



Science: Year 4

I. INTRODUCTION TO CLASSIFICATION OF ANIMALS

- Scientists classify animals according to the characteristics they share, for example:
 - Cold-blooded or warm-blooded
 - Vertebrates (have backbones and internal skeletons) or invertebrates (do not have backbone or internal skeletons)
- Different classes of vertebrates

Teachers: Children should become familiar with examples of animals in each class and some basic characteristics of each class, such as:

- Fish: aquatic animals, breath through gills, cold-blooded, most have scales, most develop from eggs that the female lays outside her body
- Amphibians: live part of their life cycle in water and part on land, have gills when young, later develop lungs, cold-blooded, usually have moist skin
- Reptiles: hatch from eggs, cold-blooded, have dry, thick, scaly skin
- Birds: warm-blooded, most can fly, have feathers and wings, most build nests, hatch from eggs, most baby birds must be fed by parents and cared for until they can survive on their own (though some, like baby chickens and quail, can search for food a few hours after hatching)
- Mammals: warm-blooded, have hair on their bodies, parents care for the young, females produce milk for their babies, breathe through lungs, most are terrestrial (live on land) though some are aquatic

II. ECOLOGY

Teachers: Some topics here, such as habitats, were introduced in Year One. In this year, these topics will be covered in more detail and new areas will be studied.

- Habitats, interdependence of organisms and their environment
- The concept of a 'balance of nature' (constantly changing, not a static condition)
- The food chain: producers, consumers, decomposers
- Ecosystems: how they can be affected by changes in environment (for example, rainfall, food supply, etc.) and by man-made changes
- Fossils and how they can tell us about the environment long ago
- Man-made threats to the environment
 - Air pollution: emissions, smog
 - Water pollution: industrial waste, run-off from farming
- Measures we can take to protect the environment (for example, conservation, recycling)

III. THE HUMAN BODY: SYSTEMS, VISION AND HEARING

A. THE MUSCULAR SYSTEM

- Muscles
 - Involuntary and voluntary muscles

B. THE SKELETAL SYSTEM

- Skeleton, bones, marrow
- Musculo-skeletal connection
 - Ligaments
 - Tendons, Achilles tendon

- Cartilage
- Skull, cranium
- Spinal column, vertebrae
- Joints
- Ribs, rib cage, sternum
- Scapula (shoulder blades), pelvis, tibia, fibula
- Broken bones, X-rays

C. THE NERVOUS SYSTEM

- Brain: medulla, cerebellum, cerebrum, cerebral cortex
- Spinal cord
- Nerves
- Reflexes

D. VISION: HOW THE EYE WORKS

- Parts of the eye: cornea, iris and pupil, lens, retina
- Optic nerve
- Farsighted and nearsighted

E. HEARING: HOW THE EAR WORKS

- Sound as vibration
- Outer ear, ear canal
- Eardrum
- Three tiny bones (hammer, anvil and stirrup) pass vibrations to the cochlea
- Auditory nerve

IV. LIGHT AND OPTICS

Teachers: Through experimentation and observation, introduce children to some of the basic physical phenomena of light, with associated vocabulary.

- The speed of light: light travels at an amazingly high speed.
- Light travels in straight lines (as can be demonstrated by forming shadows).
- Transparent and opaque objects
- Reflection
 - Mirrors: plane, concave, convex
 - Use of mirrors in telescopes and some microscopes
- The spectrum: use a prism to demonstrate that white light is made up of a spectrum of colours.
- Lenses can be used for magnifying and bending light (as in magnifying glass, microscope, camera, telescope, binoculars).

V. SOUND

Teachers: Through experimentation and observation, introduce children to some of the basic physical phenomena of sound, with associated vocabulary.

- Sound is caused by an object vibrating rapidly.
- Sounds travel through solids, liquids and gases.
- Sound waves are much slower than light waves.
- Speed of sound: Concorde
- Qualities of sound
 - Pitch: high or low, faster vibrations = higher pitch, slower vibrations = lower pitch
 - Intensity: loudness and quietness
- Human voice
 - Larynx (voice box)
 - Vibrating vocal chords: longer, thicker vocal chords create lower, deeper voices

- Sound and how the human ear works
- Protecting your hearing

VI. ASTRONOMY

- The 'Big Bang' as one theory
- The universe: an extent almost beyond imagining
- Galaxies: Milky Way and Andromeda
- Our solar system
 - Sun: source of energy (heat and light)
 - The nine planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto [Note that, in 2006, Pluto was classified as a dwarf planet]
- Planetary motion: orbit and rotation
 - How day and night on Earth are caused by the Earth's rotation
 - Sunrise in the east and sunset in the west
 - How the seasons are caused by the Earth's orbit around the sun, tilt of the Earth's axis
- Gravity, gravitational pull
 - Gravitational pull of the moon (and to a lesser degree, the sun) causes ocean tides on Earth
 - Gravitational pull of 'black holes' prevents light from escaping
- Asteroids, meteors ('shooting stars'), comets, Halley's Comet
- How an eclipse happens
- Stars and constellations
- Orienteering (finding your way) by using North Star, Big Dipper
- Exploration of space
 - Observation through telescopes
 - Rockets and satellites: from unmanned flights
 - Apollo 11, first landing on the moon: 'One small step for a man, one giant leap for mankind'
 - Space shuttle

VII. SCIENCE BIOGRAPHIES

- Alexander Graham Bell (invented the telephone)
- Copernicus (had new sun-centred idea about the solar system)
- Galileo Galilei ('Father of modern science', provided scientific support for Copernicus's theory)
- Caroline Herschel (German-British astronomer, discovered several comets, worked with brother William)
- Isaac Newton (English physicist, mathematician, astronomer, natural philosopher and alchemist)