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# SCIENCE

## ASSESSMENT PROFILE

**Science: Gateshead Assessment Profile (SGAP)**

The educationGateshead Assessment Profile Grids for Science have been devised to support both Formative and Summative assessment in the classroom.

The grids cover the programme of study for each year group in key stages 1 and 2. Whilst the National Curriculum for Science states that: 'schools are only required to teach the relevant programme of study by the end of the key stage.' However, it is important to be mindful when designing the school science curriculum that some concepts in science do build upon prior knowledge of previous areas of the programme of study. These assessment grids will help schools to identify some of the key concepts and areas of scientific knowledge which need to be taught in this sequential way.

Schools need to ensure that Summative Assessment information for each year group is not only passed to the next class teacher to ensure progression, but also that this information is used to inform the relevant end of Key Stage Teacher Assessments which are submitted as part of statutory assessment.

The National Curriculum for Science provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics.

'Working Scientifically' is a key aspect of the science curriculum, it is important to remember that 'it should not be taught as a separate strand.'(NC 2014).

'In order for pupils to show their competence in 'working scientifically,' they need to be in situations where they are raising questions, planning investigations, observing, measuring, analysing, arguing and evaluating. They must also be engaged in supporting their conclusions with argument and evidence and in working with and learning from others.' (Developing policy, principles and practice in primary school science assessment – 2012 W Harlen et al)

The National Curriculum indicates that, for each Key Stage/Phase, pupils need the opportunity to develop the skills of all 5 types of scientific enquiry e.g.

- Observing over time
- Pattern seeking
- Identifying, classifying and grouping
- Comparative and fair testing
- Researching using secondary sources

It is important in planning science that each teacher ensures sufficient opportunity is given for pupils to undertake practical enquiry work within each programme of study. This should not be merely by demonstration, otherwise it will not be possible to ascertain an individual pupil's competence when working scientifically. In addition, the acquisition of relevant subject knowledge for each programme of study is

enhanced when pupils can use science to ‘explain what is occurring, predict how things will behave and analyse causes.’ (NC 2014)

Using the grids

The grids will enable teachers to assess the current attainment of an individual pupil and suggest the next steps in their understanding required to reach or exceed the expected standard for the aspect of the programme of study being assessed. This will inform planning of practical opportunities to ensure that the curiosity of a pupil is ignited and thereby their desire to engage with the learning which will deepen understanding.

In each year group some pupils will be working below the standard, some at the expected standard and some exceeding the standard. **A child will be at the expected standard when the vast majority (90%+) of the statements are being met**. There may also be some evidence that they have a growing depth of understanding in this programme of study with some areas of the exceeding statements being highlighted

**A child will be beyond ARE and Exceeding the standard expected for the year group, for a programme of study, when all of the statements for the expected standard have been met. The pupil will also be able to demonstrate evidence that a majority (60+%) of the statements for exceeding have been achieved.**

Pupils who are working towards the standard for a particular programme of study will show limited evidence of meeting any of the expected standard statements but may demonstrate some foundational understanding of the scientific concept as shown by the ‘Working Towards’ statements.

Vocabulary

Whilst the National Curriculum states that pupils are only expected to be able to read and spell vocabulary ‘at a level consistent with their increasing word reading and spelling knowledge,’ it is vitally important that pupils develop their vocabulary bank and understanding of scientific words.

Scientific vocabulary has therefore been suggested for each area of the programme of study. It is important that these words are discussed and pupils have access to them, so they can access more readily the concept being studied and more fully articulate their understanding.

Scientists

It is useful for pupils to understand how the current knowledge of science and the world around them developed by considering the scientists who discovered and developed a concept/area of science. To facilitate this a list of scientists for each area of the programmes of study have been suggested. These are by no means an

exhaustive list or the definitive list of ‘experts’ in the field. They do give however a cross section (where possible) of scientists who are male and female, of various ethnic and cultural backgrounds. As well as living and dead scientists! These may help to change some of the stereo-typical images pupils (and adults) have of scientists.

In developing the school Science curriculum try to ensure that pupils do ‘meet’ a range of these scientists and understand the contribution they made to our world today. In the case of scientists who are still living and involved in current research there may also be opportunity to consider future developments that pupils may see within their lifetime.

It is also useful however to invite local scientists and members of the community with scientific backgrounds or who use science extensively in their work into school to meet pupils e.g. nurse, engineer, forensic police, pharmacist, chef etc. This will enable pupils to gain a sense of the importance of science in our world today and perhaps develop their interest in future careers.

Science Assessment against National Curriculum

| Year group | 1 | Area of NC: Animals, including humans (Biology) |
|---|---|---|
| Pupils should be taught to.. | Identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals.<br><br>Identify and name a variety of common animals that are carnivores, herbivores and omnivores.<br><br>Describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets).<br><br>Identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can point to different parts of the body and suggest names | Pupil can identify and name the main parts of the human body and their functions | Pupil can name and identify the location of some internal features of the body as well as all external features |
| Pupil knows that not all animals eat the same food types and that some eat only meat and other plants | Pupil can explain the difference between carnivores, herbivores and omnivores and give examples of animals in each group | Pupil begins to recognise that animals are consumers and part of a food chain for other animals |
| Pupil begins to identify that we have different senses | Pupil recognises that we have 5 different senses and explain which part of the body is associated with each | Pupil can accurately name each sense and explain why we need these senses to keep us safe and alive. |
| Pupil can identify some similarities and differences in the animals they see around them and may loosely group them according to these features | Pupil recognises the different features/structure of common animals and can use these to group some animals they see around themselves | Pupil can accurately name the different features of each animal group and can name each group whilst explaining their differences |
| Vocabulary:<br><br>animals; human; fish; reptile; amphibian; bird, mammal; vertebrate; invertebrate; carnivore; omnivore; herbivore; feathers; scales; fur; hair; touch; skin; taste; mouth, tongue; hear; sight; smell; nose; ear; eye; face; leg; foot; ankle; knee; toe; arm; hand; finger; thumb; | | |

head; neck; elbows; environment; habitat; pets; wild; sweet; salty; sour; bitter; rough; smooth; dry; wet; moist; hot; cold; icy; consumer; food chain.

Scientists to consider: Charles Darwin; David Attenborough; Steve Irwin; Jane Goodall; Diane Fossey; Gerald Durrell.

Science Assessment against National Curriculum

| Year group | 1 | Area of NC: Everyday Materials (Chemistry) |
|---|---|---|
| Pupils should be taught to.. | Distinguish between an object and the material from which it is made.<br><br>Identify and name a variety of everyday materials, including wood, plastic, glass, metal, water and rock.<br><br>Describe the simple everyday physical properties of a variety of everyday materials.<br><br>Compare and group together a variety of everyday materials on the basis of their simple physical properties. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupils understand that some materials are not natural | Pupil can identify a range of natural and man-made materials from which objects are made | Pupil confidently groups objects made from materials with similar properties |
| Pupil can identify several materials and may be able to name objects made from these materials | Pupil is aware that objects are made from certain materials dependent on their properties | Pupil can give reasons for why objects are made from particular materials according to their properties |
| Pupil has a limited vocabulary to express the properties of materials | Pupil can use a range of vocabulary to describe the properties of materials | Pupil has a wide-ranging vocabulary to accurately describe the properties of materials |
| Pupil is unable to say why a material is appropriate to use in making an object | Pupil suggests different ways to investigate the properties of materials to test if they would be suitable for making an object | Pupil can suggest suitable materials to use when making a new object with a clearly defined purpose |

Vocabulary:
materials; properties; hard; soft; stretchy; elastic; stiff; shiny; dull; rough; smooth; bendy; not bendy; flexible; rigid; solid; liquid; waterproof; absorbent; not absorbent; transparent; opaque; brick; wood; plastic; metal; fabric; wool; foil; elastic; man made; natural; manufactured; object.

Scientists to consider: Isaac Newton; Galileo Galilei; Robert Hooke

Science Assessment against National Curriculum

| Year group | 1 | Area of NC: Plants (Biology) |
|---|---|---|
| Pupils should be taught to… | Identify and name a variety of common wild and garden plants, including deciduous and evergreen trees.<br><br>Identify and describe the basic structure of a variety of common flowering plants, including trees. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can identify and name a limited number of plants usually requiring support | Pupil can identify and name accurately a range of plants | Pupil begins to notice similarities and differences between the plants they identify |
| Pupil can use some vocabulary accurately to name parts of a plant (may not be consistent across a range of plants) | Pupil can accurately and consistently name the main parts of a plant over a range of plants | Pupil can identify similarities in the structure of plants and begins to ask questions and seek answers to explain |
| Pupil can recognise that some trees do/do not have leaves in winter | Pupil can name and use correct vocabulary to describe the features of some deciduous and evergreen trees | Pupil can suggest some reasons for the differences between deciduous and evergreen trees |
| | Pupil can identify that some plants found in the wild are not grown in gardens and vice versa | Pupil recognises some plants are cultivated in gardens and tries to explain why |

Key Vocabulary:
plant; leaf/ves; flower; blossom; petal; fruit; bud; root; bulb; seed; trunk; branches; stem; wild; garden; common; tree; deciduous; evergreen; earth; soil; dead; healthy; alive; living; grow(ing);

*Pupils create lists of common flowers/plants seen in/around the local area with photographs of the plants at different times of the year/stages in their life cycle* e.g. dandelion; daisy; buttercup; bluebell; dock; clover; grass; nettles

Scientists to consider: Beatrix Potter; Charles Darwin; David Attenborough; David Bellamy; Agnes Arber.

