2026
EXAMINATION

CBSE

QUESTION & CONCEPT BANK

Chapter-wise & Topic-wise

CLASS 11

Chapter-wise
CONCEPT MAPS

Definitions, Myth Buster & Mnemonics
NCERT & SMART SNAPS

Revision Blue Print & Solved Questions
COMPETENCY FOCUSED

Important Questions with Detailed Explanations
POWER PRACTICE

BIOLOGY

HOW TO USE THIS BOOK

This book is structured to support your learning journey of preparing for your board exams through a variety of engaging and informative elements. Here's how to make the most of it:

"Plants are nature's true magicians, transforming sunlight into food and air into life. They are the silent caretakers of our planet, giving us oxygen to breathe, food to eat, and even medicines to heal. The Plant Kingdom is a fascinating world full of diversity and surprises—from the tiny algae dancing in water to the majestic trees touching the sky. This takes you on a journey to explore the incredible variety of plants, uncovering how they adapt, grow, and support life in countless ways. Different plant groups, from algae to flowering plants, each play a vital role in ecosystems and show the evolution of plants over time."

SYLLABUS

List of Concept Names
Plant Kingdom
Basis of Classification and Algae (Chlorophyceae, Phaeophyceae and Rhodophyceae)
Bryophytes, Pteridophytes and Gymnosperms

Preview

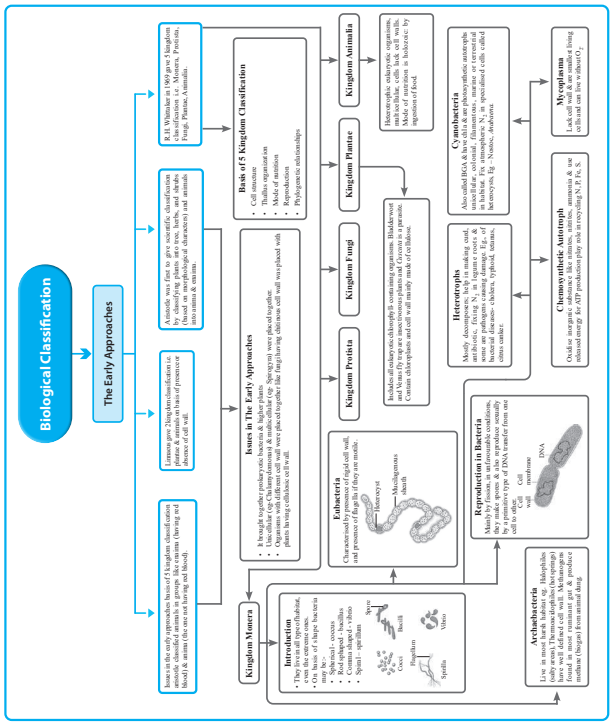
At the start of every chapter, you'll find a thoughtfully chosen image and a quote that captures the main idea and motivation of the topic. This approach aims to get your interest and give you a glimpse of the theme ahead.

Before diving into the details, we outline the syllabus. This helps you prioritize your study focus based on the significance of each section.

The concept map appears to be a comprehensive study aid that outlines key concepts in a structured format, featuring definitions, diagrams, and processes. For a student, it would serve as a visual summary, making complex ideas more accessible and aiding in revision and understanding of concept for their curriculum.

Concept Map

CONCEPT MAP



1 EARLY APPROACHES OF CLASSIFICATION, FIVE KINGDOM CLASSIFICATION

NCERT Definitions *(Commonly asked in 1 mark)*

- **Autotrophs:** Organisms synthesise their own food from inorganic substrates.
- **Heterotrophs:** Depend on other organisms or on dead organic matter for food.
- **Heterocyst:** Specialised cells in some cyanobacteria, like *Nostoc* and *Anabaena*, that fix atmospheric nitrogen.
- **Diatomaceous earth:** Accumulation of cell wall deposits of diatoms over billions of years, used in polishing, filtration of oils and syrups.
- **Plankton:** Microscopic organisms that float passively in water currents.
- **Pseudopodia:** Projections of the cytoplasm that extend from the body of an *Amoeba* by which *Amoeba* move and capture its prey, it is also known as false feet of *Amoeba*.

Important Facts

01. Linnaeus' Two Kingdom classification did not distinguish between the eukaryotes and prokaryotes, unicellular and multicellular organisms and photosynthetic (green algae) and non-photosynthetic (fungi).
02. R.H. Whittaker (1969) proposed Five Kingdom Classification, which included Monera, Protista, Fungi, Plantae, and Animalia.
03. Bacteria are the sole members of the Kingdom Monera.
04. Archaebacteria are found in most harsh habitats.
05. Cyanobacteria (blue-green algae) have chlorophyll *a* similar to green plants and are photosynthetic autotrophs.
06. Bacteria reproduce mainly by fission. Sometimes, under unfavourable conditions, they produce spores.
07. Organisms completely lack a cell wall and can survive without oxygen. – ***Mycoplasma***
08. All single-celled eukaryotes are placed under Protista.
09. Diatoms are the chief 'producers' in the oceans.

