

Science Age 11-12

(A) Biology: ORGANISMS, THEIR BEHAVIOUR AND THE ENVIRONMENT

1. Humans

Nutrition

- understand the need for a balanced diet containing carbohydrates, proteins, fats, minerals, vitamins, fibre and water, and learn about foods that are sources of these (carbohydrates are energy-containing foods, proteins are needed for growth and repair, fats are an energy source and are also needed for insulation)
- know that glucose and starch are examples of carbohydrates, vitamin C is an example of a vitamin, and calcium salts are an example of a mineral; understand the effects on humans of lack of vitamin C and calcium; carry out the iodine test for starch
- food is used as a fuel during respiration to maintain the body's activity and as a raw material for growth and repair

Movement

- understand the role of the skeleton and joints and the principle of antagonistic muscle pairs [*e.g. biceps and triceps*] in movement
- know that the skeleton protects delicate organs, supports the body and provides attachment for muscles, that muscles can contract and are pulled back to their original length by the contraction of antagonistic muscles and that muscles usually operate across moveable joints

2. Green plants as organisms

Nutrition and growth

- revise photosynthesis, noting that plants need carbon dioxide, water and light for **photosynthesis**, and produce biomass and oxygen

Classification

- classify living things into the major taxonomic groups: use a simple key to identify the group to which a specimen belongs
- know that animals and plants are classified into separate kingdoms, that bacteria, fungi and single-celled organisms are placed in other kingdoms
- understand the characteristic features of the animal and plant kingdoms and why fungi are not included with plants
- describe the diagnostic features of: single-celled organisms, fungi, arthropods (knowing the difference between insects and spiders), fish, amphibians, reptiles, birds, mammals and flowering plants

(B) CHEMISTRY: Chemical and material behaviour

1. Classifying materials

- understand how the **particle theory** of matter can be used to explain the properties of **solids, liquids and gases**, including changes of state, gas pressure and diffusion. Know the meaning of the words atom and molecule

- understand how materials can be characterised by melting point, boiling point and density
- learn how elements vary widely in their physical properties, including appearance, state at room temperature, magnetic properties and thermal and electrical conductivity, shininess, malleability. Use these properties to classify elements as metals or non-metals. Group elements into **metals and nonmetals** depending on their characteristics.

- Use the terms conductor and insulator in both electrical and thermal contexts.

2. Elements, compounds and mixtures

- understand how **elements** combine through chemical reactions to form **compounds** [*e.g. water, carbon dioxide, magnesium oxide, sodium chloride, most minerals*] with definite composition
- understand the idea that elements combine to give compounds whose properties differ from those of the constituent elements
- know that **mixtures** [*e.g. air, sea water and most rocks*] are composed of constituents that are not combined e.g know that air is a mixture of gases and know the approximate percentages of nitrogen, oxygen and the relatively small proportion of other gases in the air
- learn the uses of oxygen and that carbon dioxide is a product of respiration and a raw material for photosynthesis

3. Patterns of behaviour

Metals

- learn how metals react with oxygen, water and acids and oxides of other metals, and what the products of these reactions are. Know how to apply the lighted splint test for hydrogen; about the rusting of iron and that oxygen in the air is involved in the rusting process. Simple rusting experiments could be extended to show that air contains 20% oxygen. Copper, iron, magnesium and zinc are suitable examples for experiments.

(C) PHYSICS: ENERGY, FORCES AND SPACE

1. Electricity and magnetism

Circuits

- design and construct series and parallel circuits, involving cells, lamps, switches (push button, SPST, reed switches), resistors, variable resistors, motors, buzzers, LDRs, LEDs, fuses, AND and OR circuits (as constructed using switches)
- learn how to measure current and voltage
- know that the current in a series circuit depends on the number of cells and the number and nature of other components and that current is not 'used up' by components; know that the unit of current is the ampere (amp); that current is measured with an ammeter and that it should be connected in series in the circuit
- know that energy is transferred from batteries and other sources to other components in electrical circuits. Learn that a battery or cell transforms chemical energy into electrical energy and that electrical energy is converted into other forms in electrical components

2. Forces and motion

- know the scientific units that scientists use: for mass – kilogramme or gram; for length – metre, kilometre, centimetre or millimetre; for time – second, minute or hour; the abbreviations for the

above units and their relative sizes (e.g. 1 m = 100 cm); know that area can be measured in m² or cm²; that volume can be measured in m³ or cm³.

- know that forces can cause objects to turn about a pivot; learn about the use of levers to change direction and magnitude of a force and their use in simple machines, e.g. *crowbars, pliers, scissors*

3. Light and sound

The behaviour of light

- know that light travels in a straight line at a finite speed in a uniform medium and that light comes from a luminous source and travels in straight lines

- know that non-luminous objects are seen because light scattered from them enters the eye

- investigate how light is reflected at plane surfaces (learn how a plane mirror alters the path of a ray of light; the meaning of the angle of incidence and angle of reflection; how to measure these angles using a protractor, and that they are equal; and investigate the practical applications of mirrors, e.g. construction of a periscope)

- understand how light is refracted at the boundary between two different materials, that on a qualitative basis, light changes direction when it reaches the boundary between two different materials and that this phenomenon is called **refraction**

- know that white light can be dispersed to give a range of colours (e.g. prisms and rainbows)

Hearing

- know that sound causes the eardrum to vibrate and that different people have different audible ranges

- investigate some effects of loud sounds on the ear [*e.g. temporary deafness*] and know that loud sounds can cause temporary or permanent damage to hearing)

4. The Earth and beyond (if not yet covered)

The solar system

- understand how the movement of the Earth causes the apparent daily and annual movement of the Sun and other stars, that the Earth is one of several planets which orbit the Sun, and the reasons for the changes causing night and day, seasons and eclipses of the Sun and Moon

- investigate the relative positions of the Earth, Sun and planets in the solar system. Understand the concept of a moon as a satellite, as shown by our Moon and the moons of other planets, that the solar system is part of the Milky Way galaxy, and that the Universe contains many such groups of stars or galaxies. Learn something of the scale of astronomical distances.

- learn about the movements of planets around the Sun and relate these to gravitational forces, i.e. know that it is gravitational forces which keep the Moon in orbit round the Earth and planets in orbit round the Sun

- know that the Sun and other stars are light sources and that the planets and other bodies are seen by reflected light: why are the planets and our Moon visible even though they are not light sources?

- learn about the use of artificial satellites and probes to observe the Earth and to explore the solar system