

# Chapter 1: Characteristics and classification of living organisms

IGCSE Biology



# 1.1 Characteristics of living organisms

## Objectives:

**Describe** the characteristics of living organisms by defining the terms: *movement, respiration, sensitivity, growth, reproduction, excretion, and nutrition*

# Characteristics of living things

- In groups of approximately 5, create a list of characteristics of living organisms
  - Hint: what are things that all living organisms do?

# Characteristics of living things

- In your group of approximately 5, come up with a definition for each of the 7 characteristics of living organisms
  - *Movement, Respiration, Sensitivity, Growth, Reproduction, Excretion, Nutrition*

# **Movement**

an action by an organism causing a change of position or place

- **Plants move when they grow**
  - Roots move down into soil, leaves and stems move up toward light
- **Animals move to obtain food/avoid being caught**

# Respiration

the chemical reactions in cells that break down nutrient molecules and release energy

- Involves chemical reactions happening in cells to breakdown glucose
  - Oxygen is usually needed
- Glucose + oxygen → carbon dioxide + water
- Use energy for movement, growth, repair and reproduction

# Sensitivity

the ability to detect and respond to changes in the environment

- Plants respond to the sun by moving leaves to face the light
  - Some flowers open/close at day/night
- Animals have sense receptors (cells) for detecting light, sound, touch, pressure, and chemicals in the air and in food

# Growth

permanent increase in size

- Involves making more complex molecules such as proteins
- Plants grow throughout their lives
- Animals stop growing when they reach a certain size



# Reproduction

the processes that make more of the same kind of organism

- Asexual reproduction involves one parent giving rise of offspring that are often identical to each other and to the parent
- Sexual reproduction involves two parent organisms producing **gametes** (sex cells) which fuse to give rise to the next generation
  - Offspring show **variation** - they are not identical to each other or to their parents

# Excretion

removal from organisms of toxic materials and substances in excess of requirements

- **Metabolism** is all the chemical reactions that occur in an organism
- Plants store waste substances in their leaves so they are removed when leaves fall off
- Animals breathe out carbon dioxide; other wastes leave the body in the urine

# Nutrition

taking in of materials for energy, growth and development

- **Green plants - photosynthesis**
  - energy from sunlight is absorbed and used to turn  $\text{CO}_2$  and water into simple sugars
- **Animals**
  - eat plants/animals to gain energy and nutrients
  - process of taking in food is called **ingestion**

# Acronym to remember

**M**ovement

**R**espiration

**S**ensitivity

**G**rowth

**R**eproduction

**E**xcretion

**N**utrition

# 1.2 Classification

## Objectives:

- State that organisms can be classified into groups by the features that they share

# Classification

- Living organisms can be classified into 5 *major* groups called **kingdoms**:
  - Animals
  - Plants
  - Fungi
  - Protists
  - Prokaryotes (bacteria)
- Organisms in each kingdom show similar features

# Classification

- Smallest grouping of organisms: **species**
- Kingdoms are subdivided into **phyla**  
(singular: **phylum**)
- Kingdom, **Phylum**, **Class**, **Order**, **Family**,  
**Genus**, **Species**

# 1.2 Binomial System

## Objectives:

- State that organisms can be classified into groups by the features that they share
- Define species
- Define and describe the binomial system of naming species



# Binomial System

- Binomial system means 'two names'
- A species is a group of individuals that look alike
  - live in the same habitat and breed together producing fertile offspring which can breed with one another
- Each species is given two name

# Binomial System

- First name is for the **genus**
  - group of species that are closely related but do not breed with one another
- Second name is the **trivial** name that is **applied to one species within the genus**
  - never use the trivial/species name on its own

# Writing the Binomial Name

- *Genus species* or Genus species
  - The Genus is always capitalized
  - The species is always lowercase
  - the full name must always be *italicized* (computer) or underlined (hand written), never both!

**Examples - try to guess the common name of the following animals and plants**



Examples - try to guess the common names of the following animals and plants

- |                                |                            |
|--------------------------------|----------------------------|
| 1. <i>Canis latrans</i>        | 1. Coyote                  |
| 2. <i>Lynx rufus</i>           | 2. Bobcat                  |
| 3. <i>Hadrurus arizonensis</i> | 3. Arizona Desert Scorpion |
| 4. <i>Cercidium floridum</i>   | 4. Palo verde tree         |
| 5. <i>Carnegiea gigantea</i>   | 5. Saguaro cactus          |