant to plant</u></p> <p><u>8. Investigate the way in which water is transported within plants</u></p> <p>9. Describe how the stem has a role in support and nutrition (transport of water)</p> <p><u>10. Describe why plants need flowers</u></p> <p>11. Describe the role of bees and insects in pollination</p> <p>12. Describe how pollen and seeds are dispersed</p> <p><u>13. Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal</u></p>			
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	GDS: 1. <i>Explain why healthy roots and a healthy stem are needed for plants to grow</i> 2. Explain that differences in plant growth are due to the amount of light and/or water 3. Compare methods of seed dispersal 4. Compare the roots of different plants (e.g. desert plants or rainforest tree. Teacher Note: rainforest trees have very shallow roots as the quality of the soil is more and most of the nutrients are near the surface)			
Light	WTS: 1. Name a number of light sources, including the sun 2. Recognise that they cannot see in the dark 3. State that reflections can be seen in shiny surfaces 4. Makes generalisations about shiny surfaces (e.g. smooth) 5. Recognise that light travels from a source 6. Recognise that when light is blocked, a shadow is formed 7. Make observations of changes in shadows			WTS: 1. Describe reflection as light 'bouncing off' objects 2. Explore how light travels using torches and periscopes ARE: 1. Understand that in order to be seen, all non-luminous objects must reflect light 2. <u>Recognise that light appears to travel in straight lines</u> 3. Diagrammatically represent light from sources and bouncing off reflective surface using arrows

<p>ARE:</p> <ol style="list-style-type: none"> 1. Describe and compare some light sources 2. State that light sources are seen when light from them enters the eyes 3. <u>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes</u> 4. <u>Recognise that they need light in order to see things and that dark is the absence of light</u> 5. Explain that places are dark because there is no light and a light source is needed to help us see in such places 6. <u>Notice that light is reflected from surfaces</u> 7. Demonstrate light travelling using a torch and record light bouncing off a mirror 8. Identify suitable reflective clothing for travelling in the dark 9. Explain that they cannot see shiny objects in the dark because there are no light sources 10. <u>Recognise that shadows are formed when the light from a light source is blocked by a solid object</u> 11. Recognise that shadows are similar in shape to the objects forming them 12. Explain that shadows are formed when light from a source is blocked 13. State that even transparent objects block some light and form 			<p>4. <u>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</u></p> <ol style="list-style-type: none"> 5. Draw diagrams to illustrate how light is travelling from the source to the eye 6. <u>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</u> 7. Describe a variety of ways of changing the size of the shadow produced by an object 8. Describe the relationship between the size of a shadow and the distance between the light source and an object 9. Diagrammatically represent the formation of shadows using arrow convention 10. <u>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them</u> <p>GDS:</p> <ol style="list-style-type: none"> 1. Know that, when sunlight passes through some objects, coloured light is produced (for example in rainbows, soap bubbles and prisms)
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	<p>shadows</p> <p>14. Describe the difference in shadows cast by opaque, translucent and transparent materials</p> <p>15. Explore how to make shadows of different shapes and sizes</p> <p><u>16. Find patterns in the way that the size of shadows change</u></p> <p>GDS:</p> <p>1. Conduct experiments to find answers to their own shadow related hypothesis using own method.</p> <p>2. Develop ideas about how light travels.</p>			2. Describe how curved mirrors distort a reflection
Forces (and Magnets)	<p>WTS:</p> <p><i>1. Recognise that pushes and pulls are forces</i></p> <p>2. Recognise that a force acts in a particular direction</p> <p>3. Observe the movements, shape and direction of objects when forces act on them</p> <p>4. Identify friction as a force</p> <p>5. Observe and explore how friction affects the movement of objects</p> <p>6. Classify materials as magnetic or non-magnetic</p> <p>7. Recall that magnets have a north and a south pole</p> <p>ARE:</p> <p>1. Describe how to make a familiar object start moving by pushing or</p>		<p>WTS:</p> <p>1. Identify that force is measured in Newtons</p> <p><i>2. Name simple forces such as gravity, friction and air resistance</i></p> <p>3. Recognise that more than one force can act on an object</p> <p><i>4. Recognise that air resistance slows things down</i></p> <p>5. Recognise that friction can be useful or not useful</p> <p>ARE:</p> <p>1. Identify weight as a force</p> <p>2. Draw force diagrams with arrows showing the direction of forces acting on an object</p> <p>3. Observe and explore the effect of several forces on objects</p>	