Science Assessment against National Curriculum

| Year group | 1 | Area of NC: Seasonal Change (Physics) |
|---|---|---|
| Pupils should be taught to.. | Observe changes across the four seasons.<br><br>Observe and describe weather associated with the seasons and how day length varies. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil knows that there are different seasons | Pupil can describe the features of different seasons using correct vocabulary | Pupil describes and explains how the different seasons affect plants, animals and humans |
| Pupil knows that it is warmer in summer and colder in winter | Pupil compares and contrasts the different seasons | Pupil can talk about the seasons in the UK and is beginning to compare/contrast with seasons in different parts of the world. |
| Pupil can name some months associated with winter or summer | Pupil recognises which months are associated with different seasons | Pupil can discuss features of the weather during each month and how it impacts upon their activities |
| Pupil begins to understand that there is more daylight in summer and less in winter | Pupil can explain the different weather, light and temperature associated with each season | Pupil begins to link the temperature to the amount of daylight and discuss how this affects the weather |
| Pupil understands that a weather map helps identify changes in the weather we may face | Pupil records simple weather information on a chart or in a diary and explains the changes they observe | Pupil uses information about the seasons and daily weather patterns they know to predict changes/expected conditions |

Vocabulary:
autumn; winter; spring; summer; seasons; sun; light; day; night; rain; sleet; snow; blizzard; freezing; frost; ice; rain; mist; fog; wind; temperature; hot; cold; cool; weather; forecast; clouds; thunder; lightning; environment; air;

Consider also using local and common phrases about the weather to help pupil understanding of how people discuss the intensity of weather e.g. raining cats and dogs; it's pelting down – opportunity perhaps to discuss standard English used in weather forecasts.

Set up a weather station in class and weather watching stations around the school to record how different areas of the school grounds/local area look in different seasons.

Science Assessment against National Curriculum

| Year group | 2 | Area of NC: Animals, including humans (Biology) |
|---|---|---|
| Pupils should be taught to.. | Notice that animals, including humans, have offspring which grow into adults.<br><br>Find out about and describe the basic needs of animals, including humans, for survival (water, food and air).<br><br>Describe the importance for humans of exercise, eating the right amounts of different types of food and hygiene. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil recognises that humans are animals and all animals have young/offspring/babies which in time become adults | Pupil can describe the life cycle of common animals, including humans, and sequence them correctly over time | Pupil compares the human lifecycle to those of other animals identifying any similarities and differences |
| Pupil can explain several of the basic needs that all animals have for survival | Pupil describes the basic needs of all animals, including humans, for survival and begins to recognise the reasons for these needs | Pupil is beginning to compare the basic needs of different animals and the consequences of these needs not being met or being limited – i.e. death, starvation, adaptation of body |
| Pupil understands that poor diet can affect humans | Pupils recognise that humans need a balanced diet and can explain what constitutes a balanced diet | Pupil can describe the different food groups in a balanced diet and explain the effect on the body of poor diet/imbalanced diet |
| Pupil is beginning to recognise why exercise is important to humans | Pupil understands that exercise is important to humans and can explain in its impact upon the body | Pupil can describe how different parts of the body respond to exercise and how the body is affected due to lack of exercise |
| Pupil can give simple reasons for humans having good hygiene | Pupil understands that germs and other diseases/health issues can be spread by poor hygiene and cleanliness and suggest some preventative measures | Pupil can explain how to stop diseases caused by germs and parasites spreading, thereby reducing stomach upsets, spread of head lice, some skin conditions etc |

Key vocabulary:
human; animals; life cycle; grow; growth; young; offspring; reproduce; parent; baby; toddler; child; teenager; adult; mature; elderly; water; air; oxygen; food; diet; balanced diet; variety; germs; bacteria; diseases; parasites; bugs; infection; hygiene; cleanliness; medicines; safety; habitat; survive; food plate/pyramid; proteins; fats; carbohydrates; fibre; minerals; vitamins; sugary foods; dairy foods; energy; calorie; taste; sweet; sour; salty; move; exercise; fitness; heart; heart rate; pulse; blood; healthy; unhealthy;

(Higher level vocabulary may be introduced for HA pupils: contagious; infectious; parasites; respiratory system; digestive system; circulatory system)

Scientists to consider: Clarence Birdseye; James Lind; Louis Pasteur; Edward Jenner.

Science Assessment against National Curriculum

| Year group | 2 | Area of NC: Living things and their habitats (Biology) |
|---|---|---|
| Pupils should be taught to.. | Explore and compare the differences between things that are living, dead and things that have never been alive.<br><br>Identify that most living things live in habitats to which they are suited and describe how different habitats provide for the basic needs of different kinds of animals and plants, and how they depend on each other.<br><br>Identify and name a variety of plants and animals in their habitats, including microhabitats.<br><br>Describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify and name different sources of food. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can identify most things as living, dead and never been alive | Pupil uses key features to identify living, dead and never been alive – e.g. living things grow, reproduce, use their senses, feed, move | Pupil can use MRS GREN acronym to classify things which are living, dead and never been alive<br><br>Pupil explains each aspect of MRS GREN |
| Pupil can name some basic habitats and the names of some animals or plants found there | Pupil can explain how a habitat provides the basic needs for a range of animals and plants<br><br>Pupil can name a wide range of habitats and some micro-habitats (local and globally) together with the names of animals/plants found here | Pupil can explain the names of a wide range of both habitats and micro-habitats and how they meet the basic needs of animals/plants found there |
| Pupil understands that a habitat is where an animal or plant lives when basic needs are met | Pupil describes how animals and plants, in a habitat, depend on each other for survival and what may happen if a basic need is no longer available in the habitat | Pupil can describe the impact upon animals/plants of changing a basic need in a habitat/micro-habitat and suggest how this aspect could be restored |
| | Pupil recognises that animals/plants may adapt to live in a habitat / micro-habitat | Pupil can explain how a range of animals/plants have adapted to live in different habitats / micro-habitats e.g. desert, polar |

| | | |
|---|---|---|
| Pupil knows that plants can make their own food and animals cannot | Pupil knows that plants make their own food (producers) and animals get their food by eating plants and/or other animals (consumers). | Pupils can describe food chains using appropriate vocabulary to identify the sun as the source of energy in a food chain, then the relationships between producers, consumers (herbivores, carnivores or omnivores) and decomposers |
| Pupils recognise that animals need to eat plants and/or other animals to survive and a food chain shows this relationship | Pupil can identify and/or create a range of food chains to show the relationships between producers and consumers in a habitat, recognising predators and prey | |
| Key vocabulary:<br>animal; plant; Habitat; micro-habitat; environment; classify; sort; living things; dead; alive; food chain; healthy; predator; prey; producer; consumer; decomposer; nocturnal; group; adaption; diversity; survive; survival; organism; group; herbivore; carnivore; omnivore;<br><br>In addition give names of some key local and global habitats that you will explore and animals/plants which live there e.g. woodland; pond; seashore; ocean; rainforest; polar; under a log/rock/bush; on a stony path; canopy; woodlouse; hermit crab; sea weed; bracken; moss;<br><br>Scientists to consider: Rachel Carson; Nancy Moran; Al Gore; David Attenborough; John Muir; Theodore Roosevelt; Wangari Maathai. | | |

Science Assessment against National Curriculum

| Year group | 2 | Area of NC: Uses of everyday materials (Chemistry) |
|---|---|---|
| Pupils should be taught to | Identify and compare the suitability of a variety of everyday materials, including wood, metal, plastic, glass, brick, rock, paper and cardboard for particular uses.<br><br>Find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil understands that some materials can be used for a variety of purposes e.g. plastic, wood, metal | Pupil can explain the properties of materials which make them suitable for a purpose<br><br>Pupil can demonstrate how a wide range of materials are suitable for the same purpose | Pupil can use their knowledge of materials to suggest which is most suitable for a purpose giving clear, reasoned argument for their choice of one and limitations of other materials |
| Pupil can group objects made from similar materials and begin to explain the suitability of the material | Pupil can use their knowledge of materials to suggest different ways they could be grouped e.g. hardness; flexibility | Pupil can describe why it is helpful to scientists to be able to classify and group materials according to their properties |
| Pupil recognises that the shape of some solid objects can be changed and offers simple explanations to explain why this occurs | Pupil has investigated the properties of materials extensively and understands that the shapes of some solid objects can be changed.<br><br>Pupil can use appropriate language to describe the change of shape of some solid objects when pressure is applied in different ways | Pupil can compare and contrast, using correct vocabulary, the properties of a wide range of materials allowing the shape of objects made from them to change |
| Pupil recognises that inventors/scientists have and still are making new materials to meet needs in the world | Pupils can name a scientist who has developed useful new materials explaining what property this material has which makes it useful | Pupils can discuss the work of several scientists who have created new materials and explain their usefulness today |

Key vocabulary: (Build on Year 1 word list)

materials; natural; man-made; manufactured; object; group; properties; change; bake; bend; twist; stretch; squash; heat; cool; freeze; melt; boil; metal; plastic; wood; paper; glass; clay; rock; fabric; sand; hard; soft; rough; smooth; shiny; dull; bendy; waterproof; absorbent; non-absorbent; strong; weak; magnetic; non-magnetic; transparent; opaque; translucent;

Scientists to consider: John Dunlop; Alexander Parkes; Carl Siemans; Hans Orsted; Joseph Aspin; Leo Baekeland; Charles Goodyear

Pupils may research recently invented materials which may affect our lives now and in the future e.g. superglue; BacillaFilla; D30.

