

# Ackworth Howard C of E School

Educating for 'life in all its fullness.'



## Science Curriculum – Essential Knowledge

# Intent

At Ackworth Howard J&I School, our children are natural scientists who are keen to explore, enquire and understand the world around them.

## Mind



To encourage growth in mind, we investigate life processes, materials, physical processes and concentrate on developing children's scientific skills, encouraging them to question, investigate and test appropriately.

## Body



To encourage growth in body, we focus on group work and collaboration, with lots of practical work and experimentation. Through scientific investigations, we aim to build resilience by showing the children that they can learn from their mistakes, and that it is okay to get things wrong!

## Spirit



To encourage growth in spirit, we support their learning in a variety of ways including school trips and fieldwork. Our children will, through their scientific studies, garner a curiosity about the world around them. They will learn the skills and essential knowledge they need to become a fully contributing member of society.

# Early Years: Science (Understanding the World)

## Statutory Guidance from the EYFS Framework for Understanding the World

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

## Ackworth Howard's Knowledge Essentials

### Understanding the World: Natural World

#### Nursery

- I can show respect and care for my environment.
- I can talk about my home environment and school environment.
- I can explore my world and environment through my senses.
- I can explore the changing weather and seasons.
- I am continuing to explore using my senses.
- I can name parts of the body.
- I am showing more of an interest in the world.
  - I can explore collections of materials
- I can use senses in hands on exploration
- I can explore how things work
- I understand that the weather changes and that in different countries you have different weather
- I understand the difference between plants and animals
  
- I can explore natural materials, indoors and outside.
- I understand how and why we respect and care for animals.
- I can explore a range of materials and natural objects
- I can explore the changing weather and seasons (Spring), I am learning about new life and plants based around Spring time
- I can plant seeds and care for growing plants with support

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## Ackworth Howard's Knowledge Essentials

### Understanding the World: Natural World

#### Nursery

- I can explore and respond to different natural phenomena in their setting and on trips.
- I can grow plants from seeds and care for them,.
- I can explore how these plants grow and change over time.
- I can explore the changing weather and seasons (Summer)
- I can notice changes such as ice melting in the sun and offering a reason why.
- I can explore collections of materials, identifying similar and different properties
- I can name my 5 senses
- I can explore and talks about forces (push and pull)
- I can identify what you need to wear for each season and why
- I can explain the life cycle of a daffodil and a butterfly

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## Ackworth Howard's Knowledge Essentials

### Understanding the World: The Natural World

#### Reception

- I can have discussions around human lifecycles and how we grow and change.
- I understand how I have grown and how I will continue to grow. Looking at how I look and people older than me look – what is the same and what is different.
- I can name body parts and know how to keep healthy.
- I know about the seasons and know it is Autumn.
- I can talk about the seasons and have some understanding about the changes that happen in the world.
- I can talk about differences between materials and changes they notice.
- I can name my 5 senses
- I explore and talk about forces (push and pull)
- I can name and order seasons
- I can say what plants need to survive
- I can talk about different life cycles

# Early Years: Science (Understanding the World)

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## Ackworth Howard's Knowledge Essentials

### Understanding the World: The Natural World Reception

- I can describe an animal using some scientific vocabulary.
- I have an understanding of some animal habitats and can describe them and who lives in them.
- I can name parts of a plant and what it needs to grow as part of the current topic.
- I can grow my own plants and look after them.
- I can observe the plants and trees around me and how they change.
- I am developing a good understanding of a lifecycle as part of the topic.
- I can make observations or find information about different locations and places.
- I recognise, know, and can describe features of a studied location.
- I understand some changes in the natural world around me, including the seasons.
- I can explain what my five senses are
- I can explore non-contact forces (gravity and magnetism)
- I can understand the effect of seasons on the natural world, discussing when and how things grow
- I can talk about different life cycles
  
- I am confident at naming a range of animals and where they live (habitat) and can sort some animals into the country they live in.
- I can care for and look after animals and encourage others to do so.
- I can compare animals and observe their changes (Lifecycles).
- I can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and paper.
- I am beginning to understand what 're-cycle' means and why we should do it.
- I can explore the natural world around me
- I can understand the need to respect and care for the natural environment and all living things.

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### Understanding the World: The Natural World

#### Reception

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- I can identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and paper.
- I am beginning to understand what 're-cycle' means and why we should do it.
- I can explore the natural world around me
- I can understand the effect of seasons on the natural world, discussing when and how things grow
- I can understand the need to respect and care for the natural environment and all living things.

