Hardwick - Science

National Curriculum

Early Years Foundation Stage

The principal focus of science teaching in EYFS: Understanding the world involves guiding children to make sense of their physical world and their community. The frequency and range of children's personal experiences increases their knowledge and sense of the world around them – from visiting parks, libraries and museums to meeting important members of society such as police officers, nurses and firefighters. In addition, listening to a broad selection of stories, non-fiction, rhymes and poems will foster their understanding of our culturally, socially, technologically and ecologically diverse world. As well as building important knowledge, this extends their familiarity with words that support understanding across domains. Enriching and widening children's vocabulary will support later reading comprehension.

Pupils should be taught to:

- Explore the natural world around them, making observations and drawing pictures of animals and plants;
- Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class
- Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter.

The national curriculum for science aims to ensure that all pupils:

- develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- are equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.

Key Stage 1

- The principal focus of science teaching in key stage 1 is to enable pupils to experience and observe phenomena, looking more closely at the natural and humanly-constructed world around them.
- They should be encouraged to be curious and ask questions about what they notice.
- They should be helped to develop their understanding of scientific ideas by using different types of scientific enquiry to answer their own questions, including observing changes over a period of time, noticing patterns, grouping and classifying things, carrying out simple comparative tests, and finding things out using secondary sources of information.
- They should begin to use simple scientific language to talk about what they have found out and communicate their ideas to a range of audiences in a variety of ways.
- Most of the learning about science should be done through the use of first-hand practical experiences, but there should also be some use of appropriate secondary sources, such as books, photographs and videos.
- 'Working scientifically' is described separately in the programme of study, but must always be taught through and clearly related to the teaching of substantive science content in the programme of study.
- Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.
- should read and spell scientific vocabulary at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

Lower Key Stage 2

- The principal focus of science teaching in lower key stage 2 is to enable pupils to broaden their scientific view of the world around them.
- They should do this through exploring, talking about, testing and developing ideas about everyday phenomena and the relationships between living things and familiar environments, and by beginning to develop their ideas about functions, relationships and interactions.
- They should ask their own questions about what they observe and make some decisions about which types of scientific enquiry are likely to be the best ways of answering them, including observing changes over time, noticing patterns, grouping and classifying things, carrying out simple comparative and fair tests and finding things out using secondary sources of information.
- They should draw simple conclusions and use some scientific language, first, to talk about and, later, to write about what they have found out.
- 'Working scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study.
- Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.
- Pupils should read and spell scientific vocabulary correctly and with confidence, using their growing word reading and spelling knowledge.

Upper Key Stage 2

- The principal focus of science teaching in upper key stage 2 is to enable pupils to develop a deeper understanding of a wide range of scientific ideas.
- They should do this through exploring and talking about their ideas; asking their own questions about scientific phenomena; and analysing functions, relationships and interactions more systematically.
- At upper key stage 2, they should encounter more abstract ideas and begin to recognise how these ideas help them to understand and predict how the world operates.
- They should also begin to recognise that scientific ideas change and develop over time.
- They should select the most appropriate ways to answer science questions using different types of scientific enquiry, including observing changes over different periods of time, noticing patterns, grouping and classifying things, carrying out comparative and fair tests and finding things out using a wide range of secondary sources of information.
- Pupils should draw conclusions based on their data and observations, use evidence to justify their ideas, and use their scientific knowledge and understanding to explain their findings.
- 'Working and thinking scientifically' is described separately at the beginning of the programme of study, but must always be taught through and clearly related to substantive science content in the programme of study.
- Throughout the notes and guidance, examples show how scientific methods and skills might be linked to specific elements of the content.
- Pupils should read, spell and pronounce scientific vocabulary correctly.

