

Science

Skills

Observe carefully in order to gather data.

Learner will

- ? Examine objects and living things to find out more about them.
- ? Observe and manipulate objects by using all their senses as appropriate.
- ? Observe changes in living things, objects and events over a period of time.
- ? Distinguish between significant and less significant observations.
- ? Record observations in a systematic way.

Phase 1

K1, K2, Year 1

Explore their environment to identify an attribute.

Manipulate objects to explore its properties (e.g. explore playdough for its physical properties).

Record data using simple pictures (or mark making) and charts (tally).

Explore objects for specific attributes.

Observe changes over time (e.g. seed-seedling-fully grown plant).

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

Learner will

- ? Use a range of tools and techniques with increasing competency.
- ? Use standard and non-standard units for measurement.
- ? Measure, compare and record data including mass, weight, time and temperature.
- ? Select appropriate tools and measurement units.

Phase 1

K1, K2, Year 1

Make comparisons in measurement during structured activities.

Use non-standard units for measurement and record.

Make comparisons of measurement between mass, weight and temperature.

Use observation and scientific tools during structured and unstructured scientific investigations.

Choose appropriate equipment from a prescribed range.

Use scientific vocabulary to explain their observations and experiences.

Learner will

?Talk about what is observed.

?Describe simple features of objects and events.

?Describe what is happening using an increasing scientific vocabulary.

? Record and present findings and conclusions using a variety of strategies and appropriate scientific vocabulary

Phase 1

K1, K2, Year 1

Discuss what is observed

Respond to questions regarding attributes of objects (e.g. What colour is it? What does it feel like? What can you do with it? Where does it come from?).

Discuss what is happening in a scientific investigation (initially using non scientific language, then with some scientific language (e.g. 'I saw the reflection get lighter/darker') with initial teacher modeling of scientific vocabulary.

Discuss what is observed with a teacher/peers using specific scientific vocabulary (e.g. float/sink).

Name and describe several attributes of an object and event (e.g. 'When the towel was absorbing water, I saw it go inside.').

Share findings using scientific vocabulary (e.g. 'This is heavier because it has more weight').

Identify or generate a question or problem to be explored.

Learner will

?Ask questions or show curiosity about the natural and physical environment.

?Ask questions or identify problems that may lead to investigations.

?Pose questions and define problems that will facilitate effective investigations or inquiries.

Phase 1

K1, K2, Year 1

Respond to the world around them by using their senses.

Engage in scientific investigations by making observations (e.g. How does this work? What can you see happening? What makes it do that?).

Ask questions about the world around them, including about the scientific inquiry e.g. How? What will happen if? Why?

Recall scientific investigations.

Discuss scientific ideas and, with teacher support, ask questions.

Recall scientific investigations by identifying the problem investigated and suggest next steps.

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

Learner will

?Identify variables

?Collect information and data from a range of sources.

?Suggest approaches and methods for solving problems

?Identify one or two variables relevant to an investigation.

?Recognize the way in which an experiment is unfair if the relevant variables are not controlled.

?Reflect on methods used in investigations and their effectiveness

Phase 1

K1, K2, Year 1

Identify changes in their immediate environment.

Use methods to collect information from observations.

Identify problems to solve during scientific investigations.

Begin to think of ways they can solve scientific problems.

Begin to think of ways to change outcomes in a scientific investigation (variables)

Identify variables within a scientific investigation.

Make and test predictions.

Learner will

?Observe similarities and differences.

?Guess and suggest what will happen next in structured situations.

?Based on prior learning and/or observations, suggest outcomes of an investigation.

?Make justified predictions.

? Propose ideas or simple theories that may be explored or tested

Phase 1

K1, K2, Year 1

Identify ways their environment can be the same and different.

Guess an outcome during structured activity working towards predicting a reasonable outcome during a structured experience.

Propose simple ideas to test during exploration (scientific or otherwise).

Identify similarities and differences in a range of contexts.

Make a prediction based on observations during a scientific investigation.

Interpret and evaluate data gathered in order to draw conclusions.

Learner will

?Sort and classify according to observable features or selected criteria.

?Look for and recognize patterns in observations.

?Compare results of different investigations.

?Interpret information and offer explanations.

Phase 1

K1, K2, Year 1

Sort and classify by teacher/student selected criteria and draw a simple conclusion (e.g. collect smooth/rough stones and observing that not all rocks feel the same).