	<p>pulling</p> <p>2. Describe how to use pushes and pulls to make familiar objects speed up, slow down, change direction or shape</p> <p>3. Produce annotated drawings showing the direction of force needed to make an object move</p> <p>4. Describe some ways in which friction between solid surfaces can be increased or decreased</p> <p><u>5. Compare how things move on different surfaces</u></p> <p><u>6. Observe how magnets attract or repel each other and attract some materials and not others</u></p> <p><u>7. 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</u></p> <p>8. Describe the difference between a magnet and a magnetic material</p> <p>9. Describe what happens when some materials are put near a magnet</p> <p><u>10. Notice that some forces need contact between two objects, but magnetic forces can act at a distance</u></p> <p>11. Recall that magnets have a north and a south pole</p> <p><u>12. Describe magnets as having two poles</u></p> <p>13. Describe the direction of forces between magnets</p>		<p><u>4. Identify the effects of air resistance, water resistance and friction, that act between moving surfaces</u></p> <p>5. Describe some situations in which there is more than once force acting on an object</p> <p>6. Describe and explain the motion of some familiar objects in terms of several forces acting on them</p> <p>7. Identify forces on an object as either balanced or unbalanced</p> <p>8. Use the terms 'balanced' and unbalanced' when describing several forces on an object</p> <p>9. Explain that balanced forces on an object cause it to remain stationary or travel at the same speed</p> <p>10. Explain that unbalanced forces on an object cause it to speed up, change shape or slow down</p> <p><u>11. Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object</u></p> <p>12. Understand that air resistance is the frictional force of air on objects moving through it</p> <p>13. Describe some of the factors that increase friction between solid surfaces and increase air and water resistance</p> <p>14. Describe situations in which frictional forces are helpful as well as those in which frictional forces are unhelpful</p> <p>15. Explore the effects of levers, pulleys and gears</p>	
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	<p><u>14. Predict whether two magnets will attract or repel each other, depending on which poles are facing</u></p> <p>GDS:</p> <ol style="list-style-type: none"> 1. Describe some everyday uses of magnets 2. Explain that a compass works by lining up with the Earth's magnetic field <p>describe how lodestone was found to be a naturally occurring magnet and was used as the first compass for navigation.</p>		<p><u>16. Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect</u></p> <p>GDS:</p> <ol style="list-style-type: none"> 1. Describe how levers, pulleys and gears are used in everyday life (e.g. having gears can make it easier to pedal a bike, a bottle opener makes it easier to open a bottle lid) 2. Explain how introducing gears onto bikes has changed cycling 3. Identify streamlined objects and describe why they have been designed in this way (e.g. cycling helmets, formula 1 cars, dolphins) 	
<p>Materials</p> <p>(Rocks, fossils and soils, states of matter, properties and changes)</p>	<p>ROCKS, FOSSILS AND SOILS</p> <p>WTS:</p> <ol style="list-style-type: none"> 1. Observe the characteristics of a variety of rocks 2. Name and describe the characteristics of several rocks 3. Identify fossils in rocks 4. Understand that there are rocks under the Earth's surface 5. Recognise that soil is a mixture of different materials and living things <p>ARE:</p> <ol style="list-style-type: none"> 1. Classify rocks from the evidence of investigations 2. Explain that rocks are used for different purposes dependent on 	<p>STATES OF MATTER</p> <p>WTS:</p> <ol style="list-style-type: none"> 1. Name some solids and liquids 2. State that air is a gas 3. State some differences between solids, liquids and gases 4. Observe what happens to a variety of materials when they are heated (e.g. chocolate, ice cream, butter, water) 5. Describe what happens to water when it is heated and cooled 6. State that ice, water and steam are the same material <p>ARE:</p> <ol style="list-style-type: none"> 1. Recognise everyday substances as solids, liquids and/or gases 	<p>MATERIALS AND THEIR PROPERTIES</p> <p>WTS:</p> <ol style="list-style-type: none"> 1. Observe and explore the properties of materials (e.g. hardness, transparency, magnetism, electrical and thermal conductivity) 2. Identify some materials that are good thermal insulators and some everyday uses of these 3. Recognise that dissolving is a reversible change 4. Recognise that changes of state are reversible 5. Recognise the hazards of burning materials 	