Hardwick - Science

Working Scientifically

Year 1 Scientist

Working Scientifically

1. *Know how to ask simple questions* ***and recognise that they can be answered in different ways (Y2).***
2. *Know how to use simple equipment to make observations.*
3. *Know how to perform simple tests.*
4. *Know how to identify and classify things.*
5. *Know how to use observations and ideas to suggest answers to questions.*
6. *Know how to use simple measurements and equipment* ***(e.g. hand lenses, egg timer). *(Y1/2)***
7. *Know how to gather and record data to help to answer questions.*
8. *Know how to explain to others what I have found out.*

Biology

Nursery Scientist

Understanding the World

Independent Learning

1. ***Talk about what they see, using a wide vocabulary.***
   - *Encourage children to talk about what they see.*
   - *Model observation and investigational skills. Ask out loud: "I wonder if…?"*
   - *Plan and introduce new vocabulary, encouraging children to use it to discuss findings and ideas.*
2. ****Begin to understand the effect of changing seasons on the natural world around them.***
   - **Name the four seasons.*
   - *Guide children's understanding by drawing children's attention to the weather and seasonal features.*
   - *Throughout the year, take children outside to observe the natural world and encourage children to observe how animals behave differently as the seasons change.*

Materials

3. ***Use all their senses in hands-on exploration of natural materials.***
4. ***Explore collections of materials with similar and/or different properties.***
5. ***Talk about what they see, using a wide vocabulary.***
   - *Provide interesting natural environments for children to explore freely outdoors.*
   - *Make collections of natural materials to investigate and talk about. Suggestions:*
     - *contrasting pieces of bark*
     - *different types of leaves and seeds*
     - *different types of rocks*
     - *different shells and pebbles from the beach*
   - *Provide equipment to support these investigations. Suggestions: magnifying glasses or a tablet with a magnifying app.*
   - *Encourage children to talk about what they see.*
   - *Model observational and investigational skills. Ask out loud: "I wonder if…?"*
   - *Plan and introduce new vocabulary, encouraging children to use it to discuss their findings and ideas.*

Water (forces and changing state)

6. ***Explore and talk about different forces they can feel.***
   - *Draw children's attention to forces e.g. how the water pushes up when they try to push a plastic boat under it.*
   - *Explore how different materials sink and float.*
7. ***Talk about differences between materials and changes that they notice.***
   - *Provide children with opportunities to change materials from one state to another e.g. melting – leave ice cubes out in the sun, see what happens when you shake salt onto them (children should not touch to avoid danger of frostbite),*
   - *Plan and introduce new vocabulary related to the exploration and encourage children to use it.*

Reception Scientist

Understanding the World

Independent Learning

1. ***Explore the natural world around them.***
   - *Provide children with have frequent opportunities for outdoor play and exploration.*
   - *Encourage interactions with the outdoors to foster curiosity and give children freedom to touch, smell and hear the natural world around them during hands-on experiences.*
   - *Create opportunities to discuss how we care for the natural world around us.*
   - *Offer opportunities to sing songs and join in with rhymes and poems about the natural world.*
   - *After close observation, draw pictures of the natural world, including animals and plants.*
2. ***Describe what they see, hear and feel whilst outside.***
   - *Encourage focused observation of the natural world.*
   - *Listen to children describing and commenting on things they have seen whilst outside, including plants and animals.*
   - *Encourage positive interaction with the outside world, offering children a chance to take supported risks, appropriate to themselves and the environment within which they are in.*
   - *Name and describe some plants and animals children are likely to see, encouraging children to recognise familiar plants and animals whilst outside.*

Seasons / animals and plants

3. ***Understand the effect of changing seasons on the natural world around them.***
   - **Name and describe the four seasons.*
   - *Guide children's understanding by drawing children's attention to the weather and seasonal features.*
   - *Provide opportunities for children to note and record the weather. Select texts to share with the children about the changing seasons.*
   - *Throughout the year, take children outside to observe the natural world and encourage children to observe how animals behave differently as the seasons change.*
   - *Look for children incorporating their understanding of the seasons and weather in their play.*

Light, shadow and reflections

4. *Observe and interact with natural processes, such as light travelling through transparent material and an object casting a shadow.*

Year 1 Scientist

Plants

9. *Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.*
10. *Know and name the flower (blossom), petals, stem, leaves, seed/bulb and root of a plant.*
11. *Know and name the roots, trunk, branches and leaves of a tree.*

Animals, including humans (animal groups)

12. *Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals, including those kept as pets.*
13. *Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).*
14. *WS - Compare and contrast animals and describe how to identify and group them.*
15. *Identify and name a variety of common animals that are carnivores, herbivores and omnivores.*
16. *WS - Group animals according to what they eat.*

