

Science

Skills

Observe carefully in order to gather data.

Phase 4

Year 6

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

Take repeat readings when required for unusual or inaccurate readings

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

Phase 4

Year 6

Select and safely use tools and equipment to observe and measure

Account for the scale and the degree of accuracy required on measuring equipment

Pupils use appropriate range to enable patterns and trends to be identified

Uses standard units for measurement

Make comparisons, rank objects, estimate with precision and use measuring instruments accurately

Use scientific vocabulary to explain their observations and experiences.

Phase 4

Year 6

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

Communicate through presentations in the form of written reports, models, charts graphs, films etc.

Provide supporting evidence.

Is aware of bias e.g. validity, reliability, social acceptance and credibility.

Identify or generate a question or problem to be explored.

Phase 4

Year 6

Design and asks questions specifically related to the topic

Identify a problem that can lead to a scientific investigation.

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

Evaluate the need to design further tests.

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

Phase 4

Year 6

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 enough evidence will be yielded for the task and whether repeat readings may be required.

Make and test predictions.

Phase 4

Year 6

Suggest reasons to justify their predictions using scientific knowledge

Offer predictions about possible patterns in results

Discuss how changing the variables will affect the outcome of a given hypothesis

Interpret and evaluate data gathered in order to draw conclusions.

Phase 4

Year 6

Identify patterns and discrepancies in the data, suggests explanations for discrepancies, and summarizes the data

Draw conclusions on the basis of the data gathered

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

Can explain and defend judgement.

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

Phase 4

Year 6

Present steps in and results of an experimental procedures using numeric, symbolic, graphical and/or linguistic methods

Evaluate the experimental procedure, explains changes that could be made to improve it, and give reasons for the changes

Consider the spread of repeated measurements -Recognizes some of the

Select and use appropriate format to record data using tallies, lists, charts drawings and notes

Conceptual Understandings

EARTH AND SPACE

Phase 4

Year 6

Weather, Seasons & Cycles

There are processes involved in the water cycle (e.g., evaporation, condensation, precipitation, surface run-off, percolation), which have effects on climatic patterns. (M)

The Sun is the principle energy source for phenomena on the Earth's surface (e.g., winds, ocean currents, the water cycle, plant growth). (M)

Factors can impact the Earth's climate (e.g., changes in the composition of the atmosphere; changes in ocean temperature; geological shifts such as meteor impacts, the advance or retreat of glaciers, or a series of volcanic eruptions). (M)

The tilt of the Earth's axis and the Earth's revolution around the Sun affect seasons and weather patterns (i.e., heat falls more intensely on one part or another of the Earth's surface during its revolution around the Sun). (M)

There are ways in which clouds affect weather and climate (e.g., precipitation, reflection of light from the Sun, retention of heat energy emitted from the Earth's surface). (M)

Most of the Earth's surface is covered by water, most of that water is salt water in oceans, and that fresh water is found in rivers, lakes, underground sources, and glaciers. (M)

Form of Earth

Sudden geological changes or extreme weather conditions can affect Earth's surface. (A)

The action of wind and water wears down rock gradually into smaller pieces - sand is made of small pieces of rock and mud of still smaller pieces. (H)

Landforms are created through a combination of constructive and destructive forces (e.g., constructive forces such as crustal deformation, volcanic eruptions, and deposition of sediment; destructive forces such as weathering and erosion). (M)

The Earth is composed of different layers that change due to pressure (H) i.e. including a core, mantle, lithosphere, hydrosphere, and atmosphere. (M)

The Earth's crust is divided into plates that move at extremely slow rates in response to movements in the mantle. (M)

Form of the Universe and Earth's place in it

Planets in our Solar System have unique characteristics and movement patterns (e.g., planets differ in size, composition, and surface features; planets move around the Sun in elliptical orbits; some planets have moons, rings of particles, and other satellites orbiting them). (M)

The regular and predictable motions of the Earth and Moon explain phenomena on Earth (e.g., the day, the year, phases of the Moon, eclipses, tides, shadows). (M)

Gravitational force keeps planets in orbit around the Sun and moons in orbit around the planets. (M)[Forces and energy]

Movements of objects within the solar system are mostly regular and predictable. (H)

The layer of air at the Earth's surface is transparent to most of the radiation coming from the Sun, which passes through it. (H)

This radiation, absorbed at its surface, is the Earth's external source of energy. (H)

Radioactive decay of material inside the Earth since it was formed is its internal source of energy. (H)

Radiation from the Sun provides the energy for plants containing chlorophyll to make glucose through the process of photosynthesis. (H).

The radiation from the Sun absorbed by the Earth warms the surface that then emits radiation of longer wavelengths (infra-red) that does not pass through the atmosphere but is absorbed by it and keeps the Earth warm. This is called the greenhouse effect. (H)

Oxygen in the atmosphere, produced by plants during photosynthesis, indirectly protects Earth from the short wave (ultra-violet) part of the Sun's radiation which is harmful to man organisms (H).