Science Assessment against National Curriculum

| Year group | 2 | Area of NC: Plants (Biology) |
|---|---|---|
| Pupils should be taught to.. | Observe and describe how seeds and bulbs grow into mature plants.<br><br>Find out and describe how plants need water, light and a suitable temperature to grow and stay healthy. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can identify that seeds and bulbs can grow into plants when conditions are suitable | Pupil can describe with appropriate vocabulary the different stages of plant growth from a seed/bulb to mature plant | Pupil can recognise and describe that different types of plants may have different growth patterns from a seed/bulb to mature plant |
| Pupil can identify one condition a plant needs to grow and be healthy | Pupil can identify all conditions needed for a plant to grow and be healthy | Pupil may be able to suggest making changes to the conditions experienced by a seed/bulb in order to accelerate growth or correct abnormal growth patterns |
| Pupil recognises that plants can grow at different rates | Pupil can measure the rate of growth of a range of plants giving some reasons for the differences in rate of growth they note | Pupil can measure, compare and contrast the growth of a range of common, wild and commercial plants |
| Pupil understands a seed/bulb will not grow if growing conditions are not correct | Pupil identifies the suitability of some plants for different growing conditions e.g. low light, drought/arid habitats; no soil. | Pupil recognises and begins to explain what happens to a seed/bulb or plant if it does not have suitable conditions for growth or the conditions change during growth<br><br>Pupil explains that some plants may be more suited to changeable environmental conditions than others. |

Key Vocabulary: (In addition to Y1)
seed; bulb; seedling; mature plant; water; light; temperature; grow(th); healthy; unhealthy; suitable conditions; germinate; live; living; non-living; accelerate; stunted; weak; spindly; wild; commercial; soil; energy; food; producer;

Scientists to consider: Joseph Banks; Agnes Arber; Joseph Hooker; James Edward Smith; George Washington Carver;

Science Assessment against National Curriculum

| Year group | 3 | Area of NC: Animals, including humans (Biology) |
|---|---|---|
| Pupils should be taught to | 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.<br><br>Identify that humans and some other animals have skeletons and muscles for support, protection and movement. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil understands that animals cannot make their own food and get nutrition from the food they eat | Pupil can explain that animals get nutrition from the food they eat and different foods give different nutrients and amounts of energy | Pupil begins to describe process of digestion and the ways in which nutrients and water are transported within animals, including humans |
| Pupil can name some foods and the food groups they belong to | Pupil can explain what comprises a balanced diet identifying foods in the correct food groups e.g. protein, fat, carbohydrate, fibre | Pupil can discuss that a balanced diet for a man is different to other animals and compare the differences/similarities |
| Pupil can describe some consequences of a poor or limited diet | Pupil can describe the dangers of poor and limited diets on the body, health and fitness of man and other animals, giving examples of diseases associated with inadequate and excessive nutrient intake | Pupil can recognise the impact of diet, exercise, and lifestyle on the way the body functions and the health implications due to poor choices for the individual and society |
| Pupils can group some animals by the type of diet they eat increasingly using technical language e.g. carnivore, herbivore, omnivore | Pupil can group animals by comparing and contrasting the different diets of humans and some common animals e.g. pets; farm animals; common wild animals – they use technical language to describe the groups | Pupils can create food webs for different habitats showing the way that energy is transferred from plants to animals |
| Pupil can identify, name, draw and label the basic parts of the human body including some internal bones and organs | Pupil recognises that vertebrate animals have skeletons and invertebrates do not, naming examples of each | Pupil can name a large number and knows how many bones there are in the human body, as well as their functions |

| | | |
|---|---|---|
| Pupil can recognise 1 function of the skeleton | Pupil can explain the functions of the skeleton in animals and describe the disadvantages that not having a skeleton would bring for the animal | Pupil can compare the skeletons of humans and other animals commenting on the similarities and differences, as well as the impact of this upon movement, support and protection |
| Pupil understands that muscles help the movement of bones | Pupil recognises how bones are joined to and move in the skeleton of animals and humans, explaining the effect of and how muscles work | Pupil can discuss the process of healing following a bone being broken or muscle damaged |
| Pupil can name at least 1 muscle in the arms, chest, legs | Pupil can describe the 3 types of muscle and identify their different functions e.g. role in lifting, running, sitting. | Pupil understands the effect of exercise and nutrition on the development of bones and muscles |
| Key vocabulary: (build upon KS1)<br><br>Food groups; composite foods; balanced diet; protein (food for growth); fats & carbohydrates (foods for activity); vitamins, minerals and fibre (foods for health); whole grain; energy; food plate; food pyramid; carnivore; omnivore; herbivore; vegetarian; perspiration; sweat; pulse rate; skeletons; support; protection; movement; organs; muscles; function; structure; vertebrate; vertebrae; invertebrate; oxygen; carbon dioxide; relax; contract; heart; lungs; brain; ribs; skull; bones; spine; joints; attached; femur; patella; tibia; fibula; radius; ulna; digits; tarsals; humerus; clavicle; scapula; skull; spine<br><br>Scientists to consider: WK Kellog; Clarence Birdseye; World Health Organisation; Wilhelm Roentgen; Nicola Tesla; Marie Curie;<br><br>As further study: Pupils could consider replacement materials for bones being used today and developed for the future. | | |

Science Assessment against National Curriculum

| Year group | 3 | Area of NC: Forces and Magnets (Physics) |
|---|---|---|
| Pupils should be taught to.. | Compare how things move on different surfaces<br><br>Notice that some forces need contact between two objects, but magnetic forces act at a distance<br><br>Observe how magnets attract or repel each other and attract some materials and not others<br><br>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<br><br>Describe magnets as having two poles<br><br>Predict whether two magnets will attract or repel each other, depending on which poles are facing | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil recognises that objects need a force applying to move them | Pupil knows that for an object to move a force is applied to overcome the stationary force holding it in place and the object moves in the direction of this larger force | Pupil can describe the effect of gravity, friction, air or water resistance on the movement of an object over/through a variety of media |
| Pupil recognises that objects need greater/less force to move over different types of surface | Pupil can give reasons as to why objects may require more or less force to move over different surfaces | |
| Pupil recognises that objects move in the direction a force is applied | Pupil can identify a force as a push or a pull and show the effect of these on an object in a simple drawing with explanation | Pupils can explain both verbally and diagrammatically the different forces acting on an object to make it move using correct technical vocabulary |
| Pupil is beginning to recognise that some materials are magnetic and others non-magnetic | Pupil knows that magnets can make some objects move over surfaces without touching the object | Pupil can develop investigations which will show the strength of a magnet to attract or repel other magnets. |

| | | |
|---|---|---|
| Pupil knows that a magnet has 2 different poles | Pupil can explain that a magnet has different poles which can repel or attract each other depending on which poles are facing. | Pupil can create a simple electromagnet and reverse the polarity |
| Pupil explains that some materials and objects made from them are attracted towards the magnet - Magnetic | Pupil can group materials as either magnetic or non-magnetic | Pupil can grade the strength of different types of magnets by their ability to move, by attraction or repulsion, different types of magnetic materials |
| | Pupil can explain some possible everyday uses for magnets | Pupil can devise investigations which will have an everyday use to show the properties of a magnet |
| Key vocabulary:<br>force; push; pull; friction; magnet; magnetic; non-magnetic; North pole; South pole; repel; attract; surface; strength; pattern; resistance; direct; contact<br><br>Scientists to consider: Isaac Newton; Magnes; Michael Faraday; Albert Einstein | | |

Science Assessment against National Curriculum

| Year group | 3 | Area of NC: Plants (Biology) |
|---|---|---|
| Pupils should be taught to.. | Identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers.<br><br>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.<br><br>Investigate the way in which water is transported within plants.<br><br>Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can identify each part of a flowering plant with accurate vocabulary<br><br>Pupil recognises the functions of some parts of a flowering plant | Pupil can identify and describe the function of each part of a flowering plant | Pupil can explain the impact upon a plant if one or more of its parts failed to function correctly |
| Pupil can name and describe some of the requirements of a plant for life and growth | Pupil can name and describe the requirements of a plant for life and growth | Pupils can describe and demonstrate practically, for a range of plants, that they need different requirements for life and growth, as well as explaining the impact on the plant if one requirement is missing |
| | Pupil can explain that some plants have different requirements for life and growth due to environmental adaptations | |
| Pupil recognises that plants need water to grow and be healthy as well as naming the root as the part of the plant through which water enters the plant | Pupil can explain how water is transported around the plant | Pupil uses correct vocabulary to explain the transportation of water around a plant to keep it healthy and how this can be shown practically |

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| Pupil knows that flowers are important in pollination, fertilisation and seed dispersal | Pupil can explain the process of pollination, fertilisation and seed dispersal in the life cycle of a flowering plant<br><br>Pupil can explain the role that the wind and animals play in pollination and seed dispersal | Pupil can suggest external factors which can limit the processes of pollination, fertilisation and seed dispersal, as well as ways these could be overcome by the intervention of man |
| Vocabulary: (Building upon KS1 vocabulary)<br>function; transportation; anchor; nutrients; minerals; fertiliser; air; oxygen; carbon dioxide; photosynthesis; pollination; fertilisation; seed dispersal; reproduction; pest; diseases; overcrowding; wilt; spindly; pale; stunted; life processes; producer; life cycle; germination; dormant; stigma; style; ovary; anther; filament; stamen; sepal; ovule; pollen; nectar; insect<br><br>Scientists to consider: Joseph Banks; Agnes Arber; Joseph Hooker; James Edward Smith; George Washington Carver; Beatrix Potter; Charles Darwin; David Attenborough; David Bellamy | | |

Science Assessment against National Curriculum

| Year group | 3 | Area of NC: Rocks (Chemistry) |
|---|---|---|
| Pupils should be taught to.. | Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties<br><br>Describe in simple terms how fossils are formed when things that have lived are trapped within rock<br><br>Recognise that soils are made from rocks and organic matter | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil understands that there are different types of rocks and can give some reasons for their differences | Pupil can group rocks by their appearance and physical properties with accurate reasoning relating to colour, hardness, grain or crystal composition | Pupil can explain that rocks can be eroded or weathered by different environmental conditions and the rate at which this happens depends on their composition |
| Pupil can name some common types of rocks e.g. limestone, granite and may use the terms igneous, metamorphic or sedimentary when discussing properties | Pupil can describe the structure of the Earth and where the different types of rocks may be found | Pupil can describe the effect of heat and/or pressure on rocks involved in the formation of igneous, metamorphic and sedimentary rocks |
| | Pupil can explain how igneous, metamorphic and sedimentary rocks are formed | Pupil can describe that the properties of rocks are determined by their composition, as well as by the heat/pressure applied from the surrounding environment |
| Pupil can describe some aspects of the rock cycle | Pupil can explain the rock cycle with simple scientific vocabulary | Pupil can describe factors which may accelerate/decelerate the rock cycle |
| Pupil understands that some rocks contain fossils and these are impressions of animals or plants that lived in the past | Pupil uses their knowledge of rock formation to explain how fossils, from previously living animals/plants, are made | Pupil uses their knowledge of rock formation to explain how fossils, from previously living animals/plants, are made suggesting how this could be duplicated in the classroom |

