

Reinforcement plan Biology and Geology 1.º ESO (PART 2)

Addressed to students with 1st year of ESO
pending subject.

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UNIT 6. Living beings**The Conditions for Life on Earth**

Life on Earth is possible due to several essential conditions. Some key factors that allow the existence of living beings on our planet include the presence of basic chemical elements, liquid water, an atmosphere, and a suitable distance from the Sun.

1. **Basic Chemical Elements:** Living things are made up of essential chemical elements, also known as bioelements. The most important ones are carbon (C), hydrogen (H), oxygen (O), nitrogen (N), phosphorus (P), and sulphur (S). These elements combine to form biomolecules, which are necessary for life.
2. **Liquid Water:** Water is fundamental for life because it allows chemical reactions to take place inside living organisms. It also helps transport substances and regulate temperature.
3. **The Atmosphere:** The Earth is surrounded by a layer of gases called the atmosphere. It protects living beings from harmful ultraviolet (UV) radiation from the Sun and helps keep the temperature stable.
4. **The Distance from the Sun:** The Earth is at an ideal distance from the Sun, which allows temperatures to be mild and suitable for life. If the Earth were too close or too far, temperatures would be extreme, making life impossible.
5. **The Role of the Moon:** Although the Moon is not essential for life, it helps stabilize the Earth's rotation and climate over long periods.

Biomolecules

Biomolecules are the molecules that make up living beings. They can be classified into two groups:

- **Inorganic biomolecules:** Water and mineral salts.
- **Organic biomolecules:** Carbohydrates (provide energy), lipids (store energy and form structures), proteins (form muscles, skin, and bones), and nucleic acids (contain genetic information).

Cells: The Basic Unit of Life

All living beings are made up of cells. All cells have **genetic material, cytoplasm, and a cell membrane**. There are two main types of cells, depending on whether their genetic material is enclosed within a nucleus or not.

- **Prokaryotic cells:** Simple cells without a nucleus. Bacteria are prokaryotic organisms.
- **Eukaryotic cells:** More complex cells that have a nucleus. They can be found in plants, animals, fungi, protists (protozoan) and chromists (algae).

Differences between cell types:

- **Prokaryotic cells** are smaller and do not have a nucleus or organelles.
- **Plant eukaryotic cells** have a cell wall, chloroplasts, and large vacuoles.
- **Animal eukaryotic cells** do not have a cell wall or chloroplasts, but they have small vacuoles and other specialized organelles.

The Functions of Living Things

Living things perform three main functions: nutrition, reproduction, and interaction.

1. **Nutrition**

- **Autotrophic nutrition:** Organisms such as plants produce their own food using sunlight (photosynthesis).
- **Heterotrophic nutrition:** Organisms such as animals and fungi consume other organisms to obtain energy.

2. **Reproduction**

- **Sexual reproduction:** Two parents contribute genetic material, producing offspring with genetic differences.
 - **Asexual reproduction:** A single organism produces offspring identical to itself.
3. **Interaction** Living beings detect and respond to changes in their environment. For example, plants grow towards light, and animals react to danger.

Conclusion

Life on Earth depends on a combination of essential conditions, including chemical elements, liquid water, the atmosphere, and the right distance from the Sun. Organisms are made up of cells that carry out the functions of nutrition, reproduction, and interaction, ensuring the survival of life on our planet.

ACTIVITIES UNIT 6

1. Complete the following table. Write *Yes* if each characteristic is necessary for Planet Earth to support life. Write *No* if it is not necessary.

Characteristics	Yes/No
Presence of basic chemical elements	
Presence of liquid water	
Existence of an atmosphere	
Existence of a satellite called the Moon	
Distance between the Earth and the Sun	
Existence of electricity	

2. Fill in the gaps with the correct words:

- A. The distance between the Earth and the Sun allows the Earth's _____ to be mild.
- B. The presence of basic chemical _____ is essential because they combine to make up the _____ found in living matter.
- C. An essential characteristic of Planet _____ is the presence of liquid _____, which allows living things to carry out vital functions.
- D. The Earth is surrounded by a layer of gases that is called the _____.
- E. This layer protects living things from ultraviolet _____ and keeps _____ stable.

3. Write whether these sentences are true or false:

- A. There are a lot of planets with living things. _____
- B. The distance between the Earth and the Sun is the same as the distance between other planets in the Solar System and the Sun. _____

- C. The atmosphere helps prevent an extreme change in the temperature of the Earth.