The action of ultra-violet radiation on oxygen in the upper atmosphere produces ozone thus absorbing this harmful radiation. (H)

Certain chemicals resulting from human actions on Earth can break down ozone in the atmosphere. (H)

FORCES AND ENERGY

Phase 4

Year 6

Magnetism

There is an attraction and repulsion between objects that are electrically charged. (H)

Gravity

There is a gravitational force between all objects, which depends on their mass and distance apart. It is only felt when one or more of the objects has a very large mass, as in the case of the Earth pulling things towards it. (H)

An object that is not being subjected to a force will continue to move at a constant speed and in a straight line. (M)

Forces and motion

Change in motion is caused by unbalanced forces. If no net force is acting any motion will not change; the object will remain stationary or, if in motion, go on forever in a straight line (e.g., stars in the sky).

When opposing forces acting on a solid object are not in the same line, they act to turn or twist the object. (H)

An object's motion can be described by tracing and measuring its position over time. (M)

Friction always opposes motion and causes changes in the speed or direction of an object's motion. (M)

There is a relationship between the strength of a force and its effect on an object (e.g., the greater the force, the greater the change in motion; the more massive the object, the smaller the effect of a given force). (M)

Energy

Energy can be transferred from one system to another or from a system to its environment in different ways

Energy appears in different forms and can be transformed within a system.

Light travels and tends to maintain its direction of motion until it interacts with an object or material.

Electrical circuits provide a means of transferring and transforming electricity. (A)

Materials vary in how they respond to electric currents, magnetic forces, and visible light or other electromagnetic waves. (V)

Energy from a variety of sources, both renewable and non-renewable, can be used to generate electricity (A)

Energy passes through ecosystems. When food is used by organisms for life processes some is dissipated as heat but is replaced in the ecosystem by energy from the Sun being used to produce plant food. (H)[connection to 'Living Things']

Energy flows; matter cycles.

Light and other electromagnetic waves can warm objects. (V)

LIVING THINGS

Phase 4

Year 6

Heredity

Reproduction is a characteristic of all living things and is essential to the continuation of a species. (M)

In sexual reproduction, a sperm from a male unites with an egg from a female. These are specialised cells each of which has one of the two versions. (H)

The characteristics of an organism can be described in terms of a combination of traits; some traits are inherited through the coding of genetic material and others result from environmental factors. (M)

Form and function of cells and organisms

All living things are made of one or more cells. All the basic functions of life are the result of what happens inside cells. (H)

Different body tissues and organs are made up of different kinds of cells. Some cells are specialised e.g. muscle, blood and nerve cells which carry out specific functions within the organism. (V/H)

Cells divide to make more cells in growth, repair and in reproduction and they extract energy from food in order to carry out these and other functions. (H)

Cycles and systems

Interdependent organisms living together in particular environmental conditions form an ecosystem. In a stable ecosystem there are producers of food (plants), consumers (animals) and decomposers, which are bacteria and fungi that feed on waste products

In stable ecosystems there are producers (plants), consumers (animals) and decomposers (bacteria and fungi that feed on waste products and dead organisms). (H)

Decomposers produce materials that help plants to grow, so molecules are constantly re-used. Energy passes through the ecosystem. When organisms use food some is dissipated as heat, but replaced in the ecosystem by energy from the Sun being used to produce plant food. (H) Energy flows; matter cycles.

In any given ecosystem there is competition among species for the energy and materials they need to live. The persistence of an ecosystem depends on the continued availability of these materials in the environment. (H)

Plant species have adaptations to obtain the water, light, minerals and space they need to grow and reproduce in particular locations. If conditions change, the plant populations may change, resulting in change of animal populations. (H)

Evolution and adaptation

Biodiversity includes diversity of individuals, species, and ecosystems. (OT)

Those less suited to a particular environment may die before reproducing, so later generations will contain more of the better adapted individuals. This only occurs if the changes result from mutations (changes) in the reproductive cells. Changes in other cells are not passed on. (H)

Maintaining diversity of species and within species is important. A reduction in the diversity of life can lead to significant

ecosystem degradation and loss of ability to respond to changes in the environment. (H)

MATERIALS AND MATTER

Phase 4

Year 6

Materials and matter

The differences between solids, liquids and gases can be explained in terms of the movement of particles and the separation and strength of the attraction between neighbouring particles. (H)

The stronger the force of attraction between the particles the more energy is needed to separate them, for example in going from a solid to a liquid form or from a liquid to a gas. This is why materials have different melting and boiling points. (H)

The smallest piece of a material is called an atom. (H)

Chemical change implies the formation of a new substance. (OT)

Changes to materials can be reversible, such as melting, freezing, evaporating; or irreversible, such as burning and rusting. (A)