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| Pupil recognises that soils are made from a mixture of particles which were once rocks and organic material | Pupil can describe how soils are formed and include organic matter and inorganic materials | Pupil explains that there are different types of soil dependent upon the bedrock where they were formed and combination of organic materials |
| Key vocabulary:<br>rock; soil; appearance; grain; crystal; particle; permeable; impermeable; porous; sedimentary; metamorphic; igneous; rock cycle; bedrock; weathering; erosion; organic; peat; humus; loam; absorbent; impervious; molten; lava; fossil; texture; sand; gravel; clay; Moh's scale; sandstone; granite; marble; limestone; flint; slate; chalk; characteristics; volcano; inorganic; organic<br><br>Scientists to consider: Mary Anning; Alfred Wegener; Charles Lyell; James Hutton; Vasily Dokuchaev | | |

Science Assessment against National Curriculum

| Year group | 3 | Area of NC: Light (Physics) |
|---|---|---|
| Pupils should be taught to | Recognise that they need light in order to see things and that dark is the absence of light.<br><br>Notice that light is reflected from surfaces.<br><br>Recognise that light from the sun can be dangerous and that there are ways to protect their eyes.<br><br>Recognise that shadows are formed when the light from a light source is blocked by a solid object.<br><br>Find patterns in the way that the size of shadows change. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can name a number of light sources | Pupil can explain that we need light to see based on their own investigations | Pupil recognises that light travels from light sources or is reflected from other objects/materials to our eyes and this is how we see |
| Pupil understands that light is reflected from surfaces | Pupil can describe what happens when light is reflected off a mirror or other surfaces | Pupil can describe and group objects/materials in terms of their ability to reflect light |
| Pupil knows that shadow formation is linked to the absence of light behind an object | Pupil recognises that when light strikes an opaque object a shadow forms behind the material/object | Pupil can draw diagrams to show how shadows are formed indicating the direction that light travels, the position and shape of any shadow formed accurately |
| Pupil begins to make links between the object and shape of the shadow formed | Pupil can explain that shadows are a similar shape to the object/material which formed the shadow | Pupil recognises that light travels in straight lines from a light source |

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| Pupil understands that moving a light source affects the size and shape of a shadow | Pupil can describe the effect of changing the position of the light source and/or position of the object upon the shadow recognising any emerging patterns | Pupil can use knowledge of the position of a light source to create shadows of a particular size, shape and for a predetermined purpose |
| Pupil understands that it is dangerous to look directly at the sun | Pupil knows that looking at the sun can damage the eyes and that although we may wear protection to reduce the glare from sunlight we should still not look directly at the sun as damage will occur | Pupil can explain the effect on the eye of looking directly at the sun or other light source |
| Key vocabulary:<br>light; travel; direction; straight; line; opaque; transparent; translucent; reflect; reflective; reflection; surface; sun; source; protect; damage; eyes; shadow; object; dangerous; absence; artificial; natural; patterns; shape; torch; candle; lamp; solid; block; visibility<br><br>Scientists to consider: Ibn al-Haytham; Albert Einstein; Eratosthenes; Hendrik Lorentz; Benjamin Thompson | | |

Science Assessment against National Curriculum

| Year group | 4 | Area of NC: Animals, including humans (Biology) |
|---|---|---|
| Pupils should be taught to | Describe the simple functions of the basic parts of the digestive system in humans.<br><br>Identify the different types of teeth in humans and their simple functions.<br><br>Construct and interpret a variety of food chains, identifying producers, predators and prey | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil understands that animals, including humans, eat food and the digestive system breaks this down to give energy and nutrients | Pupil can explain the process of digestion as the breakdown of food to nutrients required by the body | Pupil is aware of some problems which may occur if one part of the digestive system is not working as it should |
| Pupil can name some parts of the digestive system | Pupil can label the main parts of the digestive system and describe the function of each part | Pupil can describe the absorption of nutrients by the body at different points in the digestive system |
| Pupil understands that there are different types of teeth and recognises some of their functions | Pupil can name the different types of teeth in humans and other animals explaining their function<br><br>Pupil recognises that herbivores, omnivores and carnivores have different types of teeth depending on their diet | Pupil can compare the different types of teeth in carnivores, omnivores and herbivores describing the number and their position in the jaw |
| Pupil recognises the importance of good oral hygiene to prevent tooth decay | Pupil can explain how tooth decay occurs and ways to prevent decay | Pupil can design an investigation to replicate the conditions leading to tooth decay and use this to suggest prevention strategies |

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| Pupil can create simple food chains which identify predators, prey and producers | Pupil can create and describe food chains and webs in a wide range of habitats | Pupil can discuss the movement of energy through increasingly complex food chains or food webs |
| | Pupil identifies producers and consumers at different levels in the food chain/web – primary, secondary, tertiary | Pupil can identify the apex predator(s) in an Eco-system and the impact of their decline or population explosion upon other animals/plants |

Key vocabulary: (Build on KS1 & Y3)

Digestion: digestive system; food; nutrients; mouth; tongue; teeth; oesophagus; stomach; small intestine; large intestine; rectum; anus; mucus; peristalsis; acid; absorption

Teeth: carnivore; herbivore; omnivore; tooth; incisor; molar; pre-molar; canine; biting; holding; tearing; grinding; root; gum; jaw bone; tooth decay; plaque; enamel; dentine; pulp

Food chains: predator; prey; food chain; producer; consumer; food webs; ecosystem; habitat; apex predator; photosynthesis; decompose; scavenger

Scientists to consider: Weston price; Harriette Chick; Justus Von Liebig; Antoine Lavoisier; Louis Pasteur; Theodor Schwann; William Beaumont; Carl Linnaeus;

Science Assessment against National Curriculum

| Year group | 4 | Area of NC: Electricity (Physics) |
|---|---|---|
| Pupils should be taught to.. | Identify common appliances that run on electricity.<br><br>Construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers.<br><br>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.<br><br>Recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit.<br><br>Recognise some common conductors and insulators, and associate metals with being good conductors. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil understands that appliances need electricity to operate and name some common appliances. | Pupil can identify appliances which run on electricity – specifying if this is mains or battery and offering simple reasons for the difference. | Pupils can identify the different amounts of electricity to run a range of appliances e.g. car, TV, kettle |
| Pupil knows that electricity is dangerous and can follow simple rules when using electricity to keep themselves safe. | Pupil understands that electricity is dangerous and how to keep safe when using electricity. | Pupil can discuss the effect of electric shock upon the body, especially the heart |
| Pupil can build a simple circuit using a battery, wire and one component. | Pupil can construct a simple series circuit with multiple components and name the different parts. | Pupil devises a practical circuit to solve a problem in the class e.g. alarm to protect the teacher's desk. |
| Pupil understands that a circuit must be complete for current to flow | Pupil can include a simple switch in a circuit and explain how it works. | Pupil can include several switches within a circuit which will operate different components |
| Pupil understands that most metals are electrical conductors and non-metals electrical insulators. | Pupil can devise investigations to classify materials as electrical conductors or insulators. | Pupil can develop circuits incorporating a range of components and switches. The latter helping them to classify materials as insulators or conductors. |

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| Pupil attempts to draw a simple circuit diagram with some clearly identified components | Pupil draws simple diagrams (pictorial representation) to show the sequence of components in the circuit. | Pupil recognises the universally accepted symbols for a range of components and use in their drawings |
| | Pupil can explain what happens to the brightness of a bulb if more bulbs are placed in the circuit or additional cells added. | Pupil is aware of the terms current and voltage from their knowledge of electricity and defines them in simple terms e.g. flow and push of electricity around the circuit. |
| Key vocabulary:<br>electricity; electrical appliance/device; mains; plug; electrical circuit; complete circuit; component; cell; battery; positive; negative; connect/connections; short circuit; crocodile clip; switch; bulb; buzzer; motor; conductor; insulator; metal; non-metal; symbol; electrical safety; electrocute; current; voltage; open/closed switch;<br><br>Scientists to consider: Benjamin Franklin; Thomas Edison; Andre-Marie Ampere; Alessandro Volta; Michael Faraday; Georg Ohm; James Joule | | |

Science Assessment against National Curriculum

| Year group | 4 | Area of NC: Living things and their habitats (Biology) |
|---|---|---|
| Pupils should be taught to | Recognise that living things can be grouped in a variety of ways<br><br>Explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment<br><br>Recognise that environments can change and that this can sometimes pose dangers to living things | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can describe the basic differences between the main animal groups | Pupil can name the main animal and plant groups describing their features | Pupils can identify animals and plants from a range of habitats by their key features |
| Pupil can use a simple key to identify the main animal groups | Pupil can use a dichotomous key to identify groups of animals and plants | Pupil can use a variety of identification keys to identify groups of animals and within groups individual species |
| | Pupil can create a simple dichotomous key to identify some living things in their local environment | Pupil can create identification keys to enable a range of different audiences to identify living things in their local, regional or global environment |
| Pupil can describe some aspects of local environmental change caused by human activity e.g. litter in park | Pupil is aware that man's actions can have an impact upon the lives of other living creatures at a local and global scale e.g. deforestation; global warming; polluting coastlines/ponds or hedges | Pupil can explain with confidence and appropriate vocabulary the impact of man upon global and local environments recognising the cause and effect of man's actions |
| Pupil can give some reasons for how environmental change can affect other living things | Pupil can suggest some changes to the actions of man which can address and/or reverse environmental change | Pupils can suggest a series of actions which could lead to permanent improvements to environments affected by man's actions |
| | Pupil can explain how some plants and animals can adapt to changing environmental conditions | Pupils begin to explore and describe the long term adaptations living things make in response to environmental change which are not reversible |

Key vocabulary:
classification; groups; branching database (dichotomous key); vertebrates; invertebrates; exoskeleton; endoskeleton; mammals; reptiles; amphibians; birds; fish; snails; slugs; worms; spiders; insects; flowering plants; non-flowering plants; environment; eco-system; pollution; damage; deforestation; global warming; floods; litter; desertification; drought; nature reserves; conservation; habitat; camouflage; organism; species; conditions; characteristics; adaptations

Scientists to consider: Aristotle; Carl Linnaeus; Ernst Mayr; Guy Callendar; Rachel Carson; Wangari Maathai; James Lovelock.