- D. The distance between the Earth and the Sun allows the existence of the Earth's atmosphere.

- E. The Earth's atmosphere allows the existence of living things on Earth as it protects us from dangerous ultraviolet radiation. _____

4. Write the name of each biomolecule being defined.

- A. This is important for many vital processes, such as the transportation of substances:

- B. This provides energy: _____
- C. This contains the organism's genetic information: _____
- D. This forms rigid structures in the organism, such as bones: _____
- E. This forms structures such as skin or muscles: _____
- F. This can store energy: _____

5. Classify the biomolecules from the previous activity into organic and inorganic.

- **Organic:**
- **Inorganic:**

6. Draw a prokaryotic cell, a eukaryotic plant cell and a eukaryotic animal cell. Label the common features present in all cells.

7. Write an "X" where the statement is true in the following table:

Characteristics	Prokar yote	Plant eukaryote	Animal eukaryote
It doesn't have a nucleus.			
It contains chloroplasts.			
It has a cell wall.			
They are small cells.			
They have organelles in the cytoplasm.			
The genetic material is found in the cell nucleus			
They are large cells.			
They have very small organelles in the cytoplasm.			

8. The following sentences have been split into two halves. Match them to create full sentences.

1. During autotrophic nutrition _____
2. During sexual reproduction, two individuals of the opposite sex _____
3. Heterotrophic nutrition _____
4. Asexual reproduction _____
5. Interaction _____

- a) allows living things to respond to changes in their environment.
- b) inorganic material is transformed into organic material.
- c) is typical in animals and fungi.
- d) produce offspring that aren't identical to their parents.
- e) produces many offspring that are identical to the parent.

9. Write whether these sentences are true or false.

- A. Reproduction provides for the continued existence of a species.
- B. All reproduction is sexual.
- C. Interaction allows living things to detect changes in the environment and respond to them.
- D. Nutrition allows living things to obtain energy.
- E. There are two types of nutrition: sexual and asexual.

10. Indicate what type of reproduction (sexual or asexual) is being described in each sentence.

- A. A bacterium multiplies and after some time a lot of identical bacteria are created:
- B. When a white mouse reproduces with a black mouse, they have grey offspring:
- C. If we plant a potato in a pot, we can obtain a potato plant:
- D. The pollen from a flower fertilised the ovary of another flower to produce a seed:
- E. When they reproduce, zebras' offspring have different stripes to their progenitors.

UNIT 7. Classification of living beings. Microorganisms**The Five Kingdoms of Living Things**

Scientists classify living things into five main kingdoms: Monera, Protocista, Fungi, Plants, and Animals. Each kingdom has specific characteristics that make its organisms unique.

Monera Kingdom

The Monera Kingdom includes bacteria. All the organisms in this kingdom are prokaryotic, which means they do not have a membrane-bound nucleus. Bacteria can be found everywhere: in water, soil, and even inside our bodies!

Bacteria can be classified by their way of getting food:

- Some bacteria are autotrophic, meaning they can produce their own food (like cyanobacteria, which perform photosynthesis).
- Others are heterotrophic, meaning they need to consume other organisms to obtain nutrients.

Bacteria have different shapes:

- Cocci (round)
- Bacilli (rod-shaped)
- Spirilla (spiral)

They have different structures:

- The cell membrane controls the passage of substances.
 - The ribosomes synthesize proteins.
 - Some bacteria have a flagellum, a long extension that allows movement.
 - Many bacteria have a cell wall, an outer layer that protects them.
-

Protocista Kingdom

The Protocista Kingdom includes protozoa and algae. These are unicellular or simple multicellular eukaryotic organisms.

Protozoa

- Protozoa are heterotrophic unicellular organisms with eukaryotic cells.
- Some protozoa are free-living, while others are parasites and live inside other organisms.
- Protozoa move using different structures:
 - Flagella: long, whip-like extensions.
 - Cilia: tiny hair-like structures.
 - Pseudopodia: temporary projections of the cytoplasm.

Algae

- Algae are autotrophic and perform photosynthesis.
- They reproduce both sexually and asexually.
- There are three main types of algae:
 1. Brown algae – Mostly large, found in seas and oceans (e.g., Fucus).
 2. Green algae – Can be unicellular or multicellular, mostly found in freshwater (e.g., Ulva lactuca).
 3. Red algae – Can be unicellular or multicellular, found in marine and freshwater environments (e.g., Corallina).