# Early Years: Science (Understanding of the World)

## Statutory Guidance from the EYFS Framework for Understanding the World

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## Ackworth Howard's Knowledge Essentials

### Early Learning Goals

#### The Natural World

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



# Early Years Science Vocabulary (Understanding the World)

## Essential Vocabulary (Natural World)

### Nursery

Respect care, look after, home, school, nursery, touch, see, feel, smell, hear, taste.	Weather, sunny, raining, snowing, ice, autumn, winter, summer, spring, body part names, explore.	Respect, care, look after, materials, man-made, natural, nature.	Weather, sunny, raining, snowing, ice, autumn, winter, summer, spring,	Seeds, soil, water, care, look after, grow,	Weather, sunny, raining, snowing, ice, autumn, winter, summer, spring, changes, why
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Senses, material, natural, change, plants, seeds, water, light, life cycle, young, old, push, pull, stretch, melt, heat, freeze, Spring, Summer, Autumn, Winter, weather

### Reception

Hygiene, healthy, nonhealthy, grow, change, germs, 5 senses, teeth brushing, dentist, face, hair, leg, human, knee, arm, elbow, back, head, toes, ear, hands, eye, fingers, mouth, nose, parent, baby, child, adult, grandparent	Autumn, day, dark, light, Winter, night, season, Moon, Sun, lighter, darker, shadow	Polar animals (Penguin, Arctic fox, Orca, Elephant seal, Polar Bear, Snowy Owl), frozen, camouflaged, survival.	Tulip, daffodil, bluebells, crocuses, snowdrops, dandelions, buttercups, daisy Plant, stem, leaf, roots, bulb, shoot, seed, growth flower, trunk, branches. life cycle, egg, caterpillar, chrysalis, cocoon, butterfly, water, food, air	Pond, garden, woodland, seaside, habitat, wild, wildlife, native, woodland, birds, (owl, duck), insects/bugs/ minibeasts (lacewing, ladybird, woodlouse, bee, wasp, spider, tarantula, earthworm, snail, millipede, butterfly, caterpillar, microhabitats,	Material, wood, plastic, glass, metal, paper, recyclable, hard, soft, rough, smooth, shiny
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Similar, different, senses, touch, taste, sight, hearing, smell, space, planets, sun, stars,, shadow, light, freeze, melt, what can you see?, what can you observe?  
Spring, Summer, Autumn, Winter, weather, seasons, changes

# Year 1

## National Curriculum

### **Working Scientifically**

Pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

### **Plants**

Pupils should be taught to:

- identify and name a variety of common wild and garden plants, including deciduous and evergreen trees
- identify and describe the basic structure of a variety of common flowering plants, including trees.

### **Seasonal Changes**

Pupils should be taught to:

- observe changes across the four seasons
- observe and describe weather associated with the seasons and how day length varies.

## Ackworth Howard's Knowledge Essentials

### **Working Scientifically**

- Use their observations to give reasons for their answers to questions.
- Collect and record simple data.
- interpret simple data
- gather and record information and use it to answer a puzzle.
- Make a prediction.
- Perform simple tests.
- Use their observations to answer simple questions.

### **Plants**

- Write instructions to describe how to plant a bean.
- Identify some garden plants that they see in photographs or in the garden area of school
- Name some garden plants from memory.
- Identify some common plants on the school field or forest school area
- Label the parts of a plant.
- Sort leaves into groups of deciduous and evergreen.
- Collect information on a Wild Plant Hunt in the forest school area
- Generate questions about plants.
- Measure the growth of a bean plant with a ruler.

### **Seasonal Changes**

- Name the four seasons.
- Name different types of weather.
- Make observations about the weather.
- Describe the weather associated with each season.
- Make simple observations about changes across the seasons by looking around school
- name an event or occasion which happens in each season
- describe how day length varies between two seasons
- make a more detailed comparison between two seasons

# Year 1

## National Curriculum

### Animals Including Humans

Pupils should be taught to:

- identify and name a variety of common animals including fish, amphibians, reptiles, birds and mammals
- identify and name a variety of common animals that are carnivores, herbivores and omnivores
- describe and compare the structure of a variety of common animals (fish, amphibians, reptiles, birds and mammals, including pets)
- identify, name, draw and label the basic parts of the human body and say which part of the body is associated with each sense.

### Everyday materials

Pupils should be taught to:

- distinguish between an object and the material from which it is made
- identify and name a variety of everyday materials, including wood, plastic, glass, metal, water, and rock
- describe the simple physical properties of a variety of everyday materials
- compare and group together a variety of everyday materials on the basis of their simple physical properties.

## Ackworth Howard's Knowledge Essentials

### Animals including Humans

- name the basic parts of the body
- name the senses and say which body part is associated with each sense
- identify and name a range of common animals
- describe the structure of common animals, including some parts of the body that are specific to animals
- say something that is the same and something that is different about two animals
- understand that animals have different diets
- use their senses to perform simple tests.
- draw and label parts of their body
- describe activities that use each of the five senses
- sort animals into simple groups, including groups based on animal diets
- describe animal bodies using relevant vocabulary
- understand the difference between carnivores, herbivores and omnivore
- identify and classify animals by suggesting groups that they belong to

### Everyday materials

- Identify and name everyday materials.
- Describe simple properties of everyday materials.
- Distinguish between an object and the material it is made from.
- Sort objects 3 ways.