Animals, including humans (body parts and senses)

17. *Identify, name, draw and label the basic parts of the human body (including head, neck, arms, elbow, legs, knees, face, ears, eyes, hair, mouth, teeth).*
18. *Say which part of the body is associated with each sense.*
19. *WS - Use senses to compare different textures, sounds and smells.*

Year 2 Scientist

Plants

9. *Describe how seeds and bulbs grow into plants.*
10. *Know what plants need in order to grow and stay healthy (water, light & suitable temperature).*

Animals, including humans

11. *Know that animals, including humans, have offspring which grow into adults.*
12. *Know the basic stages in a life cycle for animals, including humans.*
13. *Know the basic needs of animals, including humans, for survival (water, food, air).*
14. *Know why exercise, a balanced diet and good hygiene are important for humans.*

Living things and their habitats

15. *Compare differences between things that are living, dead, and things that have never been alive.*
16. *Know that most living things live in habitats that meet their needs.*
17. *Compare animals in different habitats (e.g. seashore, woodland, ocean, rainforest).*
18. *Know how a habitat provides for the basic needs of different animals and plants and how they depend on each other (e.g. food source/shelter). .*
19. *Identify and name a variety of plants and animals in their habitats, including micro-habitats.*
20. *Know that animals obtain food from plants and/or other animals.*
21. *Describe a simple food chain.*

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	Nursery Scientist	Reception Scientist	Year 1 Scientist	Year 2 Scientist
Chemistry	***Colour and light/shadows*** ***8. Talk about the differences between materials and changes they notice*** • *Explore how you can shine light through some materials, but not others.* • *Investigate shadows.* ***Animals and plants*** ***9. Plant seeds and care for growing plants.*** ***10. Understand the key features of the life cycle of a plant and an animal.*** ***11. Begin to understand the need to respect and care for the natural environment and all living things.*** • *Show and explain the concepts of growth, change and decay with natural materials.* *Suggestions:* ▪ *plant seeds and bulbs so children observe growth/decay over time* ▪ *observe an apple core going brown and mouldy over time* ▪ *help children to care for animals and take part in first-hand scientific* ▪ *explorations of animal life cycles, such as caterpillars or chick eggs.* • *Plan and introduce new vocabulary related to the exploration.* • *Encourage children to use it in their discussions, as they care for living things.* • *Encourage children to refer to books, wall displays, online resources.* • *This will support their investigations and extend their knowledge and ways of thinking.*	***Materials*** 5. *Name common everyday materials e.g. wood, plastic, glass, water, rock, brick, paper, fabrics. 6. *Explore different materials with water e.g. how can we keep the teddy dry? ***Animals and habitats*** 7. *Explore the natural world around them, making observations and drawing pictures of animals and plants. Name familiar animals and plants.* 8. *Know some similarities and differences between the natural world around them (*animal similarities/differences e.g. legs/fur/patterns/ size).* ***Floating and sinking / Magnets*** 9. *Observe and interact with natural processes, such as a boat floating on water* 10. *Observe and interact with natural processes, such as a magnet attracting an object.*	***Everyday materials*** 20. *Distinguish between an object and the material it is made from.* 21. *Identify and name a variety of materials, including wood, plastic, glass, metal, water, rock, brick, paper, fabrics, elastic, foil.* 22. *Describe the simple physical properties of a variety of everyday materials.* 23. *Use simple physical properties to compare and group a variety of everyday materials.* 24. *WS - Become familiar with properties such as hard/soft, stretchy/stiff, shiny/dull, rough/smooth, bendy/not bendy, waterproof/not waterproof, absorbent/not absorbent, opaque/transparent.* 25. *WS – Perform simple tests e.g. Which is the best material for….?*	***Uses of everyday materials*** 22. *Identify and name a range of materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard.* 23. *Know how some materials can be changed by squashing, bending, twisting and stretching.* 24. *Know that materials are used in many different ways.* 25. *Know how some materials can be used for more than one thing and that different materials can be used for the same thing.* 26. *Compare the suitability of a variety of materials for particular uses.*
Physics	***Animals and plants, human health (and materials)*** ***12. *Understand how to look after teeth.*** • *Know we need to brush our teeth twice a day.* • *Know that a dentist helps us to look after our teeth.* • *Know that some food is good for us and other food should be a treat.* ***13. Talk about the differences between materials and changes they notice.*** • *Provide children with opportunities to change materials from one state to another e.g. cooking – combining different ingredients, and then cooling or heating them (*exploring what happens when you melt chocolate and then chill it).* ***Forces*** ***14. Explore and talk about different forces they can feel.*** • *Draw children's attention to forces.* *how they can stretch elastic, snap a twig, but cannot bend a metal rod* *magnetic attraction and repulsion* • *Plan and introduce new vocabulary related to the exploration and encourage children to use it.*	***11. Understand how to look after teeth.*** • *Understand it is important to brush our teeth twice a day.* • *Understand how a dentist helps us.* • *Know that some food is good for us and other food should be a treat as too much can damage teeth.* ***12. Create opportunities to discuss how we care for the natural world around us.*** *Caring for a plant – what does it need to grow (water and to be treated gently)?* *How can we care for minibeasts?* 13. *Observe and interact with natural processes, such as ice melting. *Freeze and melt water to make ice lollies.* ***ELGs: Understanding the World*** ***4. Explore the natural world around them, making observations and drawing pictures of animals and plants;*** ***5. Know some similarities and differences between the natural world around them and contrasting environments, drawing on their experiences and what has been read in class*** ***6. Understand some important processes and changes in the natural world around them, including the seasons and changing states of matter***	***Seasonal changes*** 22. *Observe and know about the changes in the seasons. (Ongoing)* 23. *Observe and describe weather associated with the seasons. (Ongoing)* 24. *Observe and describe how day length varies. (Ongoing).*	• ***No content***

