

## Topic

## Benchmarks

### Microbes

Applies knowledge from investigations to describe the essential resources that micro-organisms need to grow and reproduce, for example, food, water, warm temperature and a suitable pH.

Draws conclusions from investigations to describe how conditions and chemicals can promote and restrict growth, including temperature, antibiotics and antifungals.

Describes how microbes (for example, bacteria and viruses) can cause disease and infection and how barriers to infection provide a first line of defence, for example, skin, mucus and stomach acids.

Describes how the immune system protects the body against disease if the first line of defence is breached, for example, through the action of white blood cells and production of antibodies.

Applies knowledge of body defence mechanisms to explain how vaccinations can protect individuals and populations from disease.

Knows that a sex cell (gamete) contains half the genetic information needed to make a complete individual.

Explains how the nuclei of an egg and a sperm (sex cells) fuse through the process of fertilisation and how the fertilised egg divides repeatedly to form an embryo.

Identifies the main structures within the pregnant womb (for example, placenta, amniotic fluid and umbilical cord) and describes their function.

Gives examples of substances, including toxins, which can cross the placenta from the mother to the embryo and demonstrates understanding of the potential damage to the embryo.

Describes DNA profiling as a way of using technology to analyse DNA to see a unique pattern for an individual and gives examples of practical applications (paternity tests and forensics).

Presents reasoned arguments on the ethical implications of collection, processing, storage and ownership of genetic information or DNA profiles.

## Chemical Reactions

Constructs names of two-element compounds which are derived from the names of the elements, from which it is formed, with a suffix of-ide.

Constructs word equations for simple reactions, for example, carbon reacting with oxygen: carbon + oxygen → carbon dioxide.

Identifies indicators of chemical reactions such as colour change, precipitate formation, release of gas, and/or a detectable energy change.

Finds the relationship between particle size, concentration temperature and catalysts and the rate of a reaction.

Explains how catalysts, including enzymes, can be used to speed up chemical reactions, and provides at least two everyday examples of reactions involving a catalyst.

Investigates and describes at least two examples of compounds with properties that are different from their constituent elements, for example, hydrogen explosion and electrolysis of water.

Constructs names of two-element compounds which are derived from the names of the elements, from which it is formed, with a suffix of-ide.

Constructs word equations for simple reactions, for example, carbon reacting with oxygen: carbon + oxygen → carbon dioxide.

## Electricity

Applies knowledge from practical investigations to describe the similarities and differences between series and parallel circuits and explain the advantages of parallel circuits in an everyday application.

## Biodiversity

Identifies living things using biological keys.

Collects and analyses increasingly complex data and information, for example, temperature and light intensity, to suggest reasons for the distribution of organisms within different habitats.

Describes the process of photosynthesis (using the word equation) in terms of reactants (raw materials) and products.

Applies knowledge gained from practical investigations to explain how green plants make their own food in the form of sugars and store this as starch.

Investigates and presents information on how plants help to sustain life, for example, by providing oxygen, food, habitat, raw materials and medicines.

Interprets data and information to establish a link between the use of fertilisers and plant yield and nutrient levels in the soil.

Researches an agricultural method, for example, chemical fertilisers, herbicides, pesticides, organic methods, genetic modification (GM) and biological control and evaluates their impact on food production.

## Chemicals Around Us

Explains the link between the relative quantity of solute or solvent and changes in the concentration of a solution.

Investigates and describes how at least two useful substances can be extracted from natural resources, for example, metal from mineral ores, dyes from plants and oils from plants.

Knows that indicators, such as universal indicator, are chemicals which produce different colours when placed in acid and alkali/bases.

Investigates and describes the colour changes of indicators when added to acid/bases.

Investigates and describes the pH of some everyday substances.

Identifies substances as acidic (pH of less than 7), alkaline/basic (pH greater than 7) or neutral (equal to 7).

Investigates and describes what happens to the pH when an acid is added to an alkali/basic.

## Waves

Demonstrates through practical investigation how refraction can cause a change of direction of light as it passes from one material to another.

Describes the practical applications of refraction in everyday situations, for example, in corrective lenses in glasses, and in magnifying glasses and optical instruments.

Explains how a visible spectrum is produced as light passes through a prism.

Describes the electromagnetic spectrum as a family of waves including Gamma Rays, X-Rays, Ultraviolet, Visible Light, Infrared, Microwaves, Television and Radio.

Researches at least one application of an electromagnetic wave beyond the visible in everyday life, giving advantages and limitations of that application.

## Geology

Describes chemical reactions involving the Earth's materials, for example, combustion of fossil fuels, carbonate rocks reacting with acid and the formation and impact of acid rain.

Applies knowledge of the rock cycle to describe the formation and characteristics of sedimentary, igneous and metamorphic rocks and gives at least one example of how each is used.

Researches the formation, characteristics and uses of at least two common minerals, for example, quartz or gypsum and communicates their findings to others using a range of media.

Investigates and describes how at least two useful substances can be extracted from natural resources, for example, metal from mineral ores, dyes from plants and oils from plants.