Why aren't algae considered plants?

Algae are not aquatic plants because they do not have true roots, stems, or leaves, even though they perform photosynthesis.

Fungi Kingdom

The Fungi Kingdom includes mushrooms, moulds, and yeasts. They are heterotrophic and absorb nutrients from decomposing material.

- Yeasts are unicellular fungi. They perform fermentation, a process in which they obtain energy by breaking down sugar, producing carbon dioxide and alcohol. Fermentation is important for making bread, beer, and wine.
 - Multicellular fungi have long microscopic filaments called hyphae, which form a mass called mycelium.
-

Plant Kingdom

Plants are multicellular, autotrophic organisms that perform photosynthesis. They have true roots, stems, and leaves, which help them absorb water, transport nutrients, and produce food.

Animal Kingdom

Animals are multicellular, heterotrophic organisms. They cannot make their own food, so they must eat other organisms. Animals have specialized organs and systems for movement, digestion, and reproduction. They are classified into:

- Vertebrates (animals with a backbone).
 - Invertebrates (animals without a backbone).
-

Microorganisms

Microorganisms are tiny living things that can only be seen with a microscope. They include:

- Bacteria (Monera Kingdom).
- Protozoa and some algae (Protocista Kingdom).
- Yeasts and moulds (Fungi Kingdom).

Three beneficial functions of microorganisms:

1. Decomposing organic matter (helping in the nutrient cycle).
2. Producing oxygen (some algae release oxygen through photosynthesis).
3. Food production (used in making yogurt, cheese, and bread).

ACTIVITIES UNIT 7

1. Complete the following sentences:

All the organisms in the Monera Kingdom are _____ (they don't have a membrane-bound nucleus). They can be divided based on the mode of nutrition, some are _____ and others are _____.

2. Write the correct word in each sentence:

- A. _____ are heterotrophic unicellular organisms with eukaryotic cells.
- B. Some protozoa are free-living and some are _____.
- C. The autotrophic organisms in the Protocista Kingdom are the _____.
- D. Some species of algae reproduce both sexually and _____.

3. Fill in the missing information in the table.

Type of algae	brown algae	_____	_____
Characteristics	_____, mostly big and found in seas and oceans.	Unicellular or multicellular, mostly found in _____.	Unicellular or multicellular, found in _____ and _____.

4. Why are algae not considered to be aquatic plants? Choose the correct answer.

- A. Because they aren't autotrophic.
- B. Because they do not have true roots, stems or leaves.
- C. Because they can move.

5. Match the words and definitions with arrows.

Hypha

Process in which yeast obtain energy

Mycelium

Unicellular fungi

Fermentation

Mass of cells that form the body of multicellular fungi

Yeasts

Microscopic filament made up of fungus cells

6. Answer the questions.

a) What are microorganisms? Can we see them with the naked eye?

b) Write three beneficial functions that microorganisms perform?

c) Which of the 5 kingdoms of living things contain microorganisms?

UNIT 8. Plants

The plant kingdom, known scientifically as the Kingdom Plantae, encompasses a vast array of multicellular organisms that are primarily characterized by their ability to perform photosynthesis. These organisms are fundamental to life on Earth, providing oxygen, food, and habitats for countless species.

Characteristics of Plants All plants share several essential characteristics:

- **Eukaryotic Cells:** Plants are composed of eukaryotic cells, meaning they have a defined nucleus and membrane-bound organelles.
- **Cell Wall:** Plant cells possess a rigid cell wall primarily made of cellulose, providing structural support.
- **Photosynthesis:** Most plants are autotrophic, producing their own food through photosynthesis. This process occurs in chloroplasts, which contain chlorophyll—the pigment that captures light energy to convert carbon dioxide and water into glucose and oxygen.
- **Reproduction:** Plants can reproduce sexually, involving the fusion of gametes, or asexually, producing offspring genetically identical to the parent.