Science Assessment against National Curriculum

| Year group | 4 | Area of NC: Sound (Physics) |
|---|---|---|
| Pupils should be taught to.. | Identify how sounds are made, associating some of them with something vibrating.<br><br>Recognise that vibrations from sounds travel through a medium to the ear.<br><br>Find patterns between the pitch of a sound and features of the object that produced it.<br><br>Find patterns between the volume of a sound and the strength of the vibrations that produced it.<br><br>Recognise that sounds get fainter as the distance from the sound source increases. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil suggests why some sounds are louder than others | Pupil can explain that sound becomes fainter the further you move from the sound source. | Pupil can suggest how sounds can be amplified when the distance from the source increases |
| | Pupil can label a simple diagram of the ear to show how a sound is heard. | Pupil can label a detailed diagram of the ear showing the movement of a sound wave from source to auditory nerve |
| Pupil can explain that sound travels by vibrations through a medium. | Pupil can describe how a sound comes from a vibration travelling through a medium e.g. air to the ear, which transmits it to the brain by the auditory nerve for interpretation<br><br>Pupil can explain that sound travels at different speeds through different media. | Pupil understands that sound cannot be made/heard in a vacuum such as in space. |
| Pupil understands that sound can vary in pitch and volume | Pupil can describe how to change the pitch of a sound.<br><br>Pupil can describe how the volume of a sound can be changed. | Pupil explains how they could investigate the types of sound made by different types of sound maker to demonstrate pitch/volume |
| Pupil understands that some materials can insulate sounds | Pupil can suggest simple ways to create sound insulators to protect the ear from loud and/or high pitch sounds. | Pupil can describe how materials can be sound insulators/conductors and create models to |

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| | | demonstrate their effectiveness. |
| Key vocabulary:<br>Sound; volume; pitch; vibration; medium; conduct; conductor; insulate; insulator; amplify; tuning fork; decibel; high; low; natural; man-made; echo; vacuum; sound waves; sonar; sound proof; outer ear; auditory canal; ear drum; cochlea; auditory nerve; voice box; vocal chords; larynx; tongue; hammer; anvil; stirrup.<br><br>Scientists to consider: Pythagoras; Robert Boyle; Leonardo Da Vinci; Christian Doppler. | | |

Science Assessment against National Curriculum

| Year group | 4 | Area of NC: States of Matter (Chemistry) |
|---|---|---|
| Pupils should be taught to | Compare and group materials together, according to whether they are solids, liquids or gases.<br><br>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).<br><br>Identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can identify solids, liquids and gases in their environment | Pupil can define and group a range of materials as solids, liquids and gases | Pupils research a range of gases and their properties considering the temperatures when a change of state occur |
| Pupils are beginning to understand that matter can change state | Pupil can explain that materials can change their state and that this is affected by temperature | Pupils can suggest other ways that changes of state may happen e.g. chemical. |
| Pupils recognise that water can exist in 3 states – ice (solid); liquid water and water vapour | Pupil can explain the different temperatures at which water changes state and can suggest how this could be investigated/measured | Pupils explore the temperatures at which a range of materials change state and compare these to water |
| Pupil can see that evaporation and condensation is happening around them and offer examples | Pupil can describe the process of evaporation and condensation giving examples from the environment around them | Pupil can give example of some changes of state that are irreversible and others which are reversible |
| | Pupil can describe how evaporation and condensation occur within the water cycle | Pupil can give detailed account of the Water Cycle noting clearly the changes of state which occur |
| Pupil can describe that the rate of evaporation seen for instance in the size of a puddle can change during the day | Pupil can explain factors, such as wind, temperature, surface of materials which may be perceived to affect the rate of evaporation and/or condensation | Pupil can describe the effect on the environment of prolonged periods when either high/low temperatures reduce moisture levels and/or the rate of evaporation/condensation |

Key vocabulary: (Build upon properties of materials in KS1 and Y3)

matter; solid; liquid; gas; vapour; expand; contract; particles; thermometer; temperature; degrees; Celsius; heating; cooling; freezing; melting; dissolve; soluble; solution; thermometer; energy; change of state; Water Cycle; evaporation; condensation; evaporate; condense; degrees

Scientists to consider: Bernard Palissy; Leonardo Da Vinci; Anders Celsius.

Science Assessment against National Curriculum

| Year group | 5 | Area of NC: Animals, including humans (Biology) |
|---|---|---|
| Pupils should be taught to.. | Describe the changes as humans develop to old age | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can describe the life cycle of a human in simple periods | Pupil can explain the life cycle of a human from conception to old age | Pupils recognise the stages of development from a zygote to when a baby is ready to be born and until old age |
| Pupil is aware that human life expectancy is different to other animals | Pupils compare the life expectancy of humans to other animals | Pupils identify any links between size of mammals and life expectancy and suggest reasons for any patterns |
| Pupil can describe some changes which happen to the body during adolescence | Pupil can explain the changes which happen to the human body during adolescence<br>Pupil can name the main parts of the human reproductive system/body and explain how these change during adolescence. | Pupils compare the life expectancy of humans to other animals focussing especially upon development of independence and age of mobility, sexual maturity etc |
| Pupil recognises that human gestation period is different to other animals. | Pupils compare the gestation periods of various mammals and compare the similarities and differences<br>Pupil can explain that most mammals are viviparous like man (give birth to live young). | Pupils can make links between the patterns they notice in gestation periods and the physical attributes/abilities of a new born mammal comparing these to man. |
| Pupils can describe some of the physical changes that happen to humans as they get older. | Pupils can describe the changes to the human body and limitations this brings as a human gets older e.g. skin, walking, hair. | Pupil can discuss some of the diseases/ailments associated with the elderly and other stages of the human life cycle with possible treatments. |

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| | | Pupil has an awareness that in the past humans looked very different to they do today and links this to evolutionary change. |
| Key vocabulary:<br>viviparous; fertilisation; egg cell; sperm cell; zygote; foetus; baby; infant; toddler; child; adolescent; teenager; young adult; mature adult; old age; elderly; gestation; life cycle; species; puberty; hormones; pituitary gland; testosterone; oestrogen; facial hair; body hair; broad shoulders; narrow waist; breasts; vagina; womb; placenta; uterus; ovary; fallopian tube; period; penis; testicles;<br><br>Scientists to consider: Charles Darwin; Gerald Durrell; Robert Winston; Michel Chevreul;<br><br>**(Note: Link this unit should be linked to school SRE policy and Y5 unit on 'Living things and their environment' for vocabulary, diagrams of male and female body, diagrams showing development during adolescence taught in year 5)** | | |

Science Assessment against National Curriculum

| Year group | 5 | Area of NC: Earth and Space (Physics) |
|---|---|---|
| Pupils should be taught to | Describe the movement of the Earth, and other planets, relative to the Sun in the solar system.<br><br>Describe the movement of the Moon relative to the Earth.<br><br>Describe the Sun, Earth and Moon as approximately spherical bodies.<br><br>Use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil understands that the Earth orbits the Sun. | Pupil can explain that the Earth and other planets orbit the Sun. | Pupil can describe the position of the Earth and Sun in relation to the wider Solar system. |
| Pupil understands that the Sun, Moon and Earth are spherical. | Pupil can explain that the Sun, Earth and Moon are spherical bodies. | Pupil can describe the structure of the planets in the solar system comparing them with their understanding of the Sun, Earth & Moon's structure, shape etc. |
| Pupil can name some planets in the Solar system and explain simply how they are different to the Earth. | Pupil can name, place and describe the differences between the planets in the Solar system. | |
| Pupil recognises that gravity enables the Earth to orbit the Sun. | Pupil understands that gravitational forces ensure that the orbits of planets are consistent and time taken to orbit the sun is dependent on distance from the sun. | Pupil can explain the environmental and gravitational pressures on planets and planetary bodies in relation to man visiting or colonising these areas. |
| Pupil understands that the Moon appears to change shape over the period of 1 month. | Pupil can explain that the Moon orbits the Earth noting the number of days, apparent shape and the lunar cycle. | Pupil can discuss the effect of the Moon on the oceans and seas of the Earth. |
| | | Pupil can compare and contrast the gravitational forces on the Earth and Moon with the effect these have on man and his activities. |

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|---|---|---|
| Pupil can describe that the length of day/night is determined by the position of the Earth and Sun. | Pupil can describe how the rotation of the Earth in relation to the Sun causes day and night. | Pupil can suggest reasons for the different lengths of a year on other planets and research any variation of day/night length. |
| | Pupil can describe how the position of the Earth's orbit in relation to the Sun affects the amount of daylight and temperatures on the Earth giving us our seasons. | |
| Pupil recognise that the apparent movement of the Sun during the day affects the size and position of shadows. | Pupils can explain the apparent movement of the Sun during the day and its effect on shadow length. | Pupil can describe that rotation of the Earth means that different time zones exist in our world |
| | | Pupil can describe some efforts of man to colonise space and scientific implications e.g. astronauts visiting the moon; International Space station; rockets/probes sent to other planets in our Solar system and beyond; NASA. |
| | | Pupil can discuss in simple terms some ideas for the formation of the Universe e.g. Big Bang theory |

Key vocabulary:

Sun; Moon; Earth; orbit; planets; moon; celestial body; Mercury; Venus; Mars; Jupiter; Saturn; Uranus; Neptune; Pluto ( as a dwarf planet ); day; night; phases; gravity; gravitational pull; Solar System; Universe; comet; colonise; explore; astronaut; rocket; space station; lunar; lunar cycle; rotate; axis; revolve; sphere; spherical; geocentric; heliocentric; constellation; full moon; gibbous moon; half moon; crescent moon; new moon; waxing moon; waning moon