# Year 1 Science Vocabulary

## Essential Vocabulary

WORKING SCIENTIFICALLY	PLANTS	SEASONAL CHANGES	ANIMALS INCLUDING HUMANS	EVERYDAY MATERIALS
Question Answer Observe Observing Equipment Identify Classify Sort Group Record – diagram, chart, map Data Compare Contrast Describe  <b>Aspirational vocabulary</b>  Biology Chemistry Physics	Common Wild plants Garden plants Trunk Branch Leaf Root Bud Flower Blossom Petal Root Stem Fruit Vegetable bulb  <b>Aspirational vocabulary</b>  Deciduous Evergreen	Seasons Seasonal Changes Weather Spring Summer Autumn Winter Weather vane Rainfall Temperature Rain gauge Wind direction Day length Night Day  <b>Aspirational vocabulary</b>  Observe Thermometer Measure Record	Common animals Fish Amphibians Reptiles Birds Mammals Pets  <b>Aspirational vocabulary</b>  Carnivores Herbivores Omnivores	<b>material</b> – wood, plastic, glass, metal, water, rock <b>properties</b> – hard/soft stretchy/stiff shiny/dull rough/smooth bendy/not bendy brick paper fabrics elastic foil  <b>Aspirational vocabulary</b>  waterproof/not waterproof absorbent/not absorbent

# Year 2

## National Curriculum

### **Working Scientifically**

Pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking simple questions and recognising that they can be answered in different ways
- observing closely, using simple equipment
- performing simple tests
- identifying and classifying
- using their observations and ideas to suggest answers to questions
- gathering and recording data to help in answering questions.

### **Living things and their habitats**

Pupils should be taught to:

- explore and compare the differences between things that are living, dead, and things that have never been alive
- 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
- identify and name a variety of plants and animals in their habitats, including microhabitats
- describe how animals obtain their food from plants and other animals, using the idea of a simple food chain, and identify different sources of food.

## Ackworth Howard's Knowledge Essentials

### **Working scientifically**

- Gather and record information.
- Record in a bar chart.
- Research the answer to a question..
- Use information to answer questions.

### **Living things and their habitats**

- Say what is different about things that are living, dead or have never been alive.
- Identify some of the plants and animals in a familiar habitat.
- Sort objects into categories.
- Find microhabitats.
- Describe the conditions in a habitat.
- Ask questions about different habitats.
- Describe the characteristics of some plants and animals.
- Name some sources of food.
- Explain some of the life processes.
- Ask questions to decide if a thing is living, dead or has never been alive.
- Identify some plants and animals in global habitats.
- Draw a map of a local habitat.
- Sort objects into categories and give reasons for their choices.
- Identify and name minibeasts in microhabitats.
- Suggest how an animal is able to survive in their habitat.
- Answer questions about habitats they have researched.
- Explain why the animals in a habitat need the plants.
- Draw a simple food chain.

# Year 2

## National Curriculum

### Plants

Pupils should be taught to:

- observe and describe how seeds and bulbs grow into mature plants
- find out and describe how plants need water, light and a suitable temperature to grow and stay healthy.

### Animals including humans

Pupils should be taught to:

- notice that animals, including humans, have offspring which grow into adults
- find out about and describe the basic needs of animals, including humans, for survival (water, food and air)
- describe the importance for humans of exercise, eating the right amounts of different types of food, and hygiene

### Use of everyday materials

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
- find out how the shapes of solid objects made from some materials can be changed by squashing, bending, twisting and stretching.

## Ackworth Howard's Knowledge Essentials

### Plants

- Label the main parts of plants and trees
- Describe the stages in the life cycle of a plant.
- Explain that plants need water, light and a suitable temperature to grow well.
- Make observational drawings of plants.
- Record the growth of my plants in a bar chart.
- Use observations to explain how we can tell that plants are living things.
- Set up a simple comparative test.

### Animals including Humans

- Say how an animal will change as it grows.
- Collect and interpret results.
- Say how an animal gets air, food and water.
- Say what is healthy about their diet.
- Say how they could improve their diet.
- Give a reason why humans need to exercise.
- Name one effect that exercise has on the human body.
- Record information about exercise.
- Use information to answer questions.
- Give reasons why humans should keep themselves clean.

### Use of everyday materials

- Identify and name everyday materials.
- Identify different uses of everyday materials.
- Demonstrate and explain how shapes of objects made from some materials can be changed.
- Explain what recycling means.
- Compare the uses of different everyday materials.
- Compare the suitability of different everyday materials.
- Explain the basic progress of recycling.
- Explain the advantages of recycling.
- Name the process invented by John McAdam.

# Year 2 Science Vocabulary

## Essential Vocabulary

WORKING SCIENTIFICALLY	LIVING THINGS AND THEIR HABITATS	PLANTS	ANIMALS INCLUDING HUMANS	USE OF EVERYDAY MATERIALS
<p>Question Answer Observe Observing Equipment Identify Classify Sort Group Record – diagram, chart, map Data Compare Contrast Describe</p> <p><b>Aspirational vocabulary</b></p> <p>Biology Chemistry Physics</p>	<p>Living Non-living Dead urban Woodland Pond Coast Minibeast Ocean Arctic Tropical Desert</p> <p><b>Aspirational vocabulary</b></p> <p>Herbivore Carnivore omnivore Consumer Producer Predator prey</p>	<p>Water Light Suitable temperature Grow Healthy</p> <p><b>Aspirational vocabulary</b></p> <p>Germination reproduction</p>	<p>Offspring Grow Adults Nutrition Reproduce Survival – water, food, air Exercise, hygiene</p> <p><b>Aspirational vocabulary</b></p> <p>Egg – chick – chicken Egg – caterpillar – pupa – butterfly Spawn – tadpole – frog Lamb – sheep Baby – toddler – child - adult</p>	<p>wood, metal, plastic, glass, brick, rock, paper, cardboard squashing, bending, twisting, stretching</p> <p><b>metal</b> – coins, cans, cars, table legs <b>wood</b> – matches, floors, telegraph poles spoons – plastic, wood, metal but not glass</p> <p><b>Aspirational vocabulary</b></p> <p><b>John Dunlop</b> – rubber <b>Charles Macintosh</b> - waterproof</p>