Classification of Plants

Plants are classified based on the presence or absence of vascular tissues and seeds:

1. **Bryophytes:** Non-vascular plants that lack specialized tissues for transporting water and nutrients. They do not produce seeds or flowers and reproduce via spores. Bryophytes include:
 - **Mosses:** Small, green plants that often form dense carpets in moist environments.
 - **Liverworts:** Plants with flat, lobed structures found in damp habitats.
2. **Pteridophytes:** Vascular plants without seeds that possess specialized tissues (xylem and phloem) for transporting water and nutrients. They reproduce through spores and do not produce flowers. Pteridophytes include:
 - **Ferns:** Plants with large, divided leaves called fronds.
 - **Clubmosses:** Plants resembling mosses but with vascular tissues.
3. **Gymnosperms:** Vascular plants that produce naked seeds, meaning they are not enclosed within fruits. They do not form flowers, and their seeds typically develop on cones. Gymnosperms include:

- **Conifers:** Trees like pines and firs with needle-like leaves.
- **Cycads:** Tropical plants with large, compound leaves.
- 4. **Angiosperms:** Also known as flowering plants, they are vascular plants that produce seeds enclosed within fruits. They are the most diverse group in the plant kingdom. Angiosperms are divided into:
 - **Monocotyledons:** Plants like grasses and lilies that have a single embryonic leaf or cotyledon.
 - **Dicotyledons:** Plants like roses and sunflowers that have two cotyledons.

Plant Organs and Their Functions

Plants have specialized organs that perform vital functions for their survival:

- **Roots:** Anchor the plant to the soil and absorb water and minerals.
- **Stems:** Support the plant and transport nutrients and water between roots and leaves.
- **Leaves:** The primary site of photosynthesis and gas exchange.
- **Flowers:** Reproductive organs that facilitate sexual reproduction.
- **Fruits:** Develop from fertilized flowers and protect seeds, aiding in their dispersal.

Functions of Plants Plants perform several essential functions:

1. **Nutrition:** Through photosynthesis, plants convert light energy into chemical energy, producing glucose for growth and development.
2. **Interaction:** Plants respond to environmental stimuli through movements and growth patterns:
 - **Tropisms:** Directional growth responses toward or away from stimuli (e.g., phototropism is growth toward light).
 - **Nastic Movements:** Non-directional responses to stimuli, such as the closing of leaves in some plants when touched.
3. **Reproduction:** Plants reproduce to ensure the continuation of their species:
 - **Sexual Reproduction:** Involves the fusion of male and female gametes, leading to genetically diverse offspring.

- **Asexual Reproduction:** Includes processes like budding, fragmentation, or the formation of runners, resulting in offspring genetically identical to the parent.

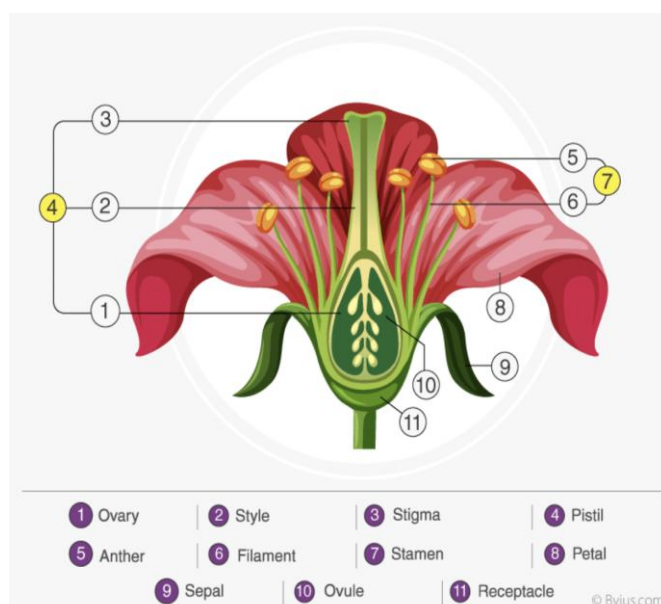
Pollination

Pollination is the transfer of pollen from the anther (male part) of a flower to the stigma (female part) of the same or another flower, enabling fertilization and the production of seeds. Pollinating agents can be animals such as insects (e.g., beetles or butterflies), birds, bats, water, wind, and even the plants themselves.

Parts of a Flower and Their Functions

A typical flower consists of several parts, each with a specific function:

- **Sepals:** Green, leaf-like structures that protect the flower bud before it opens.
- **Petals:** Often brightly coloured parts that attract pollinators.
- **Stamens:** The male reproductive organs, consisting of:
 - **Anther:** Produces pollen grains containing male gametes.
 - **Filament:** Supports the anther.
- **Carpels (or Pistils):** The female reproductive organs, consisting of:
 - **Stigma:** Receives pollen during pollination.
 - **Style:** Connects the stigma to the ovary.
 - **Ovary:** Contains ovules that develop into seeds after fertilization.