Recognise general patterns (e.g. If I water the plant it will grow) and patterns with specific criteria (e.g. most fabrics are absorbent).

Interpret information and offer simple explanations with one or two variables (e.g. the ball rolls fast because it is going down a hill).

Interpret information from a **scientific learning engagement and offer their own explanations and predictions** (e.g. this boat will sink because I put a heavy stone on top **and now I will try a lighter stone to see if it sinks**).

Compare results by observing another's investigation (e.g. My boat floated, but his boat sank when he pushed it under the water).

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

Learner will

?Share findings with peers informally.

?Represent findings using pictures and models.

?Reflect on and build upon their own current scientific theories and applications.

?Apply scientific knowledge to reconstruct or refine their understandings of the physical, chemical and biological worlds.

?Assess their understanding in light of new data or reconsideration of existing data.

Phase 1

K1, K2, Year 1

Discuss and show observations within a scientific investigation with teacher/peers (e.g. 'Look, my water turned blue'.)

Demonstrate their understanding using concrete examples (e.g. make a ramp to make cars roll down faster) drawings and flow charts.

Draw simple conclusions and with teacher support and apply new scientific understandings to the current context (e.g. All living things need food, If I don't eat I will die because I'm a living thing).

Orally recounts steps in a scientific investigation to answer a specific question.

Conceptual Understandings

EARTH AND SPACE

The study of planet Earth and its position in the universe, particularly its relationship with the sun; the natural phenomenon and systems that shape the planet and the distinctive features that identify it; the infinite and finite resources of the planet.

Related concepts: atmosphere, climate, cycles, dynamic equilibrium, erosion, evidence, geography, geology, gravity, renewable and non-renewable energy sources, resources, seasons, space, sustainability, systems (solar, water cycle, weather), tectonic plate movement, theory of origin

The composition of the Earth and its atmosphere and the processes occurring within them shape the Earth's surface and its climate. (H)

At the Earth's surface, radiation from the Sun heats the surface and causes convection currents in the air and oceans, creating climates. Below the surface heat from the Earth's interior causes movements in the molten rock. The solid surface is constantly changing through the formation and weathering of rock.

The solar system is a very small part of one of millions of galaxies in the Universe. (H)

Our sun and eight planets and other smaller objects orbiting it comprise the solar system. Day and night and the seasons are explained by the orientation and rotation of the Earth as it moves round the Sun. The solar system is part of a galaxy of stars, one of many millions in the Universe, enormous distances apart, many of the stars having planets.

Phase 1

K1, K2, Year 1

Weather, Seasons & Cycles

Weather can be described (e.g., rainy, windy, sunny). (M)

The environment changes over the seasons. (M)

Daily and seasonal changes in our environment, including the weather, affect everyday life. (A)

Form of Earth

There are different materials on Earth (e.g., rock, water, soil). (M)

Earth materials have a number of properties. (M)

There is air all around the Earth's surface. (H)

Form of the Universe and Earth's place in it

The major features of sky can be described (e.g., clouds, Sun, moon). (M)

The Sun can only be seen in the daytime but the Moon can be seen sometimes at night, sometimes during the day. The Sun, Moon and stars all appear to move across the sky. (V)

There are many stars in our sky. Our Sun is one of many stars that make up the Universe. (H)

FORCES AND ENERGY

The study of energy, its origins, storage and transfer, and the work it can do; the study of forces; the application of scientific understanding through inventions and machines.

Related concepts: energy, dynamic equilibrium, cycles, conservation of energy, efficiency, equilibrium, forms of energy (electricity, heat, kinetic, light, potential, sound), magnetism, mechanics, physics, pollution, power, technical advances, transformation of energy

Objects can affect other objects at a distance (H)

Some objects have an effect on other objects at a distance. In some cases, such as sound and light, the effect is through radiation which travels out from the source to the receiver. In other cases action at a distance is explained in terms of the existence of a field of force between objects, such as a magnetic field or the universal gravitational field.

Changing the movement of an object requires a net force to be acting on it. (H)

Objects change their velocity only if there is net force acting on them. Gravity is a universal force of attraction between all objects however large or small, keeping the planets in orbit round the Sun and causing terrestrial objects to fall towards the centre of the Earth. (H3)

The total amount of energy in the Universe is always the same but energy can be transformed (or transferred) when things change or are made to happen. (H)

Many processes or events involve changes and require energy to make them happen. Energy can be transferred from one body to another in various ways. In these processes some energy is changed to a form that is less easy to use.