NCERT Definitions: *It simplifies complex topics into brief, easy-to-understand explanations.*

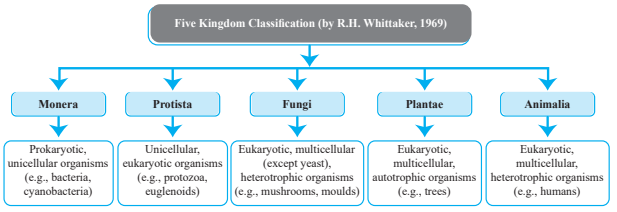
Important Facts: *Quick, bullet point facts that are crucial for exams.*

Difference Between

Eubacteria vs. Archaebacteria

Aspect	Eubacteria	Archaebacteria
Cell wall	Cell wall is made up of peptidoglycan.	Peptidoglycan is absent in cell wall.
Habitat	Found in a wide range of environments (soil, water, human body).	Found in extreme environments (hot springs, salt lakes, acidic areas).
Role	Includes pathogens, decomposers, and nitrogen-fixing bacteria.	Help in biogas production (methanogens) and thrive in harsh ecosystems.
Examples	Cyanobacteria	Halophiles

Classification



Classification: *It organizes complex information into clear categories, making it easier for students to grasp differences, recognize patterns, and predict properties or behaviors in their learning.*

Difference Between: *Side-by-side comparisons to help distinguish similar concepts.*

Real Life Application Based Questions

1. **Algae like *Chlorella* are used as food because they are high in protein. How can studying algae help solve food problems i the world?**

Ans. Studying algae can help create new, healthy food options that are rich in protein, which could help fight hunger and malnutritio

2. **Certain algae produce substances like algin and agar, used in food, cosmetics, and medical products. How do the chemic properties of these substances make them valuable for industrial applications?**

Ans. Algae produce substances like algin and agar, which can gel and thicken. These properties make them useful for making foo products like ice cream, beauty products and medicinal gels.

Myth Buster

- **Myth: All algae are green and have the same appearance.**
- **Fact:** Algae come in different colors, including green (Chlorophyceae), brown (Phaeophyceae), and red (Rhodophyceae) due t the presence of different pigments like chlorophyll, fucoxanthin, and r-phycoerythrin, respectively.
- **Myth: Green algae are simple organisms with no complexity.**
- **Fact:** Green algae show significant variation in structure, ranging from unicellular forms like *Chlamydomonas* to multicellula forms like *Spirogyra*. They also have specialized structures like pyrenoids. Pyrenoids contain protein besides starch.
- **Myth: All algae are harmful and contribute to pollution.**
- **Fact:** While some algae may cause harmful algal blooms, many algae are beneficial to humans, as they provide food, oxygen, an serve as the base of aquatic food chains. Algae such as *Chlorella*, a unicellular alga rich in proteins is used as food supplemer even by space travellers and Many species of *Porphyra*, *Laminaria* and *Sargassum* are among the 70 species of marine alga used as food.

Mnemonics

- **(Green algae-examples) "Cows Visit Us So Calmly"**

Cows	Visit	Us	So	Calmly
↓	↓	↓	↓	↓
Cows (*Chlamydomonas*)	Visit (*Volvox*)	Us (*Ulothrix*)	So (*Spirogyra*)	Calmly (*Chara*)

- **(Brown algae examples) "Every Day Leaves Shine Freshly"**

Every	Day	Leaves	Shine	Freshly
↓	↓	↓	↓	↓
Every (*Ectocarpus*)	Day (*Dictyota*)	Leaves (*Laminaria*)	Shine (*Sargassum*)	Freshly (*Fucus*)