ACTIVITIES UNIT 8**1. Figure out the group of plants with its definition.**

- a) Seedless plants with developed vascular systems:
- b) Seedless plants with simple vascular systems:
- c) Seed plants, with complex vascular systems and fruit:
- d) Seed plants, with complex vascular systems but without fruit:

2. Are the following statements true or false?

- a) Ferns are plants with complex vascular systems but no flowers: _____
- b) All plants can produce seeds: _____
- c) The group of hepatica and ferns are called pteridophytes: _____

3. Choose the correct word in each sentence.

- a) Hepatica and mosses are bryophytes / pteridophytes.
- b) Bryophytes / pteridophytes do not have complex vascular systems.
- c) The bryophytes that do not have conducting vessels are called hepatica / mosses.
- d) The bryophytes that have simple vascular systems are called hepatica / mosses.

4. Answer the following questions.

- a) What are the functions of the fruit in angiosperms?
- b) What do gymnosperms and angiosperms have in common?
- c) What is the main difference between gymnosperms and angiosperms?

5. Complete the table with YES or NO according to the characteristics of gymnosperms.

CHARACTERISTICS OF GYMNOSPERMS	YES / NO
They have complex vascular systems.	
They have fruits.	
They have seeds.	
They reproduce using spores.	

6. Are the following statements true or false?

- a) Chloroplasts absorb sunlight and turn it into chemical energy: _____
- b) The mixture of water and minerals absorbed by the roots is called phloem sap: _____
- c) During respiration plants take in oxygen and release carbon dioxide: _____
- d) A plant could live without roots: _____

7. Choose the correct option:

Xylem sap is made up of:

- a) Water and sugar b) Water and minerals c) Only water

The pores found on the underside of a leaf are called...

- a) Mitochondria b) Xylem c) Stomata

8. Answer the following questions.

- a) Through which structures do leaves exchange gases with the air?
- b) What is the name of the process by which plants make organic material?
- c) What is the name of the process in which plants eliminate water that they don't need?

9. Write the words next to their definitions: hormones; nastic movements; tropisms.

- Growth responses of plants due to external stimuli.
- Substances secreted by some plant cells, they act as an internal stimulus and generate responses in different parts of the plant.
- Movements in plants in response to a stimulus that do not depend on the direction of the stimulus.

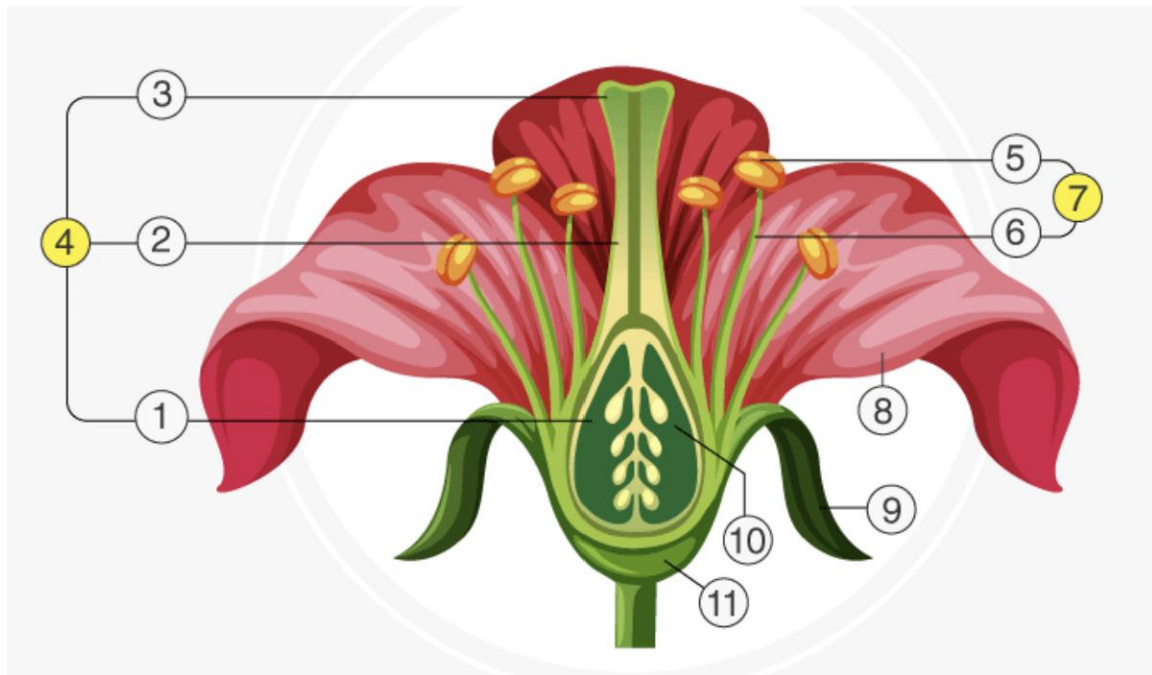
10. Choose the correct word to complete the sentences.