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Vocabulary	• head, eyes, ears, mouth, nose, • spring, summer, autumn, winter, cold, rain, sun, warm, leaves, weather • leaves, seeds, bark, rocks • sink, float, up, down, push • hot, melting, cold, freeze • light, dark, shadows • seeds, plant, grow, egg, caterpillar, butterfly • clean, teeth, dentist, sugar • magnets, stretch, snap, bend	• see, smell, touch, hear • spring, summer, autumn, winter, cold, rain, sun, warm, leaves, weather • light, dark, shadows • materials, wood, plastic, glass, water, rock, brick, paper, fabrics. • Names of familiar animals and plants, animal similarities/differences e.g. legs/fur/patterns/ size • float, sink, push, pull, magnet, attract • clean, teeth, dentist, sugar • plant, grow, seed, water, soil, light, minibeasts • hot, melting, cold, freeze	• senses, smell, taste, touch, hearing, sight, head, neck, arms, elbows, legs, knees, face, ears, eyes, hair, mouth, teeth • petal, stem, leaf, root, trunk, branch, deciduous, evergreen, flowers, blossom, fruit, bulb, seed, seasons, spring, summer, autumn, winter, sun, rain, snow, hail, storm, hot, cold • carnivore, herbivore, omnivore, fish, amphibian, reptile, bird, mammal • wood, plastic, glass, metal, water, rock, waterproof, absorbent, hard, soft, stretchy, stiff, shiny, dull, rough, smooth, bendy, opaque, transparent, brick, paper, fabrics, elastic, foil	• materials, biodegradable, squashing, bending, twisting, stretching, properties, suitable/unsuitable • animals, offspring, adults, survival, food, water, air, nutrition, exercise, hygiene, basic needs • bud, flower, germinate, leaf, petal, root, seed, shoot, stem, bulb, water, light, temperature, grow, survival, mature plant • human, toddler, baby, child, teenager, adolescent, elderly, childhood • living, dead, never alive, micro-habitat, habitat, food chain, food source, seashore, ocean, woodland, forest