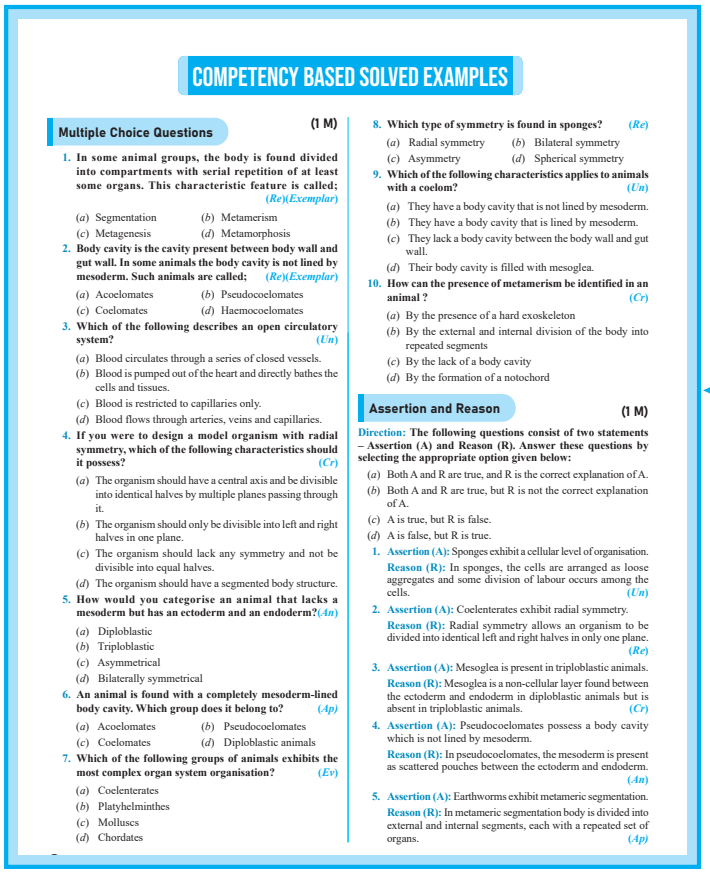
- **(Red algae examples) "Pretty People Grow Gardens"**

Pretty	People	Grow	Gardens
↓	↓	↓	↓
Pretty (*Polysiphonia*)	People (*Porphyra*)	Grow (*Gracilaria*)	Gardens (*Gelidium*)

Real-Life Application Based Questions: *Exercises that connect theory with practical scenarios. It will enhance your understanding and relevance of concepts.*

Myth Buster: *Clear up common misconceptions to ensure your understanding is accurate.*

Mnemonics: *Memory aids to help you retain and recall information.*



COMPETENCY BASED SOLVED EXAMPLES

Multiple Choice Questions (1 M)

1. **In some animal groups, the body is found divided into compartments with serial repetition of at least some organs. This characteristic feature is called;** *(Re)(Exemplar)*
   (a) Segmentation (b) Metamerism
   (c) Metagenesis (d) Metamorphosis
2. **Body cavity is the cavity present between body wall and gut wall. In some animals the body cavity is not lined by mesoderm. Such animals are called;** *(Re)(Exemplar)*
   (a) Acoelomates (b) Pseudocoelomates
   (c) Coelomates (d) Haemocoelomates
3. **Which of the following describes an open circulatory system?** *(Un)*
   (a) Blood circulates through a series of closed vessels.
   (b) Blood is pumped out of the heart and directly bathes the cells and tissues.
   (c) Blood is restricted to capillaries only.
   (d) Blood flows through arteries, veins and capillaries.
4. **If you were to design a model organism with radial symmetry, which of the following characteristics should it possess?** *(Cr)*
   (a) The organism should have a central axis and be divisible into identical halves by multiple planes passing through it.
   (b) The organism should only be divisible into left and right halves in one plane.
   (c) The organism should lack any symmetry and not be divisible into equal halves.
   (d) The organism should have a segmented body structure.
5. **How would you categorise an animal that lacks a mesoderm but has an ectoderm and an endoderm?** *(An)*
   (a) Diploblastic
   (b) Triploblastic
   (c) Asymmetrical
   (d) Bilaterally symmetrical
6. **An animal is found with a completely mesoderm-lined body cavity. Which group does it belong to?** *(Ap)*
   (a) Acoelomates (b) Pseudocoelomates
   (c) Coelomates (d) Diploblastic animals
7. **Which of the following groups of animals exhibits the most complex organ system organisation?** *(Ev)*
   (a) Coelenterates
   (b) Platyhelminthes
   (c) Molluscs
   (d) Chordates
8. **Which type of symmetry is found in sponges?** *(Re)*
   (a) Radial symmetry (b) Bilateral symmetry
   (c) Asymmetry (d) Spherical symmetry
9. **Which of the following characteristics applies to animals with a coelom?** *(Un)*
   (a) They have a body cavity that is not lined by mesoderm.
   (b) They have a body cavity that is lined by mesoderm.
   (c) They lack a body cavity between the body wall and gut wall.
   (d) Their body cavity is filled with mesoglea.
10. **How can the presence of metamerism be identified in an animal ?** *(Cr)*
    (a) By the presence of a hard exoskeleton
    (b) By the external and internal division of the body into repeated segments
    (c) By the lack of a body cavity
    (d) By the formation of a notochord

Assertion and Reason (1 M)