<p><u>their physical properties</u></p> <p>3. Explain that different types of rock react differently to physical forces (e.g. water, rubbing)</p> <p><u>4. Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties</u></p> <p><u>5. Describe in simple terms how fossils are formed when things that have lived are trapped within rock</u></p> <p>6. Recognise that soil contains dead plants and animals</p> <p>7. Recognise that there is rock under all surfaces</p> <p><u>8. Recognise that soils are made from rocks and organic matter</u></p> <p>GDS:</p> <p>1. Relate the simple physical properties of some rocks to their formation</p> <p>2. Explain how a model (e.g. biscuits, chocolate bars) can be used to represent sedimentary, metamorphic and igneous rocks</p> <p>3. Describe how Mary Anning discovered fossils</p> <p>4. Explain why we do not see the soft parts of animals in fossils</p> <p>5. Explain why we might find lots of the same types of rock in one place</p> <p>6. Explain why certain rocks are used for different purposes and why some rocks could be used for these jobs for example:</p>	<p>2. Recognise that air is a material and that it is one of a range of gases which have important uses</p> <p>3. Know that gases can be easily compressed</p> <p>4. Describe the differences between solids and liquids</p> <p>5. Compare simple solids and liquids (e.g. in terms of ease of squashing or pouring)</p> <p><u>6. Compare and group materials together, according to whether they are solids, liquids or gases</u></p> <p>7. Make clear distinctions between the properties of solids, liquids and gases</p> <p>8. Identify a wide range of contexts in which changes of state take place</p> <p>9. Describe a few examples where these changes occur</p> <p>10. Recognise that for a substance to be detected by smell, some of it must be in the gas state</p> <p><u>11. Observe that some materials change state when they are heated or cooled, and measure or research the temperature at which this happens in degrees Celsius (°C)</u></p> <p>12. Describe how when ice melts it turns to liquid and how when water freezes it becomes ice</p> <p>13. Describe how these processes can be reversed</p> <p>14. Describe how liquids evaporate to form gases and how gases condense to form liquids</p> <p>15. Describe/sequence the changes that happen in the water cycle</p> <p>16. Explain the relationship between</p>	<p>ARE:</p> <p>1. Suggest why particular materials are used for different jobs depending on their properties</p> <p><u>2. 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</u></p> <p><u>3. Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic</u></p> <p>4. Describe melting and dissolving and give everyday examples of each</p> <p>5. Separate an undissolved solid from a liquid by filtering</p> <p>6. Recognise that an undissolved solid can be separated from liquid by filtering</p> <p>7. Recognise that a solid can be recovered from a solution by evaporation</p> <p>8. Describe the properties of mixtures which can be separated by filtration</p> <p>9. Describe some methods that are used to separate simple mixtures</p> <p>10. Explain that when solids dissolve they break up so small they can pass through the holes in the filter paper</p> <p><u>11. Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution</u></p>	
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	<ul style="list-style-type: none"> - Marble- kitchen worktops or statues - Slate roof tiles - Granite walls 	<p>liquids and solids in terms of melting and freezing</p> <p>17. Explain the relationship between liquids and gases in terms of evaporation and condensation</p> <p><u>18. Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature</u></p> <p><u>19. Know that temperature can affect the rate of evaporation or condensation</u></p> <p>20. Identify a range of contexts in which changes take place (e.g. evaporation of puddles in the school playground or from clothes on the washing line, condensation in the bathroom)</p> <p>GDS:</p> <ol style="list-style-type: none"> 1. Make clear distinctions between the properties of solids, liquids and gases 2. Explain why some substances are hard to classify as solids, liquids and gases (e.g. whipped cream, mousse, mayonnaise, muddy water, fizzy drinks, cornflour and water) 3. Compare the boiling point of different liquids 4. Explain why salt is put on the roads in winter 	<p><u>12. Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating</u></p> <p>13. Recognise that some changes can be reversed and some cannot</p> <p><u>14. Demonstrate that dissolving, mixing and changes of state are reversible changes</u></p> <p>15. Observe and explore a variety of chemical changes (e.g. burning)</p> <p>16. Identify whether some changes are reversible or not</p> <p>17. Classify some changes as reversible (e.g. <i>dissolving</i>) and others as irreversible (e.g. <i>burning</i>)</p> <p><u>18. Explain that some changes result in the formation of new materials, and that this kind of change is not usually reversible, including changes associated with burning and the action of acid on bicarbonate of soda</u></p> <p>19. Explain that in some cases the new materials made are gases and identify some evidence for the production of gases (e.g. vigorous bubbling)</p> <p>GDS:</p> <ol style="list-style-type: none"> 1. Describe the difference between melting and dissolving 2. Recognise that inks and dyes are often mixtures of different colours and these can be separated by chromatography 	
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			<p>3. Explain why ink or dye moves up the paper in chromatography</p> <p>4. Describe the properties of new materials (e.g. aerogel, silly putty, wrinkle-free cotton)</p> <p>5. Explain why some materials are good thermal insulators</p>	
Evolution and Inheritance				<p>WTS:</p> <p>1. Recognise variation in different species (e.g. dogs, horses)</p> <p>2. Describe how animals and plants are adapted to their environments</p> <p>3. Recognise that animals have to compete for food</p> <p>4. Describe how animals avoid predators (e.g. speed, camouflage)</p> <p>recognise that offspring have some of the features of their parents</p> <p>ARE:</p> <p><u>1. Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</u></p> <p><u>2. Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead</u></p>

