

# Science

## Skills

Observe carefully in order to gather data.

### Phase 3

#### Year 4, Year 5

Take series of observations

Record and organizes data using standard measurements in sentences, lists and/or simple labeled diagrams

Take detailed observations over time

Record and organizes data using standard measurements in simple tables, graphs, charts or in labeled diagrams

Take repeat readings to determine experiment accuracy

Use a variety of instruments and tools to measure data accurately.

### Phase 3

#### Year 4, Year 5

Select and safely use tools and equipment to observe and measure

Use a range of tools according to context e.g. weighing scales, thermometers

Identify Intervals used in standard or non-standard units

Make comparisons, rank objects, estimate within reason and uses standard measuring instruments accurately.

Select and safely use tools and equipment to observe and measure

Consider the scale and the degree of accuracy required with measuring equipment (with support)

Range used independently and with standard and non-standard units of measurement

Makes comparisons, ranks objects, estimates with increased precision and uses standard measuring instruments accurately.

Use scientific vocabulary to explain their observations and experiences.

### Phase 3

#### Year 4, Year 5

Share and explain findings using relevant scientific vocabulary.

Use a range of presentation formats to present findings.

Use evidence to support findings.

Share using all relevant details and uses scientific vocabulary effectively to explain findings and identify trends.

Use a range of presentation formats to present findings.

Use evidence to support those findings

Explore bias e.g. validity, reliability, social acceptance and credibility

Identify or generate a question or problem to be explored.

### Phase 3

#### Year 4, Year 5

Ask questions related to the specific topic that lead to further scientific inquiry

Recognise the need for a scientific investigation.

Generate questions to investigate.(with support)

Design and ask questions specifically related to the topic.

Identify a problem that can lead to a scientific investigation.

Pose questions to clarify practical problems or inform a scientific explanation.

Plan and carry out systematic investigations, manipulating variables as necessary.

### Phase 3

#### Year 4, Year 5

Create a plan to investigate a scientific problem or question.

Build fair testing elements into the plans for an experimental procedure.

Compare and contrast observations and measurements to determine accuracy of results

Create a plan to find an answer to the question he or she has formulated

Plan an investigation knowing how to manipulate the variables e.g. constant, independent and dependent.

Consider whether to take repeat readings (with support)

## Make and test predictions.

### Phase 3

#### Year 4, Year 5

Justify predictions, based on the results of an investigation

Propose simple hypothesis to test out during scientific investigations

Justify predictions, based on the results of an investigation

Suggest relevant reasons for their predictions using prior knowledge and understanding

Develop a hypothesis using a statement.

## Interpret and evaluate data gathered in order to draw conclusions.

### Phase 3

#### Year 4, Year 5

Identify patterns and summarize the data -Draw conclusions on the basis of the data gathered and make further predictions

Evaluate the experimental procedure orally, in charts, graphs or diagrams and/or sentences

Use supporting evidence to defend judgements.

Identify patterns and discrepancies in the data, and summarize the data

Make decisions and judgements based on a given criteria e.g. comparisons, anomalies and patterns

Develop the use of supporting evidence to defend judgments.

Consider scientific models and applications of these models (including their limitations).

### Phase 3

#### Year 4, Year 5

Present steps in and results of an experimental procedure orally and in charts, graphs or diagrams and/or sentences

Suggest how the inquiry might be improved

Recognize some of the limitations of their evidence

Organise results using graphs, tables and diagrams.

Record data using tallies, lists, charts, drawings and notes. Realises a need for keeping records.

Present steps in and results of an experimental procedure orally and in charts, graphs or diagrams and/or sentences

Evaluate the experimental procedure, explains changes that could be made to improve it

Consider some of the pattern and the limitations of their evidence

Select and use appropriate format to record data

Record data using tallies, lists, charts drawings and notes.



## Conceptual Understandings

### EARTH AND SPACE

#### Phase 3

#### Year 4, Year 5

#### Weather, Seasons & Cycles

Water exists in the air in different forms (e.g., in clouds as fog as tiny droplets; in rain, snow and hail) and changes from one form to another through various processes (e.g., freezing, condensation, precipitation, evaporation). (M)

The Sun provides the light and heat necessary to maintain the temperature of the Earth. (M)

Air is a substance that surrounds us, takes up space, and moves around us as wind. (M)

Weather is determined by the conditions of the air. (H)

The temperature, pressure, direction and speed of movement and the amount of water vapour in the air combine to create the weather. (H)

Measuring these properties over time enables patterns to be found that can be used to predict the likelihood of different kinds of weather. (H)

The tilt of the Earth's axis gives rise to the seasons. (H)

#### Form of the Universe and Earth's place in it

The Earth rotates about an axis lying north to south and this motion makes it appear that the Sun, Moon and stars are moving round the Earth. (H)

Earth's rotation causes day and night as parts of the Earth's surface turn to face towards or away from the Sun. (H)

It takes a year for the Earth to pass round the Sun. (H)

The Earth is one of several planets that orbit the Sun and the Moon orbits the Earth. (M)

The patterns of stars in the sky stay the same, although they appear to slowly move from east to west across the sky nightly and different stars can be seen in different seasons. (M)

The Moon reflects light from the Sun and as it moves round the Earth. Only those parts illuminated by the Sun are seen, which accounts for the changes in how it appears at different times. (H)

The Earth's axis is tilted relative to the plane of its orbit round the Sun so that the length of day varies with position on the Earth's surface and time of the year. (H)