Hardwick - Science

Working Scientifically

	Year 3 Scientist / Year 4 Scientist	Year 5 Scientist / Year 6 Scientist
Working Scientifically	***Working Scientifically - Plan*** 1. *Know how to ask relevant scientific questions.* 2. *Know how to set up a variety of simple enquiries to explore a scientific question.* 3. *Know how to make a prediction with a reason.* 4. *Know how to set up a test to compare two things.* 5. *Know how to set up a fair test **and explain why it is fair (Y4).*** ***Working Scientifically - Do*** 6. *Make careful and accurate observations, including taking measurements **using standard units (Y4).*** 7. *Know how to use a range of equipment, **including thermometers and data loggers (Y4)** to make measurements.* 8. *Gather, record, classify and present data in different ways to answer scientific questions.* 9. *Know how to record findings using scientific language, drawings, labelled diagrams, table, **keys and bar charts (Y4).*** ***Working Scientifically - Review*** 10. *Know how to report findings, including oral and written explanations or presentation of results and conclusions.* 11. *Know how to draw simple conclusions.* 12. ***Know how to use evidence to support findings or answer questions (Y4).*** 13. *Know how to suggest improvements **and create further questions (Y4).*** 14. ***Know how to identify differences, similarities and changes related to an enquiry (Y4)***	***Working Scientifically - Plan*** 1. *Know how to plan different types of scientific enquiry to answer questions.* 2. *Know how to identify and control variables in an enquiry.* ***Working Scientifically - Do*** 3. *Measure accurately and precisely using a range of equipment, **taking repeated readings if needed (Y6).*** 4. *Know how to record data and results using scientific diagrams and labels, tables, bar graphs, line graphs, **classification keys and scatter graphs (Y6).*** ***Working Scientifically - Review*** 5. *Use the outcome of test results to make predictions **and set up a further comparative and fair test (Y6)**.* 6. *Report and present findings from enquiries in a range of ways (both oral and written form).* 7. *Know how to explain a conclusion **and causal relationships (Y6).*** 8. ***Know how to explain a degree of trust in results (Y6).*** 9. ***Identify scientific evidence that has been used to support or refute ideas or arguments (Y6).*** 10. *Read, spell and pronounce scientific vocabulary accurately.*

Biology

	Year 3 Scientist	Year 4 Scientist	Year 5 Scientist	Year 6 Scientist
Biology	***Plants*** 15. *Identify and describe the function of different parts of flowering plants and trees (roots, stem/trunk, leaves, flowers).* 16. *Know what plants need to help them grow and survive (air, light, water, nutrients from soil, room to grow) and how this varies between plants.* 17. *Investigate how water is transported within plants.* 18. *Know the plant life cycle, especially the importance of flowers (pollination, seed formation, seed dispersal).* ***Animals, including humans*** 19. *Know that animals, including humans, cannot make their own food so need a nutritious, balanced diet.* 20. *Know the main parts of the skeleton (skull, pelvis, rib cage, spine, femur, tibia).* 21. *Know the main body parts linked to muscles and that muscles help our body to move.* 22. *Know about the purpose of the skeleton and muscles in humans and animals (support, protection and movement).*	***Living things and their habitats*** 15. *Know that living things can be grouped in a variety ways.* 16. *Use and create classification keys to group, identify and name a variety of living things.* 17. *Know how changes to an environment could endanger living things.* 18. *Know that humans can have positive and negative effects on environments (e.g. nature reserves/deforestation).* ***Animals, including humans*** 19. *Identify and name the parts of the human digestive system (including mouth, tongue, teeth, oesophagus, stomach, small/large intestine).* 20. *Know the functions of key organs in the human digestive system.* 21. *Identify and know the different types of teeth in humans.* 22. *Know the functions of different human teeth.* 23. *Interpret food chains to identify producers, predators and prey.* 24. *Construct food chains to identify producers, predators and prey.*	***Living things and their habitats*** 11. *Know the differences in the life cycles of a mammal, an amphibian, an insect and a bird.* 12. *Know the process of different types of reproduction in plants.* 13. *Know the process of reproduction in some animals.* ***Animals, including humans*** 14. *Create a timeline to indicate stages of growth and development in humans.* 15. *Describe the changes as humans develop to old age.*	***Living things and their habitats*** 11. *Describe how living things (plants, animals and micro-organisms) are classified into broad groups (according to observable characteristics and based on similarities and differences).* 12. *Know that broad groups can be subdivided.* 13. *Classify animals into commonly found invertebrates (e.g. insects, spiders, snails, worms) and vertebrates (fish, amphibians, reptiles, birds and mammals).* 14. *Give reasons for classifying plants/animals in a specific way.* ***Animals, including humans*** 15. *Identify and name the main parts of the human circulatory system.* 16. *Know the function of heart, blood vessels, blood.* 17. *Know the impact of diet, exercise, drugs and life style on the way bodies function.* 18. *Know the ways in which nutrients and water are transported in animals, including humans.* ***Evolution and inheritance*** 19. *Know that living things have changed over time.* 20. *Know that fossils provide information about living things that inhabited the Earth millions of years ago.* 21. *Know that living things produce offspring (recognising that offspring are of the same kind, but normally vary and are not identical to their parents).* 22. *Know how animals and plants are adapted to suit their environment.* 23. *Know what evolution is and that adaptation may lead to evolution.*