Scientists and Astronomers to consider: Ptolomy; Alhazen; Copernicus; Galileo; Isaac Newton; Albert Einstein; Edwin Hubble; Edmond Halley; Frank Drake; Stephen Hawking; Cecilia Payne-Gaposchkin; Brian Cox; Heidi Hamnel

Science Assessment against National Curriculum

| Year group | 5 | Area of NC: Forces (Physics) |
|---|---|---|
| Pupils should be taught to | Explain that unsupported objects fall towards the Earth because of the force of gravity acting between the Earth and the falling object.<br><br>Identify the effects of air resistance, water resistance and friction, that act between moving surfaces.<br><br>Recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil knows that an unsupported object will fall to the Earth and this is caused by gravity. | Pupil can explain the effect of gravity on objects falling towards the earth. | Pupil can explain the wider effect of the gravitational pull of all objects upon one another. |
| Pupil understands that a force needs to be applied to an object to begin to move. | Pupil can describe the effect of gravity on the rate at which objects of different shape will fall to the Earth. | Pupil can describe and apply their knowledge of forces which oppose motion to useful contexts in the world around them. |
| Pupil understands that the rate of movement of an object can be affected by the surfaces and media with which the objects surface area has contact. | Pupil can explain that the movement of objects through air, water and across surfaces is resisted by these media.<br><br>Pupil can give ideas for how the effect of air & water resistance and friction can be minimised to enable objects to move more freely through the respective media. | Pupil can explain how aerodynamic design can increase the speed of movement of objects in, over, under a range of media. |
| Pupil recognises that gears, pulleys and levers may be utilised to transfer force. | Pupil can describe how levers, pulleys and gears work.<br><br>Pupil can explain how some mechanisms can use a small force to create a big effect. | Pupil has opportunity to experiment with different types and sizes of levers, pulleys and gears to identify patterns in the size of force they can create. |

Key vocabulary

Gravity; gravitational force; friction; force; thrust; upthrust; air resistance; water resistance; push; pull; stationary; contact force; non-contact force; buoyancy; zero gravity; motion; unsupported force; supported force; levers; pulleys; gears; springs; fulcrum/pivot; hinge; motion; particle; surface area; Mass (g & kg); Balance;

Scientists to consider: Galileo Galilei; Isaac Newton; Christopher Cockerell; Archimedes;

Science Assessment against National Curriculum

<table>
<tr><td>Year group</td><td>5</td><td colspan="2">Area of NC: Living things and their habitats (Biology)</td></tr>
<tr><td>Pupils should be taught to..</td><td colspan="3">Describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird.<br><br>Describe the life process of reproduction in some plants and animals.</td></tr>
<tr><td>Working Towards</td><td colspan="2">Expected standard</td><td>Exceeding</td></tr>
<tr><td rowspan="2">Pupil can describe the life cycles of some animals from their local environment.</td><td colspan="2">Pupil can explain the life cycle of animals including mammals, insects, amphibian and birds.</td><td>Pupil can explain some of the difficulties which may result in animal/plant lifecycles and reproduction becoming less successful and lead to a reduction in population size</td></tr>
<tr><td colspan="2">Pupil is beginning to identify similarities and differences between the life cycles of studied animal groups</td><td>Pupil can explain the similarities and differences in the reproduction of animals from each animal group.</td></tr>
<tr><td rowspan="2">Pupil can name some of the parts of a flowering plant involved in sexual reproduction.</td><td colspan="2">Pupil can label and describe the parts of a flowering plant involved in sexual reproduction.</td><td rowspan="2">Pupil can explain the process of plant reproduction and identify the differences between sexual and asexual forms.</td></tr>
<tr><td colspan="2">Pupils can describe the process of sexual reproduction in plants.</td></tr>
<tr><td>Pupil recognises that plants may not all reproduce sexually.</td><td colspan="2">Pupil can explain the process of asexual reproduction in plants.</td><td>Pupil can contrast the sharing of genetic information in asexual and sexual plant reproduction.</td></tr>
<tr><td>Pupil can describe the changes they see over time in the reproduction and growth of some animals</td><td colspan="2">Pupil can describe the process of reproduction in some animals.</td><td>Pupil can accurately describe the process of reproduction in a flowering plant and compare this to reproduction in at least 1 of the main non-human animal groups.</td></tr>
<tr><td colspan="4">Pupil recognises some scientists, naturalists and/or environmentalists for their work in scientific research of life cycles and reproduction.</td></tr>
</table>

Key vocabulary: (see also KS1 and Lower KS2)
reproduce; grow; reproduction; life cycle; mammal; amphibian; insect; bird; fish; reptile; male; female; metamorphosis; germination; fertilisation; pollination; genetic information; gene; genetic information; fruit; seed; embryo; stigma; anther; style; ovary; ovule; carpel; nucleus; pollen; pollen grain; pollen tube; sperm; sexual reproduction; asexual reproduction; egg; birth; growth; adulthood; male; female; off-spring; pupa; chrysalis; pupa; imago; adult; seeds; bulb; tuber; stem; root cutting;

Scientists to consider in Upper KS2: Terry Nutkins; Chris Peckham; Isacc Newton; Jane Goodall; David Attenborough; Bill Oddie; BF Skinner; Ivan Pavlov; Galileo; Darwin; Madam Curie;

Vocabulary for HA pupils to explore:
angiosperm; gymnosperm; embryo; genome; meiosis; haploid; diploid; generation; gene; gamete; zygote; gestation; chromosome; blastocycst; placenta; mitosis

Science Assessment against National Curriculum

| Year group | 5 | Area of NC: Properties and changes of materials (Chemistry) |
|---|---|---|
| Pupils should be taught to | 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.<br><br>Know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution.<br><br>Use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating.<br><br>Give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic.<br><br>Demonstrate that dissolving, mixing and changes of state are reversible changes.<br><br>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. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can group a wide range of materials by their common properties and suggest some similarities and differences. | Pupil can group most everyday materials on the basis of their properties explaining their similarities and differences. | |
| Pupil understands that some materials can dissolve in liquids and recognise they can be recovered from the subsequent solution. | Pupil can identify materials which are soluble in liquids and describe the process as dissolving. | Pupil can group materials by their solubility. |
| | Pupil can explain how materials dissolved in a solution can be recovered. | Pupil can describe a range of materials which can be used as solvents to create solutions. |
| Pupil can suggest some simple methods to separate materials in mixtures. | Pupil can suggest and use a range of methods to separate materials from mixtures based on their knowledge of the properties of these materials. | Pupil can use their knowledge of how to separate materials from a range of mixtures to explain the most efficient method of separation and link to possible commercial |

| | | |
|---|---|---|
| | | uses e.g. waste recycling plant |
| Pupil can identify some materials used in everyday objects and suggest why they were suitable. | Pupil can describe different uses for common everyday materials based on their properties. | |
| Pupil is beginning to understand that some changes are reversible and others irreversible. | Pupil can explain the differences between reversible and irreversible changes, giving examples of both. | Pupil can explain the by-products which can be produced during some reversible/irreversible changes and how these can be managed (e.g. heat, gases) safely and/or used for other purposes. |
| | Pupil understands (and give examples) that some irreversible changes can result in the formation of new materials. | Pupils can give clear examples of how materials can be mixed, combining their properties to make everyday objects which have improved functionality compared to using one material alone. |
| | Pupil can describe some materials which have been manufactured by irreversible (chemical) change and explain how the properties of the new materials make them useful to man. | |
| | Pupil can explain why some materials are not suitable for particular uses based on their knowledge of the properties of materials. | |
| Pupil can describe the work of a number of scientists who have developed new materials to meet changing needs in society/the world e.g. space exploration; medicine | | |
| Key vocabulary: (See also KS1 & Lower KS2 materials vocabulary)<br>freezing; melting; boiling; burning; solid; liquid; gas; properties; solution; solute; solvent; mixture; filter; sieve; evaporation; decanting; sieving; condensation; saturated; temperature; Celsius; state; reaction; chemical; reversible; irreversible; conductivity; brittle; thermal; flexible; waterproof; synthetic; absorbent; rigid; natural; hard; permeable; impermeable; hardness; conductor ; insulator; transparent; magnetic; non-magnetic<br><br>Scientists to consider: Alexander Parkes (Plastic); John Dunlop (Rubber tyre); Humphrey Davy; Marie Curie; John Dalton; Antoine Lavoisier; Spencer Silver (glue for sticky notes); Ruth Benerito (wrinkle free cotton) | | |