				<p><u>to evolution</u></p> <p>3. Explain how being well adapted to an environment means an organism is more likely to survive</p> <p><u>4. Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</u></p> <p>5. Explain why we do not have a complete fossil record</p> <p>GDS:</p> <p>1. Explain that animals which are better adapted to an environment are more likely to survive, reproduce and pass on characteristics to their offspring meaning the animal species will gradually change and evolve (giraffe with the tallest neck could reach more leaves to feed on)</p> <p>2. Describe the story of the peppered moth and how this provides evidence for natural selection</p> <p>3. Explain how antibiotic resistant bacteria provide evidence for natural selection</p> <p>4. Explain why we can see evidence for natural selection in fast reproducing organisms like bacteria (e.g. antibiotic resistant</p>
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				bacteria and pesticide resistant insects) 5. Explain how the introduction of a new species to an isolated environment can affect native species (e.g. Dodo, Kakapo or Stephen's Island Wren) 6. Compare the ideas of Darwin and Lamarck about evolution
Earth and Space			WTS: 1. Identify and name the components of the solar system (i.e. Sun, Moon, Earth and other planets) 2. Locate the Sun, Earth and other planets in the solar system 3. Recognise that the Earth and other planets orbit the Sun 4. Recall that the Earth takes one year to orbit the Sun 5. Recall that the Earth rotates on its' axis and this takes one day 6. Recognise that the Moon orbits the Earth 7. Recall that a shadow from the Sun changes over the course of a day ARE: <u>1. Describe the movement of the Earth, and other planets, relative to the Sun in the solar system</u> <u>2. Describe the movement of the Moon relative to the Earth</u>	

