

The Living World — Assignment 2

Class 11 Biology · Higher-difficulty challenge set + integrated problems · Answer key included · Narayan Gurukul Academy

Instructions: (1) Attempt all questions; start with the topic-wise challenge set, then attempt the integrated (multi-topic) problems.
(2) Give all answers with correct SI units. $g = 10 \text{ m/s}^2$ unless stated.
(3) A final answer key is provided at the end — try the full set before checking it.

Part A — Topic-wise challenge questions

What Is Living?

1. Why is growth not a defining property of living organisms?
2. What is meant by consciousness in living organisms?
3. Explain why reproduction cannot be considered a defining feature of living organisms.

Diversity in the Living World

1. Distinguish between taxonomy and systematics.
2. State the scope of systematics.
3. Describe the three processes included in taxonomy.

Taxonomical Aids

1. List the information written on a herbarium label.
2. What are the uses of a biological museum?
3. Describe the role of botanical gardens and zoological parks as taxonomical aids.

Binomial Nomenclature

1. State two rules of binomial nomenclature.
2. Why is a universal scientific name necessary?
3. State any five rules of binomial nomenclature.

Taxonomic Categories — Hierarchical Order

1. Arrange the taxonomic categories in ascending order.
2. Define species and give one example.
3. Explain the hierarchy of taxonomic categories with an example.

Identification and Classification

1. How is a key helpful in identification?
2. Distinguish between identification and classification.
3. Describe the four processes of taxonomy.

Part B — Integrated problems (multi-topic)

1. A local weed, a mango tree and a human being are all 'living'. Justify using the defining features of life rather than growth alone.
2. A student collects an unknown plant and wants to identify it. Describe, in order, the taxonomical aids and tools she should use and how a dichotomous key works.
3. Using the housefly (*Musca domestica*), trace the full taxonomic hierarchy from species to kingdom.
4. Explain why a universal system of binomial nomenclature is essential, and state the rules that make scientific names stable and unambiguous.
5. Distinguish between taxonomy, systematics and classification, and give one example each of a herbarium, a museum and a botanical garden as aids.
6. Two species are described as sharing 'fundamental similarities'. Explain what this means and how species is the basic unit of classification.

Answer Key

What Is Living?

Growth in non-living objects (e.g. a mountain, a crystal, a sand mound) occurs by accumulation of material on the surface, whereas living organisms grow from inside (by cell division). Reproduction is absent in sterile organisms (mules, worker bees) and in non-living reproduction is absent too; consciousness — the ability to sense the environment and respond — is the defining property of living organisms.

Diversity in the Living World

Taxonomy is the science of identifying, naming and classifying organisms; systematics is the study of the diversity of organisms and all their comparative and evolutionary relationships. Scope of systematics includes identification, nomenclature, classification and evolutionary relationships. Processes in taxonomy: characterisation, identification, classification and nomenclature.

Taxonomical Aids

A herbarium label carries the date and place of collection, the collector's name, and the local/botanical name of the plant. Biological museums preserve plant and animal specimens in preservative solutions and display them for study. Botanical gardens and zoological parks keep living plants and animals in protected, labelled conditions, serving as reference and study aids.

Binomial Nomenclature

PN: (1) Names are in Latin and written in italics. (2) The first word is the genus, the second the species (specific epithet). A universal name avoids ambiguity across languages and regions. Five rules include: Latin origin, two words, genus capitalised and species lowercase, underlined when handwritten, author's name placed after the species in abbreviated form.

Taxonomic Categories — Hierarchical Order

Ascending order: Species → Genus → Family → Order → Class → Phylum (Division in plants) → Kingdom. Species is a group of individuals with fundamental similarities that can interbreed; e.g. *Mangifera indica* (mango). Hierarchy example — Mango: *Mangifera* (genus) → Anacardiaceae (family) → Sapindales (order) → Dicotyledonae (class) → Angiospermae (division) → Plantae (kingdom).

Identification and Classification

A key is a taxonomic aid with contrasting paired statements (a dichotomous key) each of which leads to the correct identification. Identification determines whether an organism is a known or new taxon; classification groups organisms on the basis of similarities. Four processes of taxonomy: characterisation, identification, classification and nomenclature.

Integrated problems

1: Living things show metabolism, self-replication, consciousness and cellular organisation; a weed, mango and human all metabolise, respond to stimuli and reproduce. 2: Collect → press and herbarise → use a dichotomous key with paired contrasting statements to narrow the identity → confirm using a flora/museum reference. 3: *Musca domestica* → *Musca* (genus) → *Muscidae* (family) → *Diptera* (order) → *Insecta* (class) → *Arthropoda* (phylum) → *Animalia* (kingdom). 4: Scientific names are stable, universal Latin binomials independent of local languages; rules fix italicisation, capitalisation and authorship so names do not change with region. 5: Taxonomy = identifying/naming/classifying; systematics = diversity + evolutionary relationships; classification = grouping by similarities. Examples: herbarium (pressed specimens), museum (preserved specimens), botanical garden (living labelled plants). 6: 'Fundamental similarities' means the shared essential characters that define a species; species is the lowest, basic taxonomic category.