Science Assessment against National Curriculum

| Year group | 6 | Area of NC: Animals including humans (Biology) |
|---|---|---|
| Pupils should be taught to | Identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood.<br><br>Recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function.<br><br>Describe the ways in which nutrients and water are transported within animals, including humans. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can indicate the position and role of the heart, lungs and skeleton in the body. | Pupil can identify the role of the skeleton and its parts in protecting the heart and circulatory system, as well as enabling the circulatory cycle. | |
| Pupil can explain how blood circulates around the body. | Pupil can name the main parts of the human circulatory system and describe the function of each part. | Pupil can describe some of the health problems which may occur if the circulatory system is not working correctly. |
| Pupil recognises that blood carries oxygen, energy and carbon dioxide around the body. | Pupil can explain the composition and function of blood within the body, including how it carries oxygen and carbon dioxide. | Pupil can explain that blood is also composed of platelets, serum, white blood cells, hormones etc which affect how the body operates |
| Pupil can explain why it is important to exercise and eat healthily. | Pupil can explain the impact on the heart and circulatory system of exercise and nutrition.<br><br>Pupil can describe the impact of exercise upon the body and the benefits of a healthy, active lifestyle compared to an inactive, sedentary, unhealthy lifestyle in the short and long term. | Pupil can suggest specific activities to keep the heart and circulatory system healthy. |
| Pupil can name a range of healthy and unhealthy foods giving some reasons for their choice. | Pupil understands that the human body needs energy to function properly and this comes from our food. | Pupil can explain in some detail about the long-term effect of an unhealthy lifestyle and diet upon the |

| | | |
|---|---|---|
| Pupil explains that our energy comes from food and this should be from a balanced diet | Pupil can describe what happens to the body if we have too little/too much food to meet its needs. | individual, family and broader community. |
| | Pupil can explain how energy from our food is released and carried around the body to those organs and tissues which need it. | |
| Pupil understands that we need water to keep our body hydrated and enable it to function effectively | Pupil can explain how water is absorbed from the digestive system and transported around the body to ensure good health and function of organs/tissues. | Pupil can describe how some animals adapt to survive in areas where water is scarce |
| | Pupil can describe how other animals transport/store energy, oxygen and water noting how their systems may have evolved differently to man's due to the extreme/different habitats in which they live. | Pupil has opportunity to compare and contrast the digestive and circulatory systems of a range of animals compared to man. |
| Pupil can name some of the dangers to the body of taking drugs and medicines inappropriately. | Pupil can identify a range of helpful (medicines) and harmful drugs and explain their effect on the body including the addictive nature of many drugs. | Pupil can describe the additive nature and effect on the body of a number of harmful drugs suggesting reasons for people taking/becoming addicted to these drugs |
| Pupil can describe the work of some scientists in overcoming conditions and diseases associated with the heart, blood and circulatory system. | | |
| Key vocabulary: (See also lower KS2 vocabulary for digestion, skeleton & muscles)<br><br>cardiovascular system; transport; respiration; energy; blood; blood cells; red cells; white cells; plasma; platelets; haemoglobin; capillaries; organ; heart; heart rate; pulse; chamber; atrium; valve; artery; vein; blood vessel; ventricle; aorta; contract; oxygen; oxygenated; deoxygenated; carbon dioxide; exercise; cycle; glucose; vitamins; nutrient; immune system; lungs; alveoli; bronchiole; clot; bronchus; trachea; drugs; medicine; medication; side-effect; addiction; respiratory system; vitamins; minerals; nutrient; anti-body<br><br>Scientists: William Harvey; Christian Barnard; Magdi Yacoub; Gertrude Elion; Rosalyn Yarrow; Francoise Barré-Sinoussi. | | |

Science Assessment against National Curriculum

| Year group | 6 | Area of NC: Electricity (Physics) |
|---|---|---|
| Pupils should be taught to.. | Associate the brightness of a lamp or the volume of a buzzer with the number and voltage of cells used in the circuit.<br><br>Compare and give reasons for variations in how components function, including the brightness of bulbs, the loudness of buzzers and the on/off position of switches.<br><br>Use recognised symbols when representing a simple circuit in a diagram. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can create a simple electrical circuit with more than one component – a complete circuit. | Pupil can use knowledge of symbols and circuit diagrams to create an accurate series circuit. | Pupil has opportunity to compare the difference between a series and parallel circuit. |
| Pupils can identify and use some electrical symbols in a drawing of an electrical circuit but may not be accurate in drawing a circuit diagram. | Pupil can draw a circuit diagram using recognised symbols. | Pupil use their knowledge of electricity and circuits to design and build a range of electrical items e.g. alarm; traffic lights. |
| Pupil can identify some practical uses for simple circuits they make in the classroom. | Pupil can explain what happens to other components in a circuit if additional bulbs, buzzers are added but the number of cells/battery remains the same. | Pupil use data-loggers to produce quantifiable data which show the effect of changing, increasing, decreasing components in the circuits they build.<br><br>Pupil can explain how resistance to the flow of a current is produced from wires and components in a circuit. |
| | Pupil can explain what will happen to components in a circuit if the number of cells/batteries is increased or reduced. | Pupil can suggest why wires of different thickness are used in different types of circuits/appliances. |
| Pupil can identify some metals and other materials which are electrical conductors/insulators. | Pupil can explain why some metals are electrical conductors and other insulators. | Pupil can explain why plastic is used for the casing on electrical wires. |

| | | |
|---|---|---|
| | Pupil can explain how current flows in a circuit and what happens if the current is changed or a part of the circuit does not work/function appropriately. | Pupil can describe the movement of protons and electrons to generate a current. |
| Pupil is aware of the need to be safe around electricity and can describe some precautions. | Pupil can explain the dangers of working with electricity and the safety precautions which must be taken. | Pupil can describe how a defibrillator works by using an electrical charge to restart the heart after it has stopped. |
| | Pupil can explain how electrical appliances have safety features in their circuits to prevent electrocution or electric shock. | |
| Key vocabulary: (See also Year 4 'Electricity'<br><br>Electrical current; circuit; series circuit; symbols; cell; battery; bulb; buzzer; motor; switches; conductor; insulator; safety precautions; electrocution; electric shock; defibrillator; open switch; closed switch; positive terminal; negative terminal; electrons; protons; static electricity; volts; voltage; watts; Ohms; resistance; amps; fuse; earth; live.<br><br>Scientists to consider: Allesandro Volt; Andre Ampere; James Joule; Georg Ohm; Charles Siemans; Charles Coulomb; Michael Faraday; Thomas Edison. | | |

Science Assessment against National Curriculum

| Year group | 6 | Area of NC: Evolution and Inheritance (Biology) |
|---|---|---|
| Pupils should be taught to | Recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago.<br><br>Recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents.<br><br>Identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution. | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can explain how fossils are formed. | Pupil can explain how fossils have been formed and what they tell us about animals/plants living in the past | Pupil can explain some of the limitations of fossils. |
| Pupil understands that there are different periods of time in the Earth's past when living organisms lived which are not in existence today. | Pupil can describe key stages in the Earth's history and offer suggestions as to why different creatures/plants lived then compared to now. | Pupil can create a timeline showing the different stages of the Geological record and explain how some creatures no longer exist. |
| Pupil can describe some adaptations of plants/animals living in extreme environments. | Pupil can explain that some living things are able to survive better than others in different environments e.g. desert – cactus & succulent plants and the camel; penguins in polar/sub polar areas. | Pupil can give valid reasons why some living organisms became extinct linking this to evolution through genetic change and/or successful adaptation to new environments by species. |
| Pupil can explain that parents give some characteristics to their offspring. | Pupil understands that in sexual reproduction offspring inherit characteristics from each parent but will not be same as either, although have some features in common. | Pupil can explain that characteristics passed from parents to their offspring are contained in genetic material within cells. |
| Pupil understands that sometimes offspring are not like their parents and this can have a positive or negative effect on their survival. | Pupil can explain that variation occurs in sexual reproduction. | Pupil can describe that variation occurs when mutation happens during recombination of genetic material. |

| | | |
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| | Pupil can describe how the process of variation (or mutation) can give offspring an advantage over other offspring so they will be more successful. | Pupil may show some awareness of recent genetic research, such as cloning and selective breeding by agricultural scientists. |
| | Pupil can explain that some animals/plants have evolved over time due to changes in the environment and positive physical traits which made them better able to survive and link this to evidence in fossil record/geology of Earth. | |
| | Pupil can explain that some organisms reproduce asexually and the offspring will be almost identical to the parent. | |
| Key vocabulary: (Build upon rocks/fossils vocabulary from LKS2)<br>Adapt; adaptation; evolution; inheritance; reproduce; reproduction; fertilise; fertilisation; genes; chromosomes; characteristics; variation; natural selection; selective breeding; generation; species; trait; desirable; mutations; heredity; reproduce; diversity; survival; extinct; off spring; parents; identical; cloning; genetic engineering; naturalist; habitat; predator; prey; organisms; life cycles; Geology; Palaeontologist; Cambrian; Ordovician; Devonian; Silurian; Jurassic; Tertiary; Palaeozoic; Triassic; Carboniferous; Quarternary; Cretaceous; Permian; Cenozoic; Mesozoic.<br><br>Scientists: Mary Anning; Charles Darwin; Alfred Wallace; Lynn Margulis; Ernst May; Charles Lyell; Teodosius Dobzhansky; Gregor Mendel; Barbara McClintock; James Watson; Francis Crick. | | |

Science Assessment against National Curriculum

| Year group | 6 | Area of NC: Light (Physics) |
|---|---|---|
| Pupils should be taught to.. | Recognise that light appears to move in straight lines<br><br>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<br><br>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<br><br>Use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them | |

| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupils can name different light sources. | Pupil can explain how light travels from a light source in straight lines. | Pupil can explain that light is a spectrum and describe the visible and invisible parts of the spectrum. |
| Pupil understands that light travels faster than sound and in straight lines. | Pupil suggests ways that they can show light travels in straight lines. | Pupil uses their knowledge of light reflection to create a product which may be useful in school e.g. positioning of mirrors to see around corners in school, to see food at lunch-time. |
| Pupil knows that we see because light is reflected from objects and enters our eyes. | Pupil can describe the process whereby light travels from light sources and is reflected from objects/materials to our eyes. | Pupil can describe how the brain interprets the information sent to it from the eye as an image. |
| Pupil can label some of the key parts of the eye | Pupil can label the parts of an eye and discuss how each part is involved in seeing an object from which light is reflected. | |
| Pupil can explain that we see images because our brain is sent messages along the optic nerve from the eye. | | |
| Pupil understands that we see in colour because of how different properties reflect light | Pupil can describe that we see colour because some colours are absorbed by an object when light is reflected from its surface. | Pupil can explain how we see images in colour and name the parts of the eye involved. |
| | Pupil can describe how light is reflected by mirrors – plane; concave; convex | |