Direction: The following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

1. **Assertion (A):** Sponges exhibit a cellular level of organisation.
   Reason (R): In sponges, the cells are arranged as loose aggregates and some division of labour occurs among the cells. *(Un)*
2. **Assertion (A):** Coelenterates exhibit radial symmetry.
   Reason (R): Radial symmetry allows an organism to be divided into identical left and right halves in only one plane. *(Re)*
3. **Assertion (A):** Mesoglea is present in triploblastic animals.
   Reason (R): Mesoglea is a non-cellular layer found between the ectoderm and endoderm in diploblastic animals but is absent in triploblastic animals. *(Cr)*
4. **Assertion (A):** Pseudocoelomates possess a body cavity which is not lined by mesoderm.
   Reason (R): In pseudocoelomates, the mesoderm is present as scattered pouches between the ectoderm and endoderm. *(An)*
5. **Assertion (A):** Earthworms exhibit metameric segmentation.
   Reason (R): In metameric segmentation body is divided into external and internal segments, each with a repeated set of organs. *(Ap)*

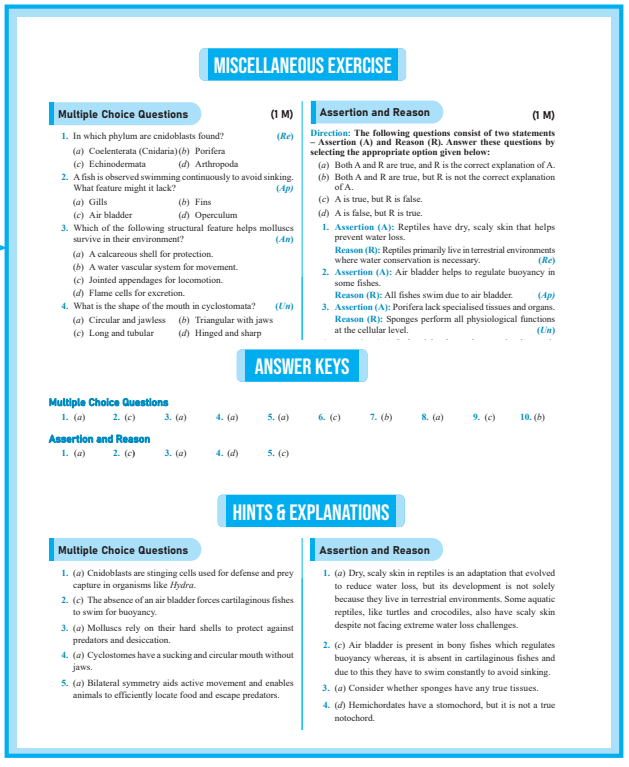
Solved Examples

For each topic, solved examples are provided including tagging of Competencies, PYQs, CBSE SQPs etc that exemplify how to approach and solve questions. This section is designed to reinforce your learning and improve problemsolving skills.

At the end of each chapter, you'll find additional exercises intended to test your grasp of the material. These are great for revision and to prepare for exams.

Answer Key and Explanations including Mistake 101, Nailing the right answer and Key takeaway to know how to write the ideal answer.

Answer Key



MISCELLANEOUS EXERCISE

Multiple Choice Questions (1 M)

1. In which phylum are cnidoblasts found? *(Re)*
   (a) Coelenterata (Cnidaria) (b) Porifera
   (c) Echinodermata (d) Arthropoda
2. A fish is observed swimming continuously to avoid sinking. What feature might it lack? *(Ap)*
   (a) Gills (b) Fins
   (c) Air bladder (d) Operculum
3. Which of the following structural feature helps molluscs survive in their environment? *(An)*
   (a) A calcareous shell for protection.
   (b) A water vascular system for movement.
   (c) Jointed appendages for locomotion.
   (d) Flame cells for excretion.
4. What is the shape of the mouth in cyclostomata? *(Un)*
   (a) Circular and jawless (b) Triangular with jaws
   (c) Long and tubular (d) Hinged and sharp

Assertion and Reason (1 M)

Direction: The following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:

(a) Both A and R are true, and R is the correct explanation of A.
(b) Both A and R are true, but R is not the correct explanation of A.
(c) A is true, but R is false.
(d) A is false, but R is true.

1. **Assertion (A):** Reptiles have dry, scaly skin that helps prevent water loss.
   Reason (R): Reptiles primarily live in terrestrial environments where water conservation is necessary. *(Re)*
2. **Assertion (A):** Air bladder helps to regulate buoyancy in some fishes.
   Reason (R): All fishes swim due to air bladder. *(Ap)*
3. **Assertion (A):** Porifera lack specialised tissues and organs.
   Reason (R): Sponges perform all physiological functions at the cellular level. *(Un)*

ANSWER KEYS

Multiple Choice Questions

1. (a) 2. (c) 3. (a) 4. (a) 5. (a) 6. (c) 7. (b) 8. (a) 9. (c) 10. (b)

Assertion and Reason

1. (a) 2. (c) 3. (a) 4. (d) 5. (c)

HINTS & EXPLANATIONS

Multiple Choice Questions

1. (a) Cnidoblasts are stinging cells used for defense and prey capture in organisms like *Hydra*.
2. (c) The absence of an air bladder forces cartilaginous fishes to swim for buoyancy.
3. (a) Molluscs rely on their hard shells to protect against predators and desiccation.
4. (a) Cyclostomes have a sucking and circular mouth without jaws.
5. (a) Bilateral symmetry aids active movement and enables animals to efficiently locate food and escape predators.