# Year 3

## National Curriculum

### **Working Scientifically**

Pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions – recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

## Ackworth Howard's Knowledge Essentials

### **Working scientifically**

- Predict what will happen in an investigation.
- Make observations.
- Set up an investigation and make predictions.
- Make observations and conclusions.
- Be able to answer questions based on their learning.
- Set up a simple practical enquiry and write an explanation for their findings.
- Take part in and contribute towards an oral presentation of their observations.
- They will make and record observations accurately
- Construct a bar chart on labelled axes.
- Form a conclusion from their results
- Explain their predictions and conclusions using key words or prompts



# Year 3

## National Curriculum

### Plants

Pupils should be taught to:

- identify and describe the functions of different parts of flowering plants: roots, stem/trunk, leaves and flowers
- 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
- investigate the way in which water is transported within plants
- explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal.

### Animals including humans

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
- identify that humans and some other animals have skeletons and muscles for support, protection and movement.

### Rocks

Pupils should be taught to:

- compare and group together different kinds of rocks on the basis of their appearance and simple physical properties
- describe in simple terms how fossils are formed when things that have lived are trapped within rock
- recognise that soils are made from rocks and organic matter.

## Ackworth Howard's Knowledge Essentials

### Plants

- Identify the different parts of flowering plants.
- Identify the main stages of the life cycle of flowering plants.
- Explain the functions of the different parts of plants.
- Identify different parts of a flower.
- Identify and describe the stages of the life cycle of flowering plants.

### Animals including humans

- Understand that plants and animals obtain food in different ways.
- Identify the right types and demonstrate they understand the right amounts of nutrients for animals including humans.
- Name the different types of skeletons as well as identify and categorise animals based on the type of skeleton it has.
- Identify the main bones in the body and how a skeleton protects, supports and helps the body to move.
- Explain how pairs of muscles work together to enable movement.
- Explain the different ways that plants and animals including humans obtain food.
- Explain the difference between food groups and nutrient groups.
- Explain what the right type and amounts of nutrition are for human beings as well as some of the consequences related to eating the wrong type of diet.
- Use the scientific names for the main bones in the human body and explain how the skeleton protects, supports and helps the body to move.

### Rocks

- Children will be able to name the three different types of rocks.
- They will handle and examine rocks to identify their properties, with support.
- They will be able to state the four different types of matter that soil is composed of.
- Children will learn to make careful observations.
- Children will be able to give examples of natural and human-made rocks.
- They will be able to group rocks by their properties and identify simple similarities and differences.
- Children will be able to explain the difference between a bone and a fossil.
- They will be able to explain, using simple scientific language, how soil is formed.

# Year 3

## National Curriculum

### Light

Pupils should be taught to:

- recognise that they need light in order to see things and that dark is the absence of light
- notice that light is reflected from surfaces
- recognise that light from the sun can be dangerous and that there are ways to protect their eyes
- recognise that shadows are formed when the light from a light source is blocked by an opaque object
- find patterns in the way that the size of shadows change.

### Forces and magnets

Pupils should be taught to:

- compare how things move on different surfaces
- notice that some forces need contact between two objects, but magnetic forces can act at a distance
- observe how magnets attract or repel each other and attract some materials and not others
- compare and group together a variety of everyday materials on the basis of whether they are attracted to a magnet, and identify some magnetic materials ☐ describe magnets as having two poles
- predict whether two magnets will attract or repel each other, depending on which poles are facing.

## Ackworth Howard's Knowledge Essentials

### Light

- Identify light sources.
- Understand that we need light to see.
- Know that light travels in a straight line.
- Identify reflective surfaces.
- Know that the Sun can damage their eyes.
- Know how to protect their eyes from the Sun.
- Understand that a shadow is formed when a solid object blocks light.
- Understand that dark is the absence of light.
- Understand how surfaces reflect light.
- Recognise that a mirror appears to reverse an image.
- Identify some parts of the eye.
- Understand how the Sun can damage parts of the eye.
- Identify opaque, translucent and transparent objects.
- Know how shadows change size.

### Forces and magnets

- Identify forces as pushes and pulls.
- Describe friction as a force that slows objects down.
- Feel the pulling force of a magnet.
- Sort materials according to whether they are magnetic or not.
- Identify the different poles of a bar magnet.
- Use a magnetic compass with four points.
- Identify the type of force required to carry out an action.
- Investigate the force of friction produced by different surfaces.
- Explain that magnets produce an invisible pulling force.
- Identify magnetic materials.
- Identify different types of magnet.
- Investigate the strength of different magnets.
- Identify when magnets will repel or attract based on their poles.