<table>
<tr><td rowspan="2">Pupil can explain that shadows are formed when light is blocked from passing through an object.</td><td>Pupil can explain how shadows are formed and how the transparency or opaque property of an object determines the clarity of the shadow we see.</td><td rowspan="2">Pupil shows their understanding of shadow formation by creating shadows of different sizes and shape by altering the position and intensity of the light source in relation to the object making the shadow.</td></tr>
<tr><td>Pupil explains that a shadow has the same shape as the object casting it but may be elongated or shorter depending on the position of the light source.</td></tr>
<tr><td></td><td>Pupil identifies that an object looks different when observed in two media e.g. water & air</td><td>Pupil can describe that refraction of light makes an object appear different when we view it across two different media.</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Pupil can describe how the process of light reflection can be used commercially e.g. manufacture of periscope; microscope; rear view mirrors; telescopes.</td><td>Pupil can describe adaptations animals have developed to see in low light or dark environments e.g. deep sea; nocturnal creatures.</td></tr>
<tr><td>Pupil can discuss technology which allows man to work in low light environments e.g. night vision goggles/TV cameras</td></tr>
<tr><td colspan="3">Key vocabulary: (Build on Y3 vocabulary)<br><br>reflection; refraction; reflective; opaque; transparent; translucent; light source; shadow; straight; filter; prism; spectrum; optic nerve; retina; iris; lens; rods; cones; pupil; inverse; cornea; plane mirror; convex; concave; optical illusions; filament; focus; optician; luminescence; bioluminescence; incandescent; nocturnal; Infra-red light; light meter; lumens; visible; invisible; telescope; microscope; short sighted; long sighted<br><br>Scientists to consider: Thomas Young; Sir David Brewster; Jean Bernard-Leo Faucault; Anna Jane Harrison;</td></tr>
</table>

Science Assessment against National Curriculum

| Year group | 6 | Area of NC: Living things and their habitats (Biology)<br>***Teach after 'Animals including Humans' & 'Evolution and Inheritance' as they can inform this unit*** |
|---|---|---|
| Pupils should be taught to.. | 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.<br><br>Give reasons for classifying plants and animals based on specific characteristics. | |

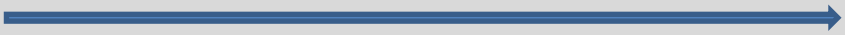
| Working Towards | Expected standard | Exceeding |
|---|---|---|
| Pupil can identify livings things using the acronym – MRS GREN | Pupil explain the features of all living things e.g. MRS GREN | |
| Pupil understand that the work of some scientists helps us to identify all living things | Pupil can describe the work of scientists in creating a binomial classification systems e.g. Carl Linnaeus | Pupil can describe and name the 7 levels of taxonomic rank used to identify all living things e.g. using a pneumonic to help – keeping precious creatures organised for grumpy scientists = kingdom-phylum-class-order-family-genus-species |
| Pupil can describe the key features of the main animal and plant groups | Pupil can identify differences and similarities between the broad classification groups of living things | Pupil can identify differences and similarities between animal and plant groups using this information to classify them accurately as below: |
| Pupil can give a definition of a vertebrate animal | Pupil understands that there are 7 main groups of vertebrates (Chordata) - Mammals, Bony Fish, Cartilaginous Fish, Birds, Amphibians and Reptiles. | Pupil can identify animals as vertebrates (Chordata) Mammalia (Mammals), Actinopterygii (Bony Fish), Chondrichthyes (Cartilaginous Fish), Aves (Birds), Amphibia (Amphibians) and Reptilia (Reptiles) – using classification keys to identify individual examples of each. |
| Pupil can give a definition of an invertebrate animal | Pupil understands that invertebrates are also classified into groups and can name some of these groups: Sponges, Cnidarians, Echinoderms, Molluscs, Segmented worms (annelids), Arthropods, Crustaceans, Insects, Round worms (Nematodes), Flat worms (Platyhelminths). | Pupil can identify the key invertebrate groups— Poriferans (sponges), Cnidarians (such as sea jellies and corals), Echinoderms (such as sea urchins and sea stars), Molluscs (such as octopuses, snails, and clams), Annelids (worms), Arthropods, Crustaceans, Insects, Round |

| | | |
|---|---|---|
| | | worms (Nematodes), Flat worms (Platyhelminths) - using classification keys to identify individual examples of each. |
| Pupil understands that there are flowering and non-flowering plants. | Pupil understands that there are 5 main groups of plants: algae; mosses & liverworts; ferns, club mosses and horsetails; conifers and flowering plants. | Pupil can identify that there are 5 main groups of plants: algae; mosses & liverworts; ferns, club mosses and horsetails; conifers and flowering plants - using classification keys to identify individual examples of each. |
| Pupil understands that microbes can be harmful or helpful | Pupil understands there are more than one type of micro-organism e.g. fungi; bacteria; virus; protists and name examples | Pupil can explain there are 4 types of micro-organisms e.g. fungi; bacteria; virus; protists and name examples. |
| | Pupil can describe how some micro-organisms are helpful and others harmful, naming examples of both. | Pupils can explain how microbes are used in the world around them and how they can be exploited for commercial purposes. |
| | | Pupil has an understanding of how the process of vaccination protects some living things from harmful micro-organisms |
| Pupil can use simple dichotomous keys to identify a range of common animals and plants from the world around them | Pupil can use dichotomous keys to identify a range of living things from within the local habitat and increasingly from a diverse range of habitats around the world | Pupil can create their own and use a range of commercially produced keys to identify animals and plants in both the local environment and other global environments. |
| | Pupils can create simple dichotomous keys to identify living things from a range of habitats | |
| Key vocabulary:<br>classification system; taxonomy; vertebrates; invertebrates; micro-organisms; plants; algae; mosses; liverworts; ferns; horsetails; conifers; flowering plants; animals; insects; spiders; snails; segmented worms; fish; amphibians; reptiles; birds; mammals; echinoderms; molluscs; crustaceans; flat worms; round worms; phylum; class; order; family; genus; species; fungi; bacteria; virus; protists; vaccination; symbiotic; parasite; toxins; unicellular; multi-cellular; autotroph; heterotroph; membrane; cell; nucleus; DNA; exoskeleton;<br><br>Scientists to consider: Carl Linnaeus; Evelyn Cheesman; Hans Sloane; Gilbert White | | |

# Working Scientifically

Opportunities should be provided in each year group of the phase but you are not expected to cover each aspect for every area of study. The types of enquiry should include: observing over time; pattern seeking; identifying, classifying and grouping; comparative & fair testing; Research using secondary sources.

The A-B-C-D approach shows how skills develop across the phases and Key Stage as pupils develop their understanding of and ability to work scientifically.

| A-B-C-D | Year 1 & 2 pupils can… | Year 3 & 4 pupils can… | Year 5 & 6 pupils can… |
|---|---|---|---|
| | ***Increasing independence & decreasing support in developing lines of enquiry and making conclusions***  | | |
| Ask | • Ask simple questions<br>• Understand there are different ways to answer | • Ask relevant questions<br>• Use different types of scientific enquiries to answer | • Use their experience to explore ideas and raise different kinds of questions |
| Breakdown | • Perform simple tests | • Set up simple practical enquiries, comparative and fair tests<br>• Make systematic and careful observations | • Plan different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary |
| Capture | • Observe closely<br>• Use simple equipment<br>• Sort and group (Identify & classify)<br>• Record observations | • Take accurate measurements using standard units<br>• Use a range of equipment, including thermometers and data loggers<br>• Gather, record, classify and present data in a variety of ways | • Take measurements:<br>- use a range of scientific equipment<br>- increase accuracy & precision<br>- take repeat reading when appropriate<br>• record data and results (with increasing complexity via:<br>- scientific diagrams and labels<br>- classification keys<br>- tables<br>- scatter graphs<br>- bar and line graphs |
| Describe | • Use observations and ideas to suggest answers to questions | • Use results to<br>- draw simple conclusions<br>- make predictions for new values<br>- suggest improvements<br>- raise further questions<br>• Report on results and conclusions from enquiries<br>- via oral and written explanations<br>- displays or presentations<br>• Identify differences, similarities or changes related to simple scientific ideas and processes<br>• Use evidence to answer questions or support findings | • Use test results to<br>- Make predictions<br>- Set up further comparative and fair tests<br>• 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<br>• Identify scientific evidence that has been used to support or refute ideas or arguments |

# Working Scientifically – KS1

## ASK

I explore the world

I ask my own questions

I find answers from books, photographs, videos

## BREAKDOWN

I carry out simple tests

I use simple measurements

I use simple equipment

## CAPTURE

I observe closely

I compare using simple features

I record what I notice in different ways

I group things using simple features

I notice patterns & relationships

I sort things using simple features

## DESCRIBE

I explain what I found out

I talk about what I have seen

I use simple scientific language

I know there are different ways to answer

# Working Scientifically – Lower KS2

## ASK

- I ask relevant questions
- I decide when to use secondary sources to help find answers
- I make simple predictions based on my knowledge of science

## BREAKDOWN

- I set up my own simple tests
- I use different enquiry types to test my questions
- I make decisions about the type of enquiry
- I learn how to use new equipment
- I decide what equipment to use

## CAPTURE

- I measure using a range of equipment
- I measure accurately using standard units
- I observe carefully
- I gather data and record in different ways
- I gather data and record in different ways
- I group, sort and classify using different criteria
- I make systematic observations

## DESCRIBE

- I can explain what I have found out using correct scientific language
- I draw simple conclusions
- I present data in different ways
- I suggest improvements to my tests
- I answer questions based on evidence orally and in writing
- I record my findings using correct language in varied ways

# Working Scientifically – Upper KS2

## ASK

- I make predictions based on evidence
- I ask different kinds of questions
- I identify appropriate secondary sources to research ideas and ask questions

## BREAKDOWN

- I can recognise and control variables in tests
- I plan different enquiries to answer questions
- I recognise when to use comparative and fair tests
- I plan when to take repeat readings

## CAPTURE

- I choose and use a range of equipment precisely
- I decide how to record data
- I can create classification keys
- I decide what observations and measurements to make

## DESCRIBE

- I can explain how scientific ideas develop over time
- I use evidence from enquiry to support or refute ideas being tested
- I use varied ways to present data
- I identify and comment, using appropriate language, on patterns I notice
- I use relevant scientific language and illustrations in reports and when drawing conclusions