Assertion and Reason

1. (a) Dry, scaly skin in reptiles is an adaptation that evolved to reduce water loss, but its development is not solely because they live in terrestrial environments. Some aquatic reptiles, like turtles and crocodiles, also have scaly skin despite not facing extreme water loss challenges.
2. (c) Air bladder is present in bony fishes which regulates buoyancy whereas, it is absent in cartilaginous fishes and due to this they have to swim constantly to avoid sinking.
3. (a) Consider whether sponges have any true tissues.
4. (d) Hemichordates have a stomochord, but it is not a true notochord.

Contents

THE LIVING WORLD

1

"The study of living organisms unravels the fascinating diversity of life forms on Earth, each uniquely adapted to its environment. This chapter highlights the classification systems that group organisms based on shared traits, making sense of this diversity. Through the concepts of taxonomy and nomenclature, we explore how scientists identify, name, and organize life forms systematically. At its core, the most striking distinction is that every entity can be categorized as either living—vibrant and dynamic—or non-living—static and inert. This fundamental difference defines the essence of life!"

SYLLABUS

List of Concept Names
Diversity in the Living World
Taxonomic Categories

CONCEPT MAP

The Living World

Diviersity in the Living World

- Each different kind of plant, animal or organisms representes a species.
- 1.7-1.8 million species have been known and described which refers to biodiversity (no. & type of organisms present on Earth)

Taxonomy

Characterisation

Identification

Classification

- Grouping into convenient categories based on easily observable characters.
- We use convenient categories to study organisms & scientific term for these categories is taxa.
- Animal, mammal, dog represent taxa at different levels.
- Based on characteristics all living organisms can be classified into different taxa which is called taxonomy.

Modern taxonomic studies

- External, internal structures, cell structure, developmental process, ecological information.

Processes that are basic to classification

- Characterisation, identification, classification and nomenclature Earlier classifications were based on the 'uses' of various organisms.

Nomenclature

Nomenclature

- Naming of organisms such that a particular organism is known by the same name all over the world.
- For plants: ICBN (International code for botanical nomenclature)
- For animals: ICZN (International code for zoological nomenclature)

Binomial nomenclature by Carolus Linnaeus

- Contains generic name and specific epithet.

Universal Rules:

- Latinised (irrespective of origin), written in italics.
- First word is genus & second is species.
- When handwritten separately underlined & printed in italics which denote their Latin origin.
- Genus starts with capital letter & species with small Eg. *Mangifera indica* Linn.

Systematics

- Branch of biology including, different organisms, their diversity and relationship between them. Latin word systema means systematic arrangement of organisms.
- Linnaeus used systema Naturae as the title of his publication.
- The scope of systematics was later enlarged to include identification, nomenclature and classification. Systematics takes into account evolutionary relationship between organisms.

Taxonomic categories

Kingdom:

- (Highest category) Eg. plantae & animalia.

Phylum or Division(division in plants):

- Classes comprising animals like fishes, amphibians, reptiles, birds along with mammals are included in the phylum Chordata.

Class (includes related orders):

- Eg. Mammalia include order primata (monkey, gorilla, gibbon) & carnivora (tiger, cat, dog)

Order (Assemblage of families):

- Order & higher taxonomic categories are identified based on aggregates of characters. Similar characters further decrease.
- Eg. convolvulaceae, solanaceae are in order polymoniales based on floral characters, Carnivora order include felidae and canidae.

Family:

- Closely related genera with less no. of similarities.
- They are characterised on both vegetative & reproductive features of plant species.
- Eg. *Solanum*, *Petunia*, *Datura* are placed in *Solanaceae* family, *Panthera* & *Felis* are placed in felidae family. Canidae → dog family.

Genus:

- Group of related species Eg. *Solanum* (potato & brinjal), *Panthera* (leo, pardus, tigris), *Felis* (cats).

Species:

- Group of organisms with fundamental similarities and can interbreed. Eg. *indica*, *tuberosum*, *leo*, *sapiens*.
- One genus may have 1 or more species representing different organisms, but having morphological similarities. Eg. *P. tigris* & *P. leo*, *S. tuberosum* & *S. nigrum* & *S. melongena*.