# Year 3 Science Vocabulary

## Essential Vocabulary

WORKING SCIENTIFICALLY	PLANTS	ANIMALS INCLUDING HUMANS	ROCKS	LIGHT	<u>FORCES AND MAGNETS</u>
<p>Research Scientific enquiry Careful observation Accurate measurements Equipment Thermometer Data Gather Record Classify Present Labelled diagrams Oral and written presentations Conclusion Prediction Differences Similarities Evidence Construct Interpret</p> <p><b>Aspirational vocabulary</b></p> <p>Comparative and fair test Systematic</p>	<p>Structure – flowering plants roots, stem, trunk, leaves, flowers Function – nutrients, support, reproduction, makes its own food Requirements for life and growth – air, light, water, nutrients from soil, room to grow Needs vary Fertiliser Life cycle – flowers,</p> <p><b>Aspirational vocabulary</b></p> <p>pollination, seed formation, seed dispersal</p>	<p>Water Skeletons – support, protection Skull – brain Ribs – heart, lungs Movement Joint Muscles Relax Diet</p> <p><b>Aspirational vocabulary</b></p> <p>Nutrition Vitamins Minerals Fat Protein Carbohydrates Fibre</p>	<p>Rocks Igneous Sedimentary Metamorphic Anthropic Chemical fossils Body fossils Trace fossils Cast fossils Mould fossils Replacement fossils Mary Anning Organic matter Topsoil Subsoil Base rock</p> <p><b>Aspirational vocabulary</b></p> <p>Permeable Impermeable</p>	<p>Light See Dark Reflect Surface Natural Star Sun Moon Shadow Blocked Solid Torch Candle Lamp Sunlight Dangerous Protect eyes</p> <p><b>Aspirational vocabulary</b></p> <p>Artificial</p>	<p>Force Push Pull Friction Surface Magnet Magnetic Pole North South Attract Repel compass</p> <p><b>Aspirational vocabulary</b></p> <p>Magnetic field</p>

# Year 4

## National Curriculum

### **Working Scientifically**

Pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- asking relevant questions and using different types of scientific enquiries to answer them
- setting up simple practical enquiries, comparative and fair tests
- making systematic and careful observations and, where appropriate, taking accurate measurements using standard units, using a range of equipment, including thermometers and data loggers
- gathering, recording, classifying and presenting data in a variety of ways to help in answering questions ☐ recording findings using simple scientific language, drawings, labelled diagrams, keys, bar charts, and tables
- reporting on findings from enquiries, including oral and written explanations, displays or presentations of results and conclusions
- using results to draw simple conclusions, make predictions for new values, suggest improvements and raise further questions
- identifying differences, similarities or changes related to simple scientific ideas and processes
- using straightforward scientific evidence to answer questions or to support their findings.

## Ackworth Howard's Knowledge Essentials

### **Working Scientifically**

- Create a classification key.
- Record observations in a table.
- Write a report.
- Present findings to the class.
- Generate relevant scientific questions.
- Identify differences related to scientific ideas.
- Make predictions and suggest equipment.
- Make careful observations, record findings using labelled diagrams and use results to make predictions for new values.
- Make observations and conclusions.
- Be able to answer questions based on their learning.
- report their findings and conclusions orally.

# Year 4

## National Curriculum

### Living things and their habitats

Pupils should be taught to:

- recognise that living things can be grouped in a variety of ways
- explore and use classification keys to help group, identify and name a variety of living things in their local and wider environment
- recognise that environments can change and that this can sometimes pose dangers to living things.

### Animals including humans

Pupils should be taught to:

- describe the simple functions of the basic parts of the digestive system in humans
- identify the different types of teeth in humans and their simple functions
- construct and interpret a variety of food chains, identifying producers, predators and prey.

### States of matter

Pupils should be taught to:

- compare and group materials together, according to whether they are solids, liquids or gases
- 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)
- identify the part played by evaporation and condensation in the water cycle and associate the rate of evaporation with temperature.

## Ackworth Howard's Knowledge Essentials

### Living things and their habitats

- Generate criteria to use to sort living things.
- Sort living things into a Venn diagram.
- Sort living things into a Carroll diagram.
- Use questions to sort animals using a key.
- Use a key to identify invertebrates by looking at their characteristics.
- Use the characteristics of living things to sort them using a classification key.
- Show the characteristics of living things in a table.
- Identify dangers to wildlife in the local and wider environment.

### Animals including humans

- Identify parts of the digestive system.
- Match the parts of the digestive system with their functions.
- Match the types and functions of teeth.
- Construct and interpret a food chain.

### States of matter

- Describe the properties of solids, liquids and gases.
- Explain that melting and freezing are opposite processes that change the state of a material.
- Identify the melting and freezing point of several different materials.
- Explain that heating causes evaporation and cooling causes condensation.
- Explain that evaporation and condensation are opposite processes that change the state of a material.
- Explain that the higher the temperature, the quicker water evaporates.
- Explain what happens to water at the different stages of the water cycle.

# Year 4

## National Curriculum

### Sound

Pupils should be taught to:

- identify how sounds are made, associating some of them with something vibrating
- recognise that vibrations from sounds travel through a medium to the ear
- find patterns between the pitch of a sound and features of the object that produced it
- find patterns between the volume of a sound and the strength of the vibrations that produced it
- recognise that sounds get fainter as the distance from the sound source increases.

### Electricity

Pupils should be taught to:

- identify common appliances that run on electricity
- construct a simple series electrical circuit, identifying and naming its basic parts, including cells, wires, bulbs, switches and buzzers
- 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
- recognise that a switch opens and closes a circuit and associate this with whether or not a lamp lights in a simple series circuit
- recognise some common conductors and insulators, and associate metals with being good conductors.

