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Science

Upper Primary level

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Young Digital Poland
EDUCATION TECHNOLOGIES

Science

Upper Primary level

Chapter One

Life processes and Cell Functions

- 1.1. Animal and plant cells
 - Animal and plant cells can form tissues
 - Tissues can form organs.
 - The functions of chloroplasts and cell walls in plant cells
 - The functions of the cell membrane, cytoplasm and nucleus in both plant and animal cells
- 1.2. Plant organs
 - The functions of plant organs
 - How fertilisation in flowering plants is the fusion of a male and a female cell
- 1.3. Special cells
 - Ways in which some cells, including ciliated epithelial cells, sperm, ova, and root hair cells, are adapted to their functions
- 1.4. Human organ systems
 - The functions of human organ systems
- 1.5. Life processes
 - Relate cells and cell functions to life processes in a variety of organisms.

Chapter Two

Humans as Organisms

- 2.1 Nutrition: a balanced diet
 - The need for a balanced diet containing carbohydrates, proteins, fats, minerals, vitamins, fibre and water
 - Sources of the above
- 2.2 Digestion
 - The principles of digestion
 - The role of enzymes in breaking down large molecules
 - Food as a fuel during respiration to maintain the body's activity and as a raw material for growth and repair
- 2.3 Absorption and waste
 - How the products of digestion are absorbed into the bloodstream and transported throughout the body, and that waste material is egested
- 2.4 The skeleton and movement
 - The role of the skeleton and joints
 - The principle of antagonistic muscle pairs [for example, biceps and triceps] in movement
- 2.5 Adolescence
 - The physical and emotional changes that take place during adolescence
- 2.6 Human reproduction
 - Human reproductive system, including the menstrual cycle and fertilisation
- 2.7 The development of a foetus
 - Foetus development in the uterus
 - The role of the placenta
- 2.8 Breathing
 - The role of lung structure in gas exchange

2.9 Smoking

The effects of smoking on the body

2.10 Respiration

Aerobic respiration as a reaction in cells between oxygen and food (glucose breakage into carbon dioxide and water)

Summarise aerobic respiration in a word equation

How the reactants and products of respiration are transported throughout the body in the bloodstream.

2.11 Drugs and health

Alcohol's, solvents' and other drugs affect on health

2.12 Fighting disease

Bacteria reproduction and viruses' replication affect on health

Body's natural defences

Immunisation and medicines

Chapter Three

Green Plants as Organisms

3.1. Plant nutrition

Plants need for carbon dioxide, water and light for photosynthesis

Production of biomass and oxygen

How to summarise photosynthesis in a word equation

3.2. Factors affecting photosynthesis

Light, water, temperature and CO₂ levels affecting photosynthesis

3.3. Plant growth

Nitrogen and other elements are required for plant growth.

The role of root hairs in absorbing water and minerals from the soil

3.4. Respiration in plants

How plants carry out aerobic respiration

Chapter Four

Variation, Classification and Inheritance

4.1. Variation

The nature of variation between organisms

4.2. Causes of variation

Environmental and inherited causes of variation within a species

4.3. Classification

How to classify living things into the major taxonomic groups

4.4. Inheritance

How selective breeding can lead to new varieties

Chapter Five

Living things in their environment

- 5.1. Sustainable development
 - Ways in which living things and the environment can be protected
 - The importance of sustainable development
- 5.2. Habitats
 - Habitats support a diversity of interdependent plants and animals
- 5.3. Adaptation
 - Some organisms are adapted to survive daily and seasonal changes in their habitats
- 5.4. Survival
 - Predation and competition for resources affect the size of populations
- 5.5. Food chains
 - Food chains can be quantified using pyramids of numbers.
 - Toxic materials in food chains
- 5.6. Food webs
 - Food webs are composed of several food chains

Chapter Six

Grouping and classifying materials

- 6.1. Solids, liquids and gases
 - Materials characterised by melting point, boiling point and density
- 6.2. Particle theory
 - How the particle theory of matter can be used to explain the properties of solids, liquids and gases
- 6.3. Physical changes
 - Changes of state, gas pressure and diffusion
- 6.4. Elements
 - Elements in the periodic table
 - Atoms
 - Symbol representation
- 6.5. Properties of metals
 - Appearance
 - State at room temperature
 - Magnetic properties and thermal and electrical conductivity of metals
- 6.6. Properties of non-metals
 - Appearance
 - State at room temperature
 - Magnetic properties and thermal and electrical conductivity of non-metals
- 6.7. Compounds
 - How elements combine through chemical reactions to form compounds with a definite composition
- 6.8. Names of compounds
 - Compounds representation by formulae
 - Reactions by word equations
- 6.9. Mixtures

Mixtures composed of constituents that are not combined

- 6.10. Separating mixtures
 - Separate mixtures into their constituents using distillation, chromatography and other appropriate methods

Chapter Seven

Changing Materials

- 7.1. Physical changes in materials
 - How mass is conserved when physical changes take place
 - Relate changes of state to energy transfers
- 7.2. Solutions
 - Variation of solubility with temperature
 - Formation of saturated solutions
 - Differences in solubility of solutes in different solvents
- 7.3. Geological changes: weathering
 - Forces generated by expansion, contraction and the freezing of water can lead to the physical weathering of rocks
- 7.4. Rock formation
 - Formation of rocks by processes taking place over different timescales
 - The mode of formation determines the rock texture and the minerals they contain.
 - The cooling of magma forms igneous rocks
 - Processes including the deposition of rock fragments or organic material, or as a result of evaporation form sedimentary rocks
 - Metamorphic rocks are formed by the action of heat and pressure on existing rocks
- 7.5. Chemical reactions
 - Mass is conserved when chemical reactions take place because (presence of the same atoms)
 - All materials, including those in living systems, are made through chemical reactions
 - the importance of chemical change in everyday situations [ripening fruit, setting superglue, cooking food]
- 7.6. The effects of combustion
 - Possible effects of burning fossil fuels on the environment [production of acid rain, carbon dioxide and solid particles]
 - How these effects can be minimised

Chapter Eight

Patterns of behaviour

- 8.1. The reactivity of metals
 - Metals reaction with oxygen, water, acids and oxides of other metals
 - The products of reactions

8.2. Displacement reactions

Displacement reactions that take place between metals and solutions of salts of other metals
Reactivity series of metals determined by considering these reactions, and used to make predictions about other reactions

8.3. Acids and alkalis

Indicators to classify solutions as acidic, neutral or alkaline
The pH scale as a measure of the acidity of a solution

8.4. Acid reactions

Metals and bases, including carbonates, react with acids
Products of these reactions
Acids in the environment lead to corrosion of some metals and chemical weathering of rock

8.5. Neutralisation

Everyday applications of neutralisation [the treatment of indigestion, the treatment of acid soil, the manufacture of fertilizer]

Chapter Nine

Electricity

9.1. Electric circuits

Circuits
How to measure current and voltage
How energy is transferred from batteries and other sources to other components in electrical circuits

9.2. Series and parallel circuits

Design and construct series and parallel circuits.

9.3. Electric current

Current in a series circuit depends on the number of cells and the number and nature of other components
Current is not 'used up' by components

9.4. Magnets

Magnetic fields as regions of space where magnetic materials experience forces
Magnetic poles repel and unlike poles attract

9.5. Electromagnets

Current in a coil produces a magnetic field pattern similar to that of a bar magnet
How electromagnets are constructed and used in devices

Chapter Ten

Forces and motion

10.1. Speed

Determine the speed of a moving object
The quantitative relationship between speed, distance and time

10.2. Weight

The weight of an object on Earth is the result of the gravitational attraction between its mass and that of the Earth

10.3. Balanced and unbalanced forces

Unbalanced forces change the speed or direction of movement of objects
Balanced forces produce no change in the movement of an object

10.4. Friction

Ways in which frictional forces, including air resistance, affect motion [for example, streamlining cars, friction between tyre and road]

10.5. Force and rotation

Forces can cause objects to turn about a pivot

10.6. Moments

Principle of moments and its application to situations involving one pivot

10.7. Pressure

Quantitative relationship between force, area and pressure and its application [the use of skis and snowboards, the effect of sharp blades, hydraulic brakes]

Chapter Eleven

Light and Sound

11.1. Light

Light travels in a straight line at a finite speed in a uniform medium
Non-luminous objects are seen because light scattered from them enters the eye

11.2. Reflection

Light reflected at plane surfaces

11.3. Refraction

Light refracted at the boundary between two different materials

11.4. Colour

White light dispersed to give a range of colours.
The effect of colour filters on white light
coloured objects appearing in white light and in other colours of light

11.5. Sound

Light can travel through a vacuum but sound cannot
Light travels much faster than sound
The relationship between the loudness of a sound and the amplitude of the vibration causing it
The relationship between the pitch of a sound and the frequency of the vibration causing it

11.6. Hearing

Sound causing the eardrum to vibrate
Different people have different audible ranges
Effects of loud sounds on the ear

Chapter Twelve

The Earth and beyond

12.1. The movement of the Earth

The movement of the Earth causing the apparent daily and annual movement of the Sun and other stars

12.2. The solar system

The relative positions of the Earth, Sun and planets in the solar system
Movements of planets around the Sun
Gravitational forces

12.3. The Sun

The Sun and other stars as light sources
Planets and other bodies seen by reflected light

12.4. Satellites

Use of artificial satellites and probes to observe the Earth
Explore the solar system

Chapter Thirteen

Energy Resources and Energy Transfer

13.1. Energy

The variety of energy resources, including oil, gas, coal, biomass, food, wind, waves and batteries
The distinction between renewable and non-renewable resources

13.2. Energy resources

The Sun as the ultimate source of most of the Earth's energy resources
How coal, oil and gas are formed

13.3. Generating electricity

Electricity generated by means of a variety of energy resources

13.4. Heat and temperature

Distinction between temperature and heat
Differences in temperature lead to transfer of energy

13.5. Transfer of energy

Ways in which energy can be usefully transferred and stored.
Energy transferred by the movement of particles in conduction, convection and evaporation
Energy transferred directly by radiation

13.6. Energy conservation

Energy may be dissipated, reducing its availability as a resource