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	Year 3 Scientist	Year 4 Scientist	Year 5 Scientist	Year 6 Scientist
Chemistry	***Rocks*** 23. *Compare and group different kinds of rocks based on their appearance and physical properties.* 24. *Know how fossils are formed when things that lived are trapped in rock.* 25. *Know that soil is made from rocks and organic matter.*	***States of matter*** 25. *Compare and group materials based on their state of matter (solid, liquid, gas).* 26. *Know that some materials can change state when they are heated or cooled. *Note – change to state of matter (solid/liquid/gas) as opposed to chemical change (burning/baking).* 27. *Know what happens to water when it is heated or cooled (solid/liquid/gas).* 28. *Measure and research the temperature at which materials change state.* 29. *Know the link between rate of evaporation and temperature.* 30. *Know the part played by evaporation and condensation in the water cycle.*	***Properties and changes of materials*** 16. *Compare and group materials based on their properties (e.g. hardness, solubility, transparency, conductivity, [electrical & thermal], and response to magnets).* 17. *Know how some materials will dissolve in a liquid to form a solution.* 18. *Know how to recover a substance from a solution.* 19. *Know how some materials can be separated.* 20. *Demonstrate how materials can be separated (e.g. through filtering, sieving and evaporating).* 21. *Know about reversible and irreversible changes.* 22. *Demonstrate that dissolving, mixing and changes of state are reversible changes.* 23. *Know how some changes result in the formation of a new material and this is usually irreversible (e.g. burning, and the action of acid on bicarb of soda).* 24. *Give evidenced reasons (from comparative and fair tests) for particular uses of everyday materials (including metals, wood and plastic).*	***No content***
Physics	***Light*** 26. *Know that light is needed in order to see.* 27. *Know what dark is (the absence of light).* 28. *Know that light is reflected from surfaces.* 29. *Know the danger of direct sunlight and describe how to protect eyes.* 30. *Know that shadows are formed when a light source is blocked by an opaque object.* 31. *Explore shadow size and explain the changes.* ***Forces and magnets*** 32. *Compare how objects move on different surfaces.* 33. *Know that some forces require contact but magnetic forces can act at a distance.* 34. *Know that magnets attract and repel each other.* 35. *Know that magnets attract and repel different materials.* 36. *Predict whether objects will be magnetic and carry out an enquiry to test this out.* 37. *Identify and group magnetic materials.* 38. *Describe magnets as having two poles.* 39. *Predict whether magnets will attract or repel (depending on poles).*	***Sound*** 31. *Know how sounds are made, associating some of them with something vibrating.* 32. *Know how vibrations from sound travels to our ears.* 33. *Identify patterns between pitch and the features of objects producing the sound.* 34. *Know the link between the volume of a sound and the strength of the vibrations that produced it.* 35. *Know that sounds get fainter as distance from source increases.* ***Electricity*** 36. *Identify common appliances that require electricity to function.* 37. *Know how to work safely with electricity.* 38. *Construct a simple series circuit.* 39. *Identify and name the components in a series circuit (including cells, wires, bulbs, switches, buzzers, motors).* 40. *Know how to draw a circuit diagram (Note – a pictorial representation (circuit symbols are introduced in Y6)).* 41. *Predict and test whether a lamp will light in a circuit (based on whether the lamp is in a complete loop with a battery).* 42. *Know that a switch opens and closes a circuit.* 43. *Know the difference between a conductor and an insulator (giving common examples of each and associating metal with being a good conductor).*	***Earth and space*** 25. *Know that our solar system has the Sun (a star) at the centre and has eight other planets (Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune).* 26. *Know about and describe the movement of the Earth and other planets relative to the Sun.* 27. *Know about and describe the movement of the Moon relative to the Earth.* 28. *Know about and explain day and night (using Earth's rotation).* 29. *Know about and explain why the sun appears to move across the sky (using Earth's rotation).* 30. *Describe the Sun, Earth and Moon as approximately spherical.* ***Forces*** 31. *Know that the force of gravity causes unsupported objects to fall to Earth.* 32. *Identify and know the effects of air resistance.* 33. *Identify and know the effects of water resistance.* 34. *Identify and know the effects of friction.* 35. *Explain how levers, pulleys and gears allow a smaller force to have a greater effect.*	***Light*** 24. *Know that light appears to travel in straight lines.* 25. *Know and explain that objects are seen as they give out/reflect light into the eye.* 26. *Know and explain that light travels from light sources to eyes, or light sources – object – eyes (and this is why we see things).* 27. *Know why shadows have the same shape as the object that casts them.* ***Electricity*** 28. *Know how the number and voltage of cells in a circuit links to the brightness of a lamp or the volume of a buzzer.* 29. *Compare and give reasons for variations in how components function (e.g. brightness of bulbs, loudness of buzzers, on/off position of switches).* 30. *Draw simple circuit diagrams using correct symbols. *Note – learning at this point is based on series (not parallel) circuits.*