## Ackworth Howard's Knowledge Essentials

### Sound

- Explain how sound sources vibrate to make sounds.
- Explain how vibrations change when the loudness of a sound changes.
- Explain how sounds travel to reach our ears.
- Describe the pitch of a sound.
- Describe patterns between the pitch of a sound and the features of the object that made the sound.
- Explain how sound travels through a string telephone.
- Identify the best material for absorbing sound.
- Create a musical instrument that can play high, low, loud and quiet sounds.

### Electricity

- identify electrical and nonelectrical appliances.
- explain, with support, how a circuit works.
- name at least two electrical conductors and insulators.
- create a simple series circuit both with and without a switch.
- Sort appliances based on whether they use mains or batteries.
- explain how a switch turns the electric current on and off.

# Year 4 Science Vocabulary

## Essential Vocabulary

<b>WORKING SCIENTIFICALLY</b>	<b>LIVING THINGS AND THEIR HABITATS</b>	<b>ANIMALS INCLUDING HUMANS</b>	<b>STATES OF MATTER</b>	<b>SOUND</b>	<b>ELECTRICITY</b>
<p>Research Scientific enquiry Careful observation Accurate measurements Equipment Thermometer Data Gather Record Classify Present Labelled diagrams Oral and written presentations Conclusion Prediction Differences Similarities Evidence Construct Interpret</p> <p><b>Aspirational vocabulary</b></p> <p>Comparative and fair test Systematic</p>	<p>Organism Variation Classification Reptile Bird Mammal Amphibian Fish Global Local Characteristic Key Habitat Environment Wildlife Endangererd Extinct Conservation</p> <p><b>Aspirational vocabulary</b></p> <p>Vertebrates Invertebrates</p>	<p>Human digestive system Mouth Tongue – mixers, moistens, saliva Teeth – incisors – cutting, slicing Transports Stomach Acids Enzymes Small intestine – absorbs water Large intestine – compacts Carnivore Herbivore Brush Floss Food chain Producers Prey predators</p> <p><b>Aspirational vocabulary</b></p> <p>Canines – ripping, tearing Molars – chewing, grinding Oesophagus</p>	<p>solid – iron, ice melt freeze liquid evaporate condense gas container changing state – chocolate, butter, cream heated heat cooled cool degrees Celsius thermometer water cycle – evaporate, temperature – melting, melt ice – warm/cool water – warm/cool water vapour</p> <p><b>Aspirational vocabulary</b></p> <p>evaporation, condense, condensation</p>	<p>Volume Quiet Loud Ear Pitch High Low Instruments wave</p> <p><b>Aspirational vocabulary</b></p> <p>Amplitude particles</p>	<p>Electricity Electric current Appliances Mains Crocodile clips Wires Bulb Bulb holder Battery (cell) Battery holder Motor Buzzer Switch Conductor insulator</p> <p><b>Aspirational vocabulary</b></p> <p>Neutrons Protons Electrons Nucleus Atom</p>

# Year 5

## National Curriculum

### Working scientifically

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary
- taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting 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
- identifying scientific evidence that has been used to support or refute ideas or arguments.

### Living things and their habitats

Pupils should be taught to:

- describe the differences in the life cycles of a mammal, an amphibian, an insect and a bird
- describe the life process of reproduction in some plants and animals.

## Ackworth Howard's Knowledge Essentials

### Working scientifically

- Compare and present data using bar and line graphs.
- Report findings in oral form.
- Compare graph types and select which is most appropriate for my data.
- Analyse and report findings in written explanations.
- Make observations and conclusions.
- Be able to answer questions based on their learning.
- Report and present findings from enquiries.
- identify dependent, independent and controlled variables
- set up reliable and accurate investigations
- make and explain predictions
- make and record accurate observations
- use scientific language to explain their findings
- use their results to make generalisations and further predictions
- be able to ask and answer questions based on their learning using scientific language

### Living things and their habitats

- Explain the function of the parts of a flower.
- Give two differences between sexual and asexual reproduction.
- Identify the features of plants pollinated by insects or the wind.
- Describe the stages of sexual reproduction.
- Describe the differences between the three types of mammals.
- Give four facts about Jane Goodall.
- Describe the stages of the life cycles of mammals, birds, insects and amphibians.
- Identify similarities and differences between the life cycles of different plants and animals.



# Year 5

## National Curriculum

### Animals including humans

Pupils should be taught to:

- describe the changes as humans develop to old age.

### Properties and changes of materials

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
- know that some materials will dissolve in liquid to form a solution, and describe how to recover a substance from a solution
- use knowledge of solids, liquids and gases to decide how mixtures might be separated, including through filtering, sieving and evaporating
- give reasons, based on evidence from comparative and fair tests, for the particular uses of everyday materials, including metals, wood and plastic
- demonstrate that dissolving, mixing and changes of state are reversible changes
- 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.

## Ackworth Howard's Knowledge Essentials

### Animals including humans

- Order the stages of human development.
- Demonstrate understanding of how babies grow in height.
- Describe the main changes that occur during puberty.
- Explain the main changes that take place in old age.
- Name the 6 stages of human development.
- Give reasons why changes occur during puberty.