Energy cannot be created or destroyed. Energy obtained from fossil fuels is no longer available in a convenient form for use. (H4) Energy flows; matter cycles.

Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms (H) ** also under Living Things strand

Phase 1

K1, K2, Year 1

Magnetism

Objects can have an effect on other objects even when they are not in contact with them. (H)

Magnets can be used to make some things move without being touched. (V)

Forces and motion

Forces can push, pull or twist objects, making them change their shape or motion. (H)

The way objects move depends on a variety of factors, including their size and shape. (A)

Objects move and can be moved in a number of ways (e.g., straight, zig zag, round and round, back and forth, and fast and slow, pushing, pulling, twisting, sinking). (M)

Energy

Energy is needed to make things change or move. (H)

Light, sound and heat are examples of energy.

LIVING THINGS

The study of the characteristics, systems and behaviours of humans and other animals, and of plants; the interactions and relationships between and among them, and with their environment.

Related concepts: adaptation, animals, biodiversity, biology, classification, conservation, cycles, dynamic equilibrium, ecosystems, evolution, genetics, growth, habitat, homeostasis, organism, plants, systems (digestive, nervous, reproductive, respiratory).

Organisms are organised on a cellular basis.

All organisms are constituted of one or more cells [link to 'Materials & Matter']. Multi-cellular organisms have cells that are differentiated according to their function. All the basic functions of life are the result of what happens inside the cells which make up an organism. Growth is the result of multiple cell divisions.

Organisms require a supply of energy and materials for which they are often dependent on or in competition with other organisms.

Food provides materials and energy for organisms to carry out the basic functions of life and to grow. Some plants and bacteria are able to use energy from the Sun to generate complex food molecules. Animals obtain energy by breaking down complex food molecules and are ultimately dependent on green plants for energy. In any ecosystem there is competition among species for the energy and materials they need to live and reproduce.

Genetic information is passed down from one generation of organisms to another.

Genetic information in a cell is held in the chemical DNA in the form of a four-letter code. Genes determine the development and structure of organisms. In asexual reproduction all the genes in the offspring come from one parent. In sexual reproduction half of the genes come from each parent.

The diversity of organisms, living and extinct, is the result of evolution.

All life today is directly descended from a universal common ancestor that was a simple one-celled organism. Over countless generations changes resulted from natural diversity within a species which makes possible the selection of those individuals best suited to survive under certain conditions. Organisms not able to respond sufficiently to changes in their environment become extinct.

Phase 1

K1, K2, Year 1

Heredity

Living things produce offspring of the same kind, but in many cases offspring are not identical with each other or their parents. (H)

Plants can reproduce in different ways (e.g. cuttings).

Life cycles are different for different organisms. (M)

Form and function of cells and organisms

Living things (organisms) are distinguished from non-living things by their ability to move, reproduce and react to certain stimuli. (H)

Living things go through a process of growth and change. (M)

Most living things need water, food and air.

Plants need light to grow.

Living things respond to stimuli (i.e. senses help people respond to danger, plants grow toward light).

Cycles and systems

Plants and animals need certain resources for energy and growth (e.g., food, water, light, air, temperature conditions). (M)

Animals eat plants or other animals for food. (V)

Living things are found in certain environments because they have features that enable them to survive there. (H)

Evolution and adaptation

There are many different kinds of plants and animals in the world today and many kinds that once lived but are now extinct. We know about these from fossils. (H)

Living things can be grouped (e.g., by appearance, behaviour, plant, animal). (M)

MATERIALS AND MATTER

The study of the properties, behaviours and uses of materials, both natural and human-made; the origins of human-made materials and how they are manipulated to suit a purpose.

Related concepts: changes of state, chemical and physical changes, conduction and convection, density, gases, liquids, properties and uses of materials, solids, structures, sustainability

All material in the Universe is made up of very small particles.

Atoms are the building blocks of all materials, living and non-living [[link to 'Living Things'](#)]. The behaviour of the atoms explains the properties of different materials. Chemical reactions involve rearrangement of atoms in substances to form new substances.

Phase 1

K1, K2, Year 1

Materials and matter

Different materials are recognisable by their properties, some of which are used to classify them as solids, liquids or gases. (H)

Observable properties of objects can be described (e.g., colour, shape, size). (M)

Objects can be sorted based on observable properties. (M)

The physical properties of things can change. (M)

Everyday materials can be physically changed in a variety of ways. (A)