1 DIVERSITY IN THE LIVING WORLD

NCERT Definitions *(Commonly asked in 1 mark)*

- **Biodiversity:** The number and types of organisms present on earth.
- **Taxonomy:** Based on characteristics, all living organisms can be classified into different taxa.
- **Systematics:** The branch of study deals with not only different kinds of organisms and their diversities, but also the evolutionary relationships among them.
- **Classification:** It is the process by which anything is grouped into convenient categories based on some easily observable characters.
- **Nomenclature:** The naming of living organisms such that a particular organism is known by the same name all over the world is called nomenclature.
- **Binomial nomenclature:** Each scientific name has two components – the Generic name and the specific epithet

Important Facts

01 The number of species that are known and described range between 1.7-1.8 million.

02 Biological species concept was given by Ernst Mayr.

03 The term taxonomy was coined by A.P. de Candolle.

04 Carolus Linnaeus is considered as the father of taxonomy.

05 The term systematics was given by Carolus Linnaeus.

06 Binomial nomenclature was given by Carolus Linnaeus.

07 For plants- Rules for nomenclature are provided by International Code for Botanical Nomenclature (ICBN).

08 For animals- Rules for nomenclature are provided by International Code of Zoological Nomenclature (ICZN).

09 Each scientific name has two components – the Generic name and the specific epithet.

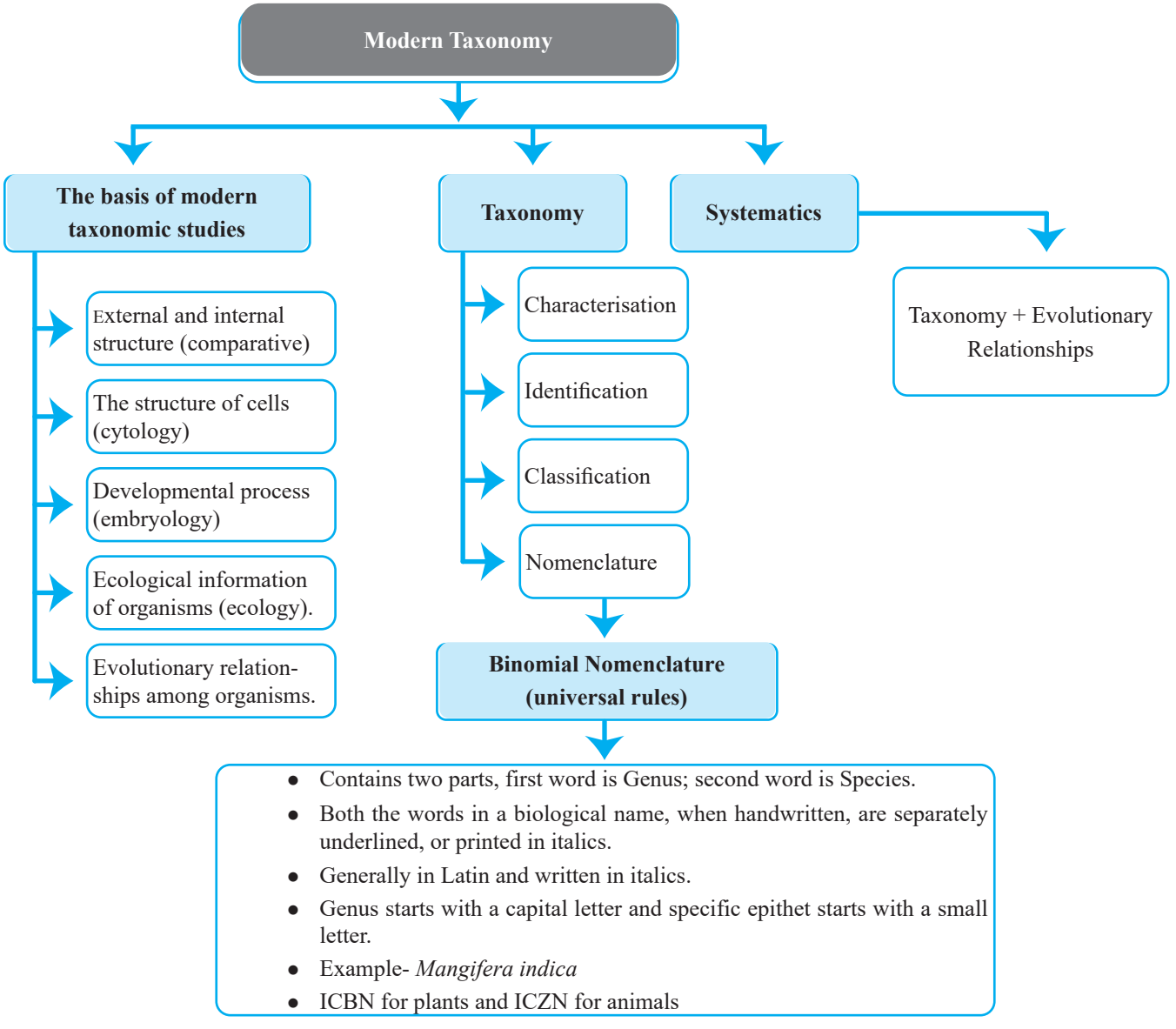
~ ***Binomial nomenclature***

10 The scientific name of mango is written as *Mangifera indica*.

11 Name of the author appears after the specific epithet, i.e., at the end of the biological name and is written in an abbreviated form, e.g., *Mangifera indica* Linn