### Properties and changes of materials

- Follow instructions to test a material's properties.
- Explain the uses of thermal and electrical conductors and insulators.
- Order materials according to their electrical conductivity.
- Explain and investigate dissolving.
- Explain the processes used to separate mixtures.
- Explain irreversible changes.
- Identify the variables in an investigation.

# Year 5

## National Curriculum

### Earth and space

Pupils should be taught to:

- describe the movement of the Earth, and other planets, relative to the Sun in the solar system
- describe the movement of the Moon relative to the Earth
- describe the Sun, Earth and Moon as approximately spherical bodies
- use the idea of the Earth's rotation to explain day and night and the apparent movement of the sun across the sky.

### Forces

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
- identify the effects of air resistance, water resistance and friction, that act between moving surfaces
- recognise that some mechanisms, including levers, pulleys and gears, allow a smaller force to have a greater effect.

## Ackworth Howard's Knowledge Essentials

### Earth and space

- Describe the Sun, Earth and Moon as spherical.
- Name the planets in the solar system independently.
- Distinguish between heliocentric and geocentric ideas of planetary movement.
- Explain that day and night is due to rotation of the Earth.
- Support the idea that different places on Earth experience night and day at different times with evidence.
- Explain how the Moon moves relative to the Earth.

### Forces

- identify and explain balanced and unbalanced forces
- explain the difference between weight and mass
- explain the link between the weight and mass of an object
- make generalisations about how to increase the effects of air resistance
- explain the conclusions and implications of Galileo's 'Tower of Pisa' experiment
- explain how to minimise the effects of water resistance
- make generalisations about the properties of materials that create the most friction
- explain how a mechanism they have designed alters force and motion to achieve a purpose

# Year 5 Science Vocabulary

## Essential Vocabulary

<b>WORKING SCIENTIFICALLY</b>	<b>LIVING THINGS AND THEIR HABITATS</b>	<b>ANIMALS INCLUDING HUMANS</b>	<b>PROPERTIES AND CHANGES OF MATERIALS</b>	<b>EARTH AND SPACE</b>	<b>FORCES</b>
Plan Variables Measurements Accuracy Precision Repeat readings Report data Scientific diagrams Labels Classification keys Tables Scatter graphs Bar graphs Line graphs Predictions Comparative and fair test Report and present Conclusions Explanations Degree of trust Evidence Support  <b>Aspirational vocabulary</b>  Causal relationship Refute Systematic Quantitative measurements	Sexual Asexual Reproduction Cell Fertilisation Pollination Male Female Pregnancy Young Jane Goodall Mammal Amphibian Insect Egg Embryo Bird plant  <b>Aspirational vocabulary</b>  Metamorphosis Gestation	Human development Baby – toddler – child – teenager – adult Puberty Length Mass Grows Grow growing  <b>Aspirational vocabulary</b>  Gestation	Properties – hardness, solubility, transparency, conductive (electrical and thermal), response to magnets Dissolve – liquid, solution Separate Separating Solids, liquids, gases – filtering, sieving, evaporating Reversible changes – dissolving, mixing, evaporating, filtering, sieving, melting Irreversible new material, burning, rusting Magnetism (Year 3) Electricity (Year 4)  <b>Aspirational vocabulary</b> Chemists – Spencer Silver, Rutherford Quantitative measurements – conductivity, insulation chemical	Earth Sun Moon Mercury Venus Mars Jupiter Saturn Uranus Neptune Planets Solar system Day Night Rotate Orbit Axis spherical  <b>Aspirational vocabulary</b>  Geocentric heliocentric	Force Push Pull opposing Gravity Air resistance Water resistance Friction Isaac Newton Galileo Galilei Streamline Brake Gear mechanism Lever Cog Pulley machine  <b>Aspirational vocabulary</b>

# Year 6

## National Curriculum

### **Working scientifically**

During years 5 and 6, pupils should be taught to use the following practical scientific methods, processes and skills through the teaching of the programme of study content:

- planning different types of scientific enquiries to answer questions, including recognising and controlling variables where necessary ▫ taking measurements, using a range of scientific equipment, with increasing accuracy and precision, taking repeat readings when appropriate
- recording data and results of increasing complexity using scientific diagrams and labels, classification keys, tables, scatter graphs, bar and line graphs
- using test results to make predictions to set up further comparative and fair tests
- reporting and presenting 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
- identifying scientific evidence that has been used to support or refute ideas or arguments.

### **Living things and their habitats**

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 microorganisms, plants and animals
- give reasons for classifying plants and animals based on specific characteristics.

## Ackworth Howard's Knowledge Essentials

### **Working scientifically**

- Decide on the most appropriate type of investigation for their question.
- Take repeat readings if necessary.
- Report the degree of trust they have in their results.
- Make observations and conclusions.
- Be able to answer questions based on their learning

### **Living things and their habitats**

- Give reasons for the classification of animals, using examples as a guide
- Classify living things using the Linnaean system
- Match groups of animals to their characteristics
- Classify creatures based on their characteristics
- Design a creature that has a specific set of characteristic, using prompts
- Describe the useful and harmful effects of different microorganisms
- Identify the variables in an investigation into harmful microorganisms
- Draw conclusion based on their results
- Describe the characteristics of different microorganisms
- Describe the characteristics of groups of organisms, using images as prompts