- a) In asexual reproduction the new plant is genetically *identical / different* from the parent plant.
- b) Sexual reproduction requires male and female *budding / gametes*.
- c) Some plants reproduce *neither / both* asexually and sexually.
- d) Vegetative reproduction is a type of *asexual / sexual reproduction*.
- e) Plants that produce spores reproduce *asexually / sexually*.
- f) *Gametophytes / Sporophytes* reproduce asexually using spores.
- g) *Gametophytes / Sporophytes* reproduce sexually using gametes.

11. Answer the questions.

- a) What is pollination?
- b) Name two living things and two other agents that help flowers to be pollinated.
- c) What is the difference between a unisexual flower and a hermaphrodite flower?

12. Label all the structures you observe in the following diagram of a flower.



UNIT 9. ANIMAL KINGDOM - INVERTEBRATES

Invertebrates are animals that lack a vertebral column, or backbone, distinguishing them from vertebrates. They represent approximately 97% of all animal species, showcasing immense diversity in form, function, and habitat.

General Characteristics of Invertebrates:

- **Lack of Backbone:** The primary characteristic uniting all invertebrates is the absence of a vertebral column.
- **Body Organization:** While some invertebrates, like sponges, have simple body structures without distinct tissues, most possess differentiated tissues and organs adapted to their specific lifestyles.
- **Reproduction:** Invertebrates exhibit various reproductive strategies, including sexual reproduction through gamete fusion and asexual methods such as fragmentation or budding.

Major Invertebrate Phyla and Their Characteristics:

1. **Porifera (Sponges):**
 - **Structure:** Possess porous bodies with multiple openings called pores.
 - **Feeding:** Filter feeders that draw water through their pores to extract nutrients.
 - **Reproduction:** Can reproduce sexually by producing gametes or asexually through fragmentation.
2. **Cnidaria (Jellyfish, Hydras, Anemones, Corals):**
 - **Body Forms:** Exhibit two main body types:
 - **Polyp:** Sessile (fixed in one place) form, such as hydras and sea anemones.
 - **Medusa:** Free-floating form, like jellyfish.
 - **Feeding:** Possess a gastrovascular cavity that functions as both mouth and anus.
3. **Platyhelminthes (Flatworms):**
 - **Body Structure:** Have flattened bodies without a body cavity.
 - **Examples:** Include tapeworms and planarians.
4. **Nematoda (Roundworms):**
 - **Body Structure:** Cylindrical, elongated bodies.
 - **Habitat:** Found in various environments, including soil and aquatic habitats.
 - **Examples:** Pinworms, whipworms, and heartworms.
5. **Annelida (Segmented Worms):**
 - **Body Structure:** Bodies divided into segments called metamerous.
 - **Examples:** Earthworms and leeches.
6. **Mollusca (Molluscs):**

- **Body Structure:** Soft-bodied animals, often protected by a hard shell.
 - **Classification:**
 - **Bivalves:** Two-part shells; includes clams and mussels.
 - **Gastropods:** Single, often spiralled shell; includes snails.
 - **Cephalopods:** Prominent head and tentacles; includes octopuses and squids.
- 7. Echinoderms**
- **Body structure:** Radial symmetry and they have a calcareous endoskeleton.
 - **Examples:** Sea urchin and starfish.
- 8. Arthropoda (Arthropods):**
- **Body Structure:** Segmented bodies with jointed appendages and a protective exoskeleton.
 - **Subgroups:**
 - **Insects:** Three-part bodies (head, thorax, abdomen); includes ants, beetles, butterflies, and flies.
 - **Arachnids:** Eight-legged; includes spiders and scorpions.
 - **Crustaceans:** Primarily aquatic with varied body structures; includes crabs, lobsters, barnacles, and prawns.
 - **Myriapods:** Elongated bodies with many segments; includes centipedes and millipedes.