12 Linnaeus used *Systema Naturae* as the title of his publication.

Classification



Difference Between

Taxonomy vs. Systematics

Aspect	Taxonomy	Systematics
Definition	The science of naming, describing, and classifying organisms based on shared characteristics.	The study of the relationships among organisms, including their classification and evolutionary relationships.
Processes	Includes: • Characterization • Identification • Classification • Nomenclature	Includes: • Characterization • Identification • Classification • Nomenclature • Evolutionary relationships between organisms
Derived from	Derived from Greek words meaning "arrangement"	Derived from the Latin word "systema," meaning systematic arrangement.
Term	Term was given by A.P. De Candolle	Term was given by Linnaeus
Scope	More focused on the organization of living organisms into taxa.	Broader scope that includes evolutionary history and ecological interactions.

Real Life Application Based Questions

1. **How does binomial nomenclature help in the development of new medicines and treatments?**

Ans. By understanding the relationships between different organisms, scientists can identify potential sources of new drugs and treatments.

2. **Can you give an example of how binomial nomenclature is applied in agriculture?**

Ans. In agriculture, binomial nomenclature help farmers and researchers identify plant varieties accurately. For example, the scientific name for maize is Zea mays. This precise identification allows for better communication about crop varieties, pest control methods, and breeding programs, ultimately leading to improved agricultural practices.

3. **How does systematics help in the development of new agricultural practices?**

Ans. By understanding the evolutionary relationships of crop plants, systematics helps in identifying desirable traits for breeding improved varieties with increased yield, disease resistance, and drought tolerance.

4. **How does taxonomy contribute to ecological studies?**

Ans. Taxonomy allows ecologists to classify organisms accurately within ecosystems, aiding in biodiversity assessments and understanding ecological interactions.

Myth Buster

- **Myth: Common names and scientific names are equally reliable.**
  Fact: Common names vary by region and language, leading to confusion. Scientific names (binomial nomenclature) follow international rules and remain consistent worldwide, ensuring accurate identification of organisms.
- **Myth: Taxonomy has no real-world applications.**
  Fact: It is used in medicine, conservation, and forensics (e.g., identifying bacteria causing diseases).
- **Myth: The same scientific name can be used for different species.**
  Fact: Each species has a unique scientific name.

Mnemonics

- **Steps in Taxonomic Study: Can I Classify Names?**

C	I	C	N
↓	↓	↓	↓
Characterization	Identification	Classification	Nomenclature

COMPETENCY BASED SOLVED EXAMPLES

Multiple Choice Questions (1 M)

1. **Who introduced binomial nomenclature?** *(Re)*
   (*a*) Aristotle (*b*) Linnaeus
   (*c*) Haeckel (*d*) Mayr
2. **What does ICZN stand for?** *(Re)*
   (*a*) International Classification of Zoological Names
   (*b*) International Code of Zoological Nomenclature
   (*c*) Indian Council for Zoological Nomenclature
   (*d*) International Code of Zoological Nature
3. **Which of the following is a correct scientific name?** *(Re)*
   (*a*) *mangifera Indica* (*b*) *Mangifera Indica*
   (*c*) *Mangifera indica* (*d*) *mangifera indica*
4. **What is the scientific name of the housefly?** *(Re)*
   (*a*) *Musca domestica* (*b*) *Panthera leo*
   (*c*) *Homo sapiens* (*d*) *Mangifera indica*
5. **Which of the following is NOT a universal rule of nomenclature?** *(Re)*
   (*a*) Biological names are in Latin
   (*b*) The first word starts with a capital letter
   (*c*) The second word starts with a capital letter
   (*d*) Biological names are written in italics.
6. **What does the first word in a scientific name represent?** *(Re)*
   (*a*) Species (*b*) Genus
   (*c*) Family (*d*) Order
7. **What is the process of assigning a scientific name to organisms called?** *(Re)*
   (*a*) Classification (*b*) Nomenclature
   (*c*) Identification (*d*) Taxonomy
8. **What is the term for the number of species known and described?** *(Re)*
   (*a*) 1.7-1.8 billion (*b*) 1.7-1.8 million
   (*c*) 10 million (*d*) 100 million
9. **What does the binomial name *Mangifera indica* signify?** *(Re)*
   (*a*) *Mangifera* is the family, *indica* is the order
   (*b*) *Mangifera* is the species, *indica* is the genus
   (*c*) *Mangifera* is the genus, *indica* is the species
   (*d*) *Mangifera* is the phylum, *indica* is the family
10. **Which of the following is against the rules of ICZN?** *(Re)*
    (*a*) Hand written scientific names should be underlined.
    (*b*) Every species should have a generic name and a specific epithet.
    (*c*) Biological names are in Latin and written in italics.
    (*d*) Specific epithet should be written starting with capital letters

Assertion and Reason (1 M)

Direction: The following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:

(*a*) Both A and R are true, and R is the correct explanation of A.
(*b*) Both A and R are true, but R is not the correct explanation of A.
(*c*) A is true, but R is false.
(*d*) A is false, but R is true.