The Earth is one of eight (so far known) planets in our solar system that, along with many other smaller bodies, orbit the Sun, in roughly circular paths, at different distances from the Sun and taking different times to complete an orbit. (H)

#### Form of Earth

The Earth's surface changes over time as a result of natural processes and human activity (ACR) (e.g., mining, quarrying, weathering, erosion, transport and deposition of sediment caused by waves, wind, water, and ice; rapid processes, such

as landslides, volcanic eruptions, and earthquakes). (M)

There are many different kinds of rock with different composition and particles. (H)

Fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time. (M) [Living things]

Fertile soil also contains air, water, some chemicals from the decay of living things, particularly plants, and various other living things such as insects, worms and bacteria. (H) [Living things]

## FORCES AND ENERGY

### Phase 3

Year 4, Year 5

#### Magnetism

Magnets can pull things made of iron and attract or repel other magnets without touching them. (H)

#### Gravity

The Earth's gravity pulls any object toward it without touching it

The pull downward that makes an object fall when released is also the result of attraction at a distance between the object and the Earth. (H)

An object that stays at rest on/near the surface of the Earth has one or more forces acting on it counter balancing the force of gravity. (H)

#### Forces and motion

When forces acting on an object are not equal and opposite in direction, their resulting effect is to change the object's motion, to speed it up or slow it down. Conversely, things only change their motion if there is a net force acting on them.

How quickly an object's motion is changed depends on the force acting and the object's mass. The greater the mass of an object, the longer it takes to speed it up or slow it down, a property of mass described as inertia. (H)

Forces can be exerted by one object on another through direct contact or from a distance. (A)

Forces cause changes in speed or direction of motion. (V)

Forces cause changes in position and the shape of an object. (M)

#### Energy

There are different forms of energy: chemical, kinetic, potential, mechanical, heat, light, sound and magnetic energy. (H)

Energy can be transformed from one form to another. (H)

Energy can be stored in different ways (e.g. batteries or food). (H)

Energy can be conserved and used efficiently. (energy conservation is the act of using less energy or saving energy [like turning your lights off or setting your thermostat lower; energy efficiency describes products and actions that use less energy due to advanced technology and equipment.

There are renewable and non-renewable sources of energy.

Heat is always produced as a byproduct when one form of energy is converted to another form. (M)

Heat can move from one object to another by conduction. (M)

Light can be reflected, refracted, or absorbed. (M)

The pitch of a sound depends on the frequency of the vibration producing it. (M)

Electricity in circuits can produce light, heat, sound and magnetic effects. (M)

## LIVING THINGS

### Phase 3

Year 4, Year 5

#### Heredity

Plants and animals (including humans) resemble their parents in many features because information is passed from one generation to the next.

Features such as skills and behaviours are not passed in same way and must be learned. (H)

Differences exist among individuals of the same kind of plant or animal. (M)

#### Form and function of cells and organisms

In the human body, systems carry out the key functions of respiration, digestion, reproduction, elimination of waste and temperature control, working together to meet our basic needs. (H/OT)

The brain gets signals from all parts of the body telling what is going on there. The brain also sends signals to parts of the body to influence what they do. (V)

The behaviour of individual organisms is influenced by internal cues (e.g., hunger) and external cues (e.g., changes in the environment), and that humans and other organisms have sense that help them to detect these cues. (M)

#### Cycles and systems

Animals are ultimately dependent on plants for their survival. (H)

The relationship among organisms can be represented as food chains and food webs (e.g., green plants make their own food with sunlight, water, and air; some animals eat the plants; some animals eat the animals that eat the plants). (H/M)

Some animals are dependent on plants for food, shelter or in the case of humans, clothing and fuel. (H)

The transfer of energy (e.g., through the consumption of food) is essential to all living organisms. (M)

An organism's patterns of behaviour are related to the nature of that organism's environment (e.g., kinds and numbers of other organisms present, availability of food and resources, physical characteristics of the environment). (M)

Changes in the environment can have different effects on different organisms (e.g., some organisms move in, others move out; some organisms survive and reproduce, others die). (M)

All organisms (including humans) cause changes in their environments, and these changes can be beneficial or detrimental. (M)

Plants also depend on animals in various ways. For example, flowering plants may depend on insects for pollination and on other animals for dispersing their seeds.(H)

#### Evolution and adaptation

The adaptation of living things to their environment has come about because of the small differences that occur during reproduction, resulting in some individuals being better suited to the environment than others. (H)

In the competition for materials and energy, those that are better adapted will survive and may pass on their adapted feature to their offspring. (H)

The effect of human activity on the environment has already resulted in changes that are damaging to many organisms. (H)

Patterns of human development are similar to those of other vertebrates. (V)

## MATERIALS AND MATTER

### Phase 3

Year 4, Year 5

#### Materials and matter

Substances can be classified by their physical and chemical properties (e.g., magnetism, conductivity, density, solubility, boiling and melting points). (M)

Matter has different states (i.e., solid, liquid, gas) and each state has distinct physical properties; some common materials such as water can be changed from one state to another by heating and cooling. (M)

When some materials are combined they form a new material with different properties than the original materials; other materials simply mix without changing permanently and can be separated again.

The mass of a material remains constant whether it is together, in parts, or in a different state. (M) Matter cannot be created or destroyed.

Natural and processed materials have a range of physical properties; these properties can influence their use. (A)