Functions and Roles of Invertebrates:

- **Ecological Roles:** Invertebrates play crucial roles in ecosystems as pollinators, decomposers, and as part of the food web.
- **Human Relevance:** Many invertebrates are vital for agriculture (e.g., pollination by insects), medicine (e.g., leeches in therapy), and industry (e.g., silk production by silkworms).

Understanding the vast diversity and characteristics of invertebrates provides insight into the complexity of life on Earth and the intricate relationships within ecosystems.

ACTIVITIES UNIT 9**1. Match the words from the previous activity with the definitions.**

- | | |
|------------------|--|
| a) Sponge | Asexual reproduction performed by porifera. |
| b) Sessile | Hole that releases water and waste products. |
| c) Choanocytes | Animals that belong to the phylum porifera. |
| d) Osculum | Cells that create a flow of water and filter food. |
| e) Fragmentation | Fixed to one place. |

2. Fill in the gaps.

_____ are animals that belong to the phylum Porifera. They have this name because their bodies have many holes or _____. They feed by filtering food particles from the water that flows through them.

They reproduce sexually by producing gametes that fuse together to produce _____. They can also reproduce _____ through fragmentation.

3. Are the following sentences *true* or *false*?

- a) Jellyfish, hydras, anemones and corals are cnidarians.
- b) Cnidarians have two basic body types: polyp and medusa.
- c) Medusae have an exoskeleton.
- d) Cnidarians are herbivores.
- e) Cnidarians have a gastrovascular cavity which functions as a mouth and an anus.

4. Next to each sentence write N if it refers to nematodes, P if it refers to Platyhelminthes and A if it refers to annelids.

- a) They have a flat body.
- b) They have bodies that are divided into segments called metameres.
- c) Pinworm, whipworm and heartworms belong to this group.
- d) They include earthworms and leeches.
- e) Tapeworms and planarians are part of this group.

5. Choose the correct option.

Clams and mussels are in the category...

- a) cephalopods b) gastropods. c) bivalves.

Snails are molluscs in the category...

- a) cephalopods. b) gastropods. c) bivalves.

6. Which characteristics do molluscs have? Write YES or NO.

Characteristics	YES/NO
They have a soft body	
They move on legs	
They are all aquatic.	
They are invertebrates	
They are categorised as bivalves, gastropods and cephalopods.	
They have a mouth.	
They are all carnivores.	

7. Choose the correct word to complete the sentence.

- a) An arthropod's body is protected by an *exoskeleton* / *shell*.
- b) An arthropod's body is usually divided into three sections: head, thorax and *abdomen* / *trunk*.
- c) The larvae of arthropods are usually very different to the adults, and they undergo *metamorphosis* / *moulting* to become adults.

8. Are the following sentences *true* or *false*?

- a) Arthropods are the most varied and largest phylum of the animal kingdom.
- b) Because the exoskeleton of an arthropod is rigid, it lasts for the animal's lifetime.
- c) Most arthropods reproduce asexually.
- d) All arthropods are terrestrial.

9. Classify the following arthropods into their four groups: ants, barnacle, beetle, butterfly, centipede, crab, fly, lobster, millipede, prawn, scorpion, spider.

Myriapods:

Arachnids:

Crustaceans:

Insects:

UNIT 10. ANIMAL KINGDOM - VERTEBRATES

Vertebrates are animals possessing a backbone or spinal column, distinguishing them from invertebrates. This group encompasses a vast array of species adapted to diverse environments across the globe.

General Characteristics of Vertebrates:

- **Vertebral Column:** All vertebrates have a backbone made up of individual vertebrae, providing structural support and protection for the spinal cord.
- **Complex Nervous System:** They possess a well-developed nervous system, with a brain encased in a skull and a spinal cord running through the vertebral column.
- **Endoskeleton:** An internal skeleton composed of bone or cartilage facilitates movement and growth without the need for moulting.
- **Advanced Organ Systems:** Vertebrates have specialized organ systems, including respiratory, circulatory, and digestive systems, allowing for efficient function and adaptation to various environments.

Major Classes of Vertebrates and Their Characteristics:**1. Fish:**

- **Body Structure:** Aquatic animals with streamlined bodies, gills for breathing, and fins for movement.
- **Subgroups:**
 - **Jawless Fish (Agnatha):** Lack jaws; examples include lampreys and hagfish.
 - **Cartilaginous Fish (Chondrichthyes):** Skeletons made of cartilage; includes sharks, rays, and skates.
 - **Bony Fish (Osteichthyes):** Skeletons made of bone; the largest group of fish, including species like salmon and trout.

2. Amphibians:

- **Body Structure:** Cold-blooded animals that typically start life as aquatic larvae with gills and metamorphose into terrestrial adults with lungs.
- **Examples:** Frogs, toads, salamanders, and newts.
- **Reproduction:** Lay eggs in water; larvae undergo metamorphosis to become adults.

3. Reptiles:

- **Body Structure:** Cold-blooded, scaly-skinned animals that breathe air through lungs.
- **Examples:** Snakes, lizards, turtles, and crocodiles.
- **Reproduction:** Most lay shelled eggs on land; some give live birth.

4. Birds:

- **Body Structure:** Warm-blooded animals with feathers, beaks, and lightweight skeletons adapted for flight.
- **Examples:** Eagles, sparrows, penguins, and ostriches.
- **Reproduction:** Lay hard-shelled eggs; exhibit various nesting behaviours.

5. Mammals:

- **Body Structure:** Warm-blooded animals with hair or fur and mammary glands that produce milk for their young.
- **Subgroups:**
 - **Monotremes:** Egg-laying mammals; examples include the platypus and echidnas.
 - **Marsupials:** Give birth to underdeveloped young that continue development in a pouch; examples include kangaroos and koalas.
 - **Placental Mammals:** Develop offspring internally with the aid of a placenta; includes humans, whales, and elephants.

Functions and Roles of Vertebrates:

- **Ecological Roles:** Vertebrates occupy various ecological niches as predators, prey, pollinators, and seed dispersers, maintaining ecosystem balance.
- **Human Relevance:** They provide food, clothing, companionship, and labour; they are also integral to cultural and scientific endeavours.

ACTIVITIES UNIT 10**1. Match the Classes of Vertebrates with Their Characteristics:**

- | | |
|------------------------|---|
| a) Fish – | i) Warm-blooded animals with feathers. |
| b) Amphibians – | ii) Cold-blooded animals with moist skin; undergo metamorphosis. |
| c) Reptiles – | iii) Aquatic animals with gills and fins. |
| d) Birds – | iv) Warm-blooded animals with hair or fur; nourish young with milk. |
| e) Mammals – | v) Cold-blooded animals with dry, scaly skin. |

2. Fill in the Gaps:

- _____ are warm-blooded vertebrates characterized by the presence of feathers. They lay _____-shelled eggs and have a lightweight _____ adapted for flight.

3. Are the Following Statements True or False?

- a) All mammals lay eggs.
- b) Reptiles have moist skin that aids in respiration.
- c) Amphibians typically start their life cycle in water.
- d) Fish are warm-blooded animals.
- e) Birds have hollow bones to reduce weight for flight.

4. Classify the Following Animals into Their Respective Vertebrate Classes:

- **Shark** – _____
- **Frog** – _____
- **Eagle** – _____
- **Lizard** – _____
- **Kangaroo** – _____

5. Match the words with their definitions:

- | | |
|---------------------|---|
| a) Vertebral Column | A structure that provides support and protects the spinal cord. |
| b) Endoskeleton | An internal support structure of bone or cartilage. |
| c) Metamorphosis | A developmental process that leads to a change in body form and function. |
| d) Monotremes | Mammals that lay eggs. |
| e) Marsupials | Mammals that carry and nurse their young in a pouch. |

6. Are the following sentences true or false?

- a) All reptiles lay eggs on land.
- b) Amphibians can live both in water and on land during different life stages.
- c) Cartilaginous fish have skeletons made of bone.
- d) All mammals give birth to live young.
- e) Birds are cold-blooded animals.

7. Next to each sentence, write F if it refers to fish, A if it refers to amphibians, R if it refers to reptiles, B if it refers to birds, and M if it refers to mammals:

- a) They have scales and lay eggs in water.
- b) They have feathers and lay hard-shelled eggs.
- c) They have hair or fur and produce milk for their young.
- d) They undergo metamorphosis from larvae to adult.
- e) They have a cartilaginous skeleton and breathe through gills.