# Year 6

National Curriculum	Ackworth Howard's Knowledge Essentials
<p><b>Animals including humans</b> Pupils should be taught to:</p> <ul style="list-style-type: none"><li>• identify and name the main parts of the human circulatory system, and describe the functions of the heart, blood vessels and blood</li><li>• recognise the impact of diet, exercise, drugs and lifestyle on the way their bodies function</li><li>• describe the ways in which nutrients and water are transported within animals, including humans.</li></ul> <p><b>Evolution and inheritance</b> Pupils should be taught to:</p> <ul style="list-style-type: none"><li>• recognise that living things have changed over time and that fossils provide information about living things that inhabited the Earth millions of years ago</li><li>• recognise that living things produce offspring of the same kind, but normally offspring vary and are not identical to their parents</li><li>• identify how animals and plants are adapted to suit their environment in different ways and that adaptation may lead to evolution</li></ul>	<p><b><u>Animals including humans</u></b></p> <ul style="list-style-type: none"><li>• Demonstrate prior knowledge of systems within the human body.</li><li>• Explain the specific functions of the lungs in the circulatory system.</li><li>• Understand the processes of how water and nutrients are transported in the body.</li><li>• State the beneficial impact of a healthy diet and exercise on the human body.</li><li>• Describe how smoking cigarettes impacts negatively on the body.</li></ul> <p><b><u>Evolution and inheritance</u></b></p> <ul style="list-style-type: none"><li>• Identify inherited traits and adaptive traits.</li><li>• Understand that adaptations are random mutations.</li><li>• Examine fossil evidence supporting the idea of evolution.</li><li>• Identify the difference between selective and cross-breeding.</li><li>• Develop an understanding of the development of evolutionary ideas and theories over time.</li><li>• Explain how human evolution has occurred and compare modern humans with those of the same genus and family.</li><li>• Understand that adaptation and evolution is not a uniform process for all living things.</li><li>• Give examples of selective and crossbreeding.</li></ul>

# Year 6

## National Curriculum

### Light

Pupils should be taught to:

- recognise that light appears to travel in straight lines
- 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
- 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
- use the idea that light travels in straight lines to explain why shadows have the same shape as the objects that cast them

### Electricity

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
- 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
- use recognised symbols when representing a simple circuit in a diagram.

## Ackworth Howard's Knowledge Essentials

### Light

- Explain how light travels to enable us to see.
- Understand that all objects reflect light.
- Identify the angles of incidence and reflection.
- Understand refraction as light bending or changing direction.
- Explain how a prism allows us to see the visible spectrum.
- Understand that colours are a result of light reflecting off an object.
- Explain Isaac Newton's experiments about light and colour
- Understand how shadows change size.
- Understand that shadows are the same shape as the object that casts them.

### Electricity

- Identify inherited traits and adaptive traits.
- Understand that adaptations are random mutations.
- Examine fossil evidence supporting the idea of evolution.
- Identify the difference between selective and cross-breeding.

# Year 6 Science Vocabulary

## Essential Vocabulary

<u>WORKING SCIENTIFICALLY</u>	<u>LIVING THINGS AND THEIR HABITATS</u>	<u>ANIMALS INCLUDING HUMANS</u>	<u>EVOLUTION AND INHERITANCE</u>	<u>LIGHT</u>	<u>ELECTRICITY</u>
Plan Variables Measurements Accuracy Precision Repeat readings Report data Scientific diagrams Labels Classification keys Tables Scatter graphs Bar graphs Line graphs Predictions Comparative and fair test Report and present Conclusions Explanations Degree of trust Evidence Support  <b>Aspirational vocabulary</b>  Causal relationship Refute Systematic Quantitative measurements	Classify Compare Carl Linnaeus Bacteria Characteristics Classification Microorganism Organism Invertebrates Vertebrates Flowering Non-flowering  <b>Aspirational vocabulary</b> Domain Kingdom Phylum Class Order Family Genus species	Heart, lungs, liver, kidney, brain Skeleton Skeletal Muscle Muscular Digest Digestion Digestive Heart, blood, vessels,  Diet, exercise, lifestyle Nutrients Water  Damage – drugs, alcohol  <b>Aspirational vocabulary</b>	Evolution Adaptation Charles Darwin Alfred Wallace DNA Genes Variation Parent Offspring Fossil Environment Habitat Fossilisation Plants Animals Living things  <b>Aspirational vocabulary</b>  Inherited traits Inheritance Adaptive traits Natural selection	Shadow Light Filter Colour Reflect Absorb Refract Spectrum Wavelength Prism Visible Lens Angle Straight Ray Beam Wave energy  <b>Aspirational vocabulary</b>  Incidence photon	Electricity Electrical current Thomas Edison Nikola Tesla Alessandro Volta Battery Cell Bulb Wire Open switch Closed switch Motor Buzzer Circuit voltage Brightness loudness  <b>Aspirational vocabulary</b>  Alternating current Direct current

# Aspirations for **Science**...

- All children have a wide variety of skills linked to both scientific knowledge and understanding, and scientific enquiry/investigative skills.
- All children have a rich vocabulary which will enable them to articulate their understanding of taught concepts.
- All children have high aspirations, which will see them through to further study, work and a successful adult life.
- All children will know and apply qualities of a good scientist especially with regards to teamwork and perseverance.