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Vocabulary	• fossils, sedimentary, hard and soft rocks, organic, appearance, physical properties, soil • fertilisation, germination, pollination, reproduction, dispersal, seeds, roots, stem, trunk, leaves, flowers, air, light, water, nutrients, support, soil, transportation, life cycle, seed formation, function, growth, nutrition • force, magnetism, negative, positive, contact, noncontact force, attract, repel, materials, poles, distance • light source, light reflector, shadows, dark, surfaces, opaque • nutrition, skeletons, muscles, function, support, protection, movement	• decay, digestion, digestive system, tongue, oesophagus, small intestine, large intestine, rectum, teeth, canines, incisors, premolars, molars, function, chew, grind, snip, rip, mouth, stomach, carnivore, herbivore • battery, circuit, insulator, motor, buzzer, conductor, switch, cell, wires, appliance, bulb • gas, liquid, solid, state, temperature, thermometer, evaporation, condensation, freeze, degrees Celsius, heated, cooled • classify, vertebrate, fish, amphibians, reptiles, birds, mammals, invertebrates, snails, slugs, worms, spiders, insects, flowering plants, non-flowering plants, fern, moss, nature reserve, ecologically planned park, garden pond, population, litter, deforestation, key, environment • cochlea, decibel (dB), ear canal, eardrum, insulator, outer ear, vibrate, pitch, volume, distance, sound, source	• Grouping materials (recap): electrical, hardness, magnetism, translucent, transparency • changing state, solid, liquid, gas, filtering, sieving, evaporating, dissolve, soluble, insoluble, solution, reversible/irreversible, burning, rusting • lunar, moon, orbit, planet, solar system, star, Earth, Sun, solar system, Moon, sphere, rotate, Mercury, Venus, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto, dwarf planet • air resistance, force, gravity, pulley, water resistance, friction, surface, lever, gear • life cycle, habitat, mammal, amphibian, insect, bird, reproduction, sexual reproduction, asexual reproduction	• adaptation, evolution, extinct, fossil, genetic, inheritance, variation, offspring, identical, environment • Heart, circulatory system, arteries, blood vessels, circulation, heart, red blood cells, vein, white blood cells, diet, exercise, drugs, lifestyle, nutrients • micro-organisms, plants and animal group names, vertebrates, invertebrates, classification • circuit, series, voltage, battery, cell, symbol, fair test, variable, volume, buzzer, bright, loud, switch, symbols, motor, components • light source, beam, straight line, reflect, opaque, transparent, shadow, translucent, reflection