			<p><u>3. Describe the Sun, Earth and Moon as approximately spherical bodies</u></p> <p>4. Recognise that the Earth, Sun and Moon are spherical and support this with some evidence</p> <p>5. Recognise that it is daylight in the part of the Earth facing the Sun</p> <p>6. Explore and describe how a shadow from the Sun changes over the course of a day</p> <p>7. Explain in terms of the rotation of the Earth why shadows change and the Sun appears to move across the sky during the course of the day</p> <p><u>8. Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky</u></p> <p>9. Explain why it is night time in Australia when it is day time in England</p> <p>GDS:</p> <p>1. Explain that gravity is a force of attraction and it is what holds the planets in orbit around the Sun and the Moon in orbit around the Earth</p> <p>2. Explain that the changes in the appearance of the Moon over a period of 28 days arise from the Moon orbiting the Earth once every 28 days</p> <p>3. Use simple physical models to explain effects that are caused by the movement of the Earth</p> <p>4. Explain how ideas about the solar system have changed over time</p>	
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Sound		<p>WTS:</p> <ol style="list-style-type: none"> 1. Recognise and describe many sounds and sound sources 2. State that they hear sounds through their ears 3. <i>Recognise that when sounds are generated by objects, something moves or vibrates</i> 4. Describe differences in pitch and volume describe what they observe when they move further away from a source of sound <p>ARE:</p> <ol style="list-style-type: none"> 1. <i>Identify how sounds are made, associating some of them with something vibrating</i> 2. Identify what is vibrating in a range of musical instruments 3. Generalise that sounds are produced when objects vibrate 4. Describe how sounds are generated by specific objects 5. Suggest ways of producing sounds 6. <i>Recognise that vibrations from sounds travel through a medium to the ear</i> 7. <i>Find patterns between the pitch of a sound and features of the object that produced it</i> 8. Distinguish between pitch and volume (loudness) 9. Know that altering vibrations alters the pitch or volume 10. Suggest how to change the loudness of the sounds produced by a range of musical instruments 		
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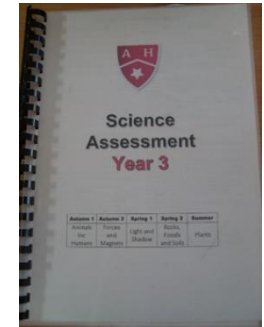
		<p>11. Explore how to vary the pitch and volume of sounds from a variety of objects or instruments</p> <p><u>12. Find patterns between the volume of a sound and the strength of the vibrations that produced it</u></p> <p><u>13. Recognise that sounds get fainter as the distance from the sound source increases</u></p> <p>14. Describe what they observe when they move further away from the source of a sound</p> <p>GDS:</p> <ol style="list-style-type: none"> 1. Describe ways in which the pitch of a sound made by a particular instrument or vibrating object can be raised or lowered 2. Generalise the effects of changes on sound (e.g. the tighter the tension the higher the pitch) 3. Group instruments independently by the way sounds are produced 4. Recognise that sounds travel through solids, water and air 5. Explore how sound travels through a variety of materials 6. Identify suitable materials to use for sound insulation 7. Recognise that sound can be reflected from a surface which can cause an echo describe how some animals use echo-location 		
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Electricity		<p>WTS:</p> <ol style="list-style-type: none"> <u>1. Identify common appliances that run on electricity</u> <u>2. Identify mains operated and battery operated devices</u> Describe some of the dangers associated with mains electricity Name some components of a simple electrical circuit Know that batteries are sources of electricity Recognise that for a circuit to work it must be complete Construct a working circuit identify materials as conductors or insulators <p>ARE:</p> <ol style="list-style-type: none"> <u>1. Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers</u> Make drawings of simple working circuits (pictorial only circuit symbols covered in year 6) Make circuits from drawings provided <u>4. 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</u> Describe the effect of making and breaking one of the contacts on a circuit Explain why some circuits work and others do not 	<p>WTS:</p> <ol style="list-style-type: none"> Know that the 'amount' of electricity (voltage) depends on the number of batteries Construct some working series circuits with specified components <u>3. Recognise conventional circuit symbols</u> <p>ARE:</p> <ol style="list-style-type: none"> <u>1. Use recognised symbols when representing a simple circuit in a diagram</u> Draw circuit diagrams and construct circuits from diagrams using conventional symbols Explore how to change the brightness of bulbs and the volume of a buzzer Recall what causes the brightness of bulbs or the volume of a buzzer to change Compare different circuits (e.g. for brightness of bulb) Recall that the amount of electricity is measured in voltage <u>7. Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit</u> <u>8. Compare and give reasons for variations in how components function, including</u>
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		<p><u>7. Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit</u></p> <p>8. Describe how switches work 9. Construct a home-made switch 10. Construct simple circuits and use them to test whether materials are electrical conductors or insulators</p> <p><u>11. Recognise some common conductors and insulators, and associate metals with being good conductors</u></p> <p>GDS:</p> <ol style="list-style-type: none"> 1. Are methodical in tracing faults in simple circuits 2. Relate knowledge about conductors and insulators to their use in electrical appliances 3. Describe the use of conductors and insulators in components including connecting wires 4. Identify graphite and playdough as non-metal conductors and explain why this is unusual 		<p><u>the brightness of bulbs, the loudness of buzzers and the on/off position of switches</u></p> <p>GDS:</p> <ol style="list-style-type: none"> 1. Explore the effect of thickness of a wire in a circuit 2. Describe the differences between wires usually used for circuits and fuse wires 3. Describe what would happen if all lights in a home were connected in the same circuit and one broke 4. Explain current in circuits using simple models and analogies (e.g. piped water, bicycle chain, children and sweets)
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* Adapted from HfL Progression in Scientific Knowledge / National Curriculum

Appendix 1: Teacher End of Unit Assessment Packs



Planning:

Learning objectives are taken from these boxes – they are the key skills/concepts the children will be learning

These are the Working Scientifically skills that need to be incorporated in the unit. These are similar to the Scientific Enquiry skills on the PINK SLIPS

Assessing:

Using the planning document, assess the children based on the statements (skills/concepts) they are meeting

Y3 Animals including Humans (Spring 1)

Skills and Knowledge	Working Scientifically (EXS)
<p>WTS</p> <ul style="list-style-type: none"> Identify some foods needed for a healthy varied diet Know they have bones and muscles in their body State that they and other animals have skeletons Identify animals that do not have an internal skeleton (invertebrates) Group animals with and without an internal skeleton Recognise that their skeletons grow as they grow <p>ARE</p> <ul style="list-style-type: none"> Describe the components of a healthy and varied diet Describe how their diet is balanced Identify that animals, including humans, need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat Describe some observable characteristics of bones Describe the main functions of their skeletons State that movement depends on both skeleton and muscles State that when one muscle contracts another relaxes Identify that humans and some other animals have skeletons and muscles for support, protection and movement <p>GDS</p> <ul style="list-style-type: none"> Describe an adequate and varied diet for humans, recognising that there are many ways of achieving this Describe problems associated with broken bones or bone diseases Describe some advantages of having an internal skeleton over no skeleton or an exoskeleton Describe the role of different food groups Compare and contrast diets of animals including pets 	<p>Ideas, Questions and Planning</p> <ul style="list-style-type: none"> Asks relevant questions and uses different types of scientific enquiries to answer them Sets up simple practical enquiries including comparative and fair tests Begins to make decisions about what observations to make including duration of these observations Uses appropriate equipment and measurements with reasonable accuracy Recognises when a simple fair test might be needed With support can use a planning board to plan an enquiry and choose variables <p>Observing and presenting evidence</p> <ul style="list-style-type: none"> Regularly makes systematic and careful observations Makes accurate measurements using standard units, using a range of equipment (e.g. thermometers, stopwatches, data loggers etc.) Recognises when and how secondary resources (books, internet, experts, diagrams) might help to answer questions that their own investigations cannot Gathers and records data in a variety of ways Prepares own format for recording data Presents findings using a range of tables, charts and diagrams Makes statements on findings from enquiries using simple scientific language <p>Considering and evaluating evidence</p> <ul style="list-style-type: none"> Groups, sorts and classifies in different ways (to include branching databases) Identifies difference, similarities or changes related to simple scientific ideas and processes With support looks for and identifies changes, patterns and relationships in their enquiry/investigation data Begins to independently use results to draw simple conclusions and answers questions using an appropriate level of knowledge based on their own experiences Interprets findings and draws conclusions both written and orally (or in other presentations) using straightforward scientific evidence and relevant scientific language With support, raises further questions arising from their findings With support, makes predictions for new values beyond the data or evidence collected

Think of these 3 boxes in the skills as progression from WTS, ARE to GDS

Take your GDS/extension questions from this last box

<WTS	WTS	EXS	GDS
A4	On track to be A5	On track to be A6	On track to be B1
No red/bold statements	Less than 40% (4) of the 10 red/bold statements	Approximately 70% (7) of the 10 red/bold statements (including several other statements)	Approximately 85% (8-9) of the 10 red/bold statements (including majority of other statements)


	Child (highlight where PP)	Awareness of AH principles	<WTS	WTS	EXS	GDS	Teachers notes
1							
2							
3							
4							
5							
6							

EXS
On track to be A6
Approximately 70% (7) of the 10 red/bold statements (including several other statements)

Follow the guidance on expectations for the assessment, but of course use your teacher assessment and moderation to support you.


Red statements are National Curriculum Objectives or key expectations for Scientific Knowledge in the specific area of study / Working Scientifically Skills.

Appendix 2: Post it Planning



Investigation Planning Board

I am investigating _____



Science at
Almond Hill

Think about the different ways in which you can adapt this investigation. How can you make it fair? Which variables can you change/keep the same? How might you measure and/or observe?

After you have completed the planning board, decide on your investigation question and then "Let's Investigate!" Remember - scientists ask questions...it's good to be curious.

Variables we could change:

We will change:

We will keep these the same...

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When I change:

Why?

Variables we could measure/observe:

We will measure/observe:

My investigation question...

How does the _____

affect the _____

What will happen to what we are measuring:

