



Science: Year 5

Teachers: Effective instruction in science requires hands-on experience and observation. While experience counts for much, book learning is also important, for it helps bring coherence and order to a child's scientific knowledge. Only when topics are presented systematically and clearly can children make steady and secure progress in their scientific learning. The child's development of scientific knowledge and understanding is in some ways a very disorderly and complex process, different for each child. But a systematic approach to the exploration of science, one that combines experience with book learning, can help provide essential building blocks for deeper understanding at a later time.

I. THE HUMAN BODY: CIRCULATORY AND RESPIRATORY SYSTEMS

A. THE CIRCULATORY SYSTEM

- Pioneering work of William Harvey
- Heart: four chambers (atrium/atria or atriums [plural] and ventricle/ventricles), aorta
- Blood
 - Red blood cells, white blood cells, platelets, haemoglobin, plasma, antibodies
 - Blood vessels: arteries, veins, capillaries
 - Blood pressure, pulse
- Filtering function of liver and spleen
- Fatty deposits can clog blood vessels and cause a heart attack.
- Blood types (four basic types: A, B, AB, O) and transfusions

B. THE RESPIRATORY SYSTEM

- Process of taking in oxygen and getting rid of carbon dioxide
- Nose, throat, voice box, trachea (windpipe)
- Lungs, bronchi, bronchial tubes, diaphragm, ribs, alveoli (air sacs)
- Smoking: damage to lung tissue, lung cancer

II. CHEMISTRY: BASIC TERMS AND CONCEPTS

A. ATOMS

- All matter is made up of particles too small for the eye to see, called atoms
- Scientists have developed models of atoms; while these models have changed over time as scientists make new discoveries, the models help us imagine what we cannot see.
- Atoms are made up of even tinier particles: protons, neutrons, electrons.
- The concept of electrical charge
 - Positive charge (+): proton
 - Negative charge (-): electron
 - Neutral (neither positive or negative): neutron
 - 'Unlike charges attract, like charges repel' (relate to magnetic attraction and repulsion).

B. PROPERTIES OF MATTER

- Mass: the amount of matter in an object, similar to weight
- Volume: the amount of space a thing fills
- Density: how much matter is packed into the space an object fills
- Vacuum: the absence of matter

C. ELEMENTS

- Elements are the basic kinds of matter, of which there are a little more than one hundred.

- There are many different kinds of atoms, but an element has only one kind of atom.
- Familiar elements, such as gold, copper, aluminium, oxygen, iron
- Most things are made up of a combination of elements.

D. SOLUTIONS

- A solution is formed when a substance (the solute) is dissolved in another substance (the solvent), such as when sugar or salt is dissolved in water; the dissolved substance is present in the solution even though you cannot see it.
- Concentration and saturation (as demonstrated through simple experiments with crystallisation)

III. ELECTRICITY

Teachers: Through reading and observation, and experiment, examine the following:

- Electricity as the charge of electrons
- Static electricity
- Electric current
- Electric circuits, and experiments with simple circuits (battery, wire, light bulb, filament, switch, fuse)
 - Closed circuit, open circuit, short circuit
- Conductors and insulators
- Electromagnets: how they work and common uses
- Using electricity safely

IV. GEOLOGY

A. THE EARTH'S LAYERS

- Crust, mantle, core (outer core and inner core)
- Movement of tectonic plates
- Earthquakes
 - Faults, San Andreas fault
 - Measuring intensity: seismograph and Richter scale
 - Tsunamis
- Volcanoes
 - Magma
 - Lava and lava flow
 - Active, dormant and extinct
 - Famous volcanoes: Vesuvius, Krakatoa, Mount St. Helens
- Hot springs and geysers: Old Faithful (in Yellowstone National Park, US)
- Theories of how the continents and oceans were formed: Pangaea and continental drift

B. HOW MOUNTAINS ARE FORMED

- Folded mountains, fault-block mountains, dome-shaped mountains

C. ROCKS

- Formation and characteristics of metamorphic, igneous, and sedimentary rock

D. WEATHERING AND EROSION

- Physical and chemical weathering
- Weathering and erosion by water, wind and glaciers
- The formation of soil: topsoil, subsoil, bedrock

V. METEOROLOGY

- The water cycle (review from Year 3): evaporation, condensation, precipitation
- Clouds: cirrus, stratus, cumulus (review from Year 3)

- The atmosphere
 - Troposphere, stratosphere, mesosphere, thermosphere, exosphere
 - How the Sun and the Earth heat the atmosphere
- Air movement: wind direction and speed, prevailing winds, air pressure, low and high pressure, air masses
- Cold and warm fronts: thunderheads, lightning and electric charge, thunder, tornadoes, hurricanes
- Forecasting the weather: barometers (relation between changes in atmospheric pressure and weather), weather maps, weather satellites
- Weather and climate: 'weather' refers to daily changes in temperature, rainfall, sunshine, etc., while 'climate' refers to weather trends that are longer than the cycle of the seasons

VI. EVOLUTION

- Animals have offspring that are of the same kind but often offspring have different appearances
- Animals and plants have adapted to suit the environment within which they live
- Adaptation may lead to evolution: Darwin's finches

VI. SCIENCE BIOGRAPHIES

- Michael Faraday (chemist and physicist, developed the electric motor and electric generator)
- Elizabeth Garrett Anderson (English physician and feminist, first Englishwoman physician and surgeon)
- Florence Nightingale (pioneering woman nurse during the Crimean War who later established the Nightingale Training School for nurses at St Thomas' Hospital in London)
- Charles Drew (American doctor and medical researcher)
- Charles Darwin (English naturalist known for his theory of evolution called *Natural Selection*)