1. **Assertion (A):** Taxonomy is the branch of biology that involves classification, nomenclature, and identification of organisms.
   Reason (R): Taxonomy classifies organisms based only on external morphological features. *(Re)*
2. **Assertion (A):** Scientific names must be written in italics or underlined separately when handwritten.
   Reason (R): Biologists follow universally accepted principles to provide scientific names to known organisms. *(Un)*
3. **Assertion (A):** Scientific names of organisms can vary based on region and language.
   Reason (R): Scientific names follow a globally standardized binomial nomenclature system. *(Re)*
4. **Assertion (A):** The author's name is included in scientific names to credit the scientist who first described the species.
   Reason (R): The author's name is placed before the species name in binomial nomenclature. *(Re)*
5. **Assertion (A):** Binomial nomenclature is only used for naming animals.
   Reason (R): For plants ,Scientific names are based on agreed principles and criteria, which are provided in International Code for Botanical Nomenclature (ICBN). *(Re)*
6. **Assertion (A):** The scientific names of all organisms must follow the guidelines set by ICZN and ICBN.
   Reason (R): ICZN governs the naming of plants, and ICBN governs the naming of animals. *(Re)*
7. **Assertion (A):** Biological name of mango is written as *Mangifera indica* Linn.
   Reason (R): Name of the author appears before the specific epithet ,it indicates that this species was first described by Linnaeus. *(Re)*
8. **Assertion (A):** Taxonomy takes into account evolutionary relationships between organisms.
   Reason (R): Systematics helps in understanding evolutionary relationships between organisms. *(Re)*

9. **Assertion (A):** Binomial nomenclature is a standardized method for naming organisms.

Reason (R): It ensures that each species has a unique and universally accepted name. ***(Re)***

10. **Assertion (A):** Taxonomy involves the classification of organisms based on shared characteristics.

Reason (R): Classification helps in systematically studying the diversity of living organisms. ***(Un)***

Subjective Questions

Very Short Answer Type Questions **(2 M)**

1. **What is binomial nomenclature? Who introduced it?** ***(Re)***

Ans. Binomial nomenclature is a two-word naming system for organisms, consisting of a genus and species name. *(1 M)*

It was introduced by Carolus Linnaeus. *(1 M)*

2. **(*a*) Define systematics.**
(*b*) Who used *Systema Naturae* as the title of his publication? ***(Re)***

Ans. Systematics is the branch of biology that deals with the classification of organisms based on evolutionary relationships. *(1 M)*

Linnaeus *Systema Naturae* as the title of his publication. *(1 M)*

3. **What are the two codes used for scientific naming of plants and animals?** ***(Re)***

Ans. International Code of Botanical Nomenclature (ICBN) – for plants. *(1 M)*

International Code of Zoological Nomenclature (ICZN) – for animals. *(1 M)*

4. **Why are scientific names preferred over common names?** ***(Re)***

Ans. Scientific names are universal, standardized, and avoid confusion caused by regional variations in common names. *(2 M)*

5. **Write the correct scientific name of humans and mango?** ***(Re)***

Ans. Humans: *Homo sapiens* *(1 M)*

Mango: *Mangifera indica* *(1 M)*

6. **What is taxonomy? Name its basic processes.** ***(Re)***

Ans. Taxonomy is the branch of biology that deals with classification, identification, and naming of organisms. *(1 M)*

Its basic processes include:

- Characterization
- Identification
- Nomenclature
- Classification *(1 M)*

7. **What is modern taxonomy?** ***(Re)***

Ans. Modern taxonomy is the classification of organisms based on evolutionary relationships, genetic data, molecular biology, and biochemical characteristics rather than just morphology. *(2 M)*

8. **What are the two components of a scientific name? Give an example.** ***(Re)***

Ans. The two components of a scientific name are:

1. Genus name – Starts with a capital letter.
2. Species name – Starts with a lowercase letter. *(1 M)*

Example: *Mangifera indica* (Mango) *(1 M)*

9. **What does the author's name in a scientific name signify? Give an example.** ***(Un)***

Ans. The author's name indicates who first described the species. *(1 M)*

Example: *Mangifera indica* Linn. (Linnaeus first described the mango species) *(1 M)*

Short Answer Type Questions **(3 M)**

1. **What are the universal rules of binomial nomenclature.** ***(Re)***

Ans.
- Scientific names must be in Latin and written in italics (or underlined when handwritten).
- The genus name starts with a capital letter, and the species name starts with a lowercase letter.
- The name should be unique and universally accepted.
- The author's name who described the species is added after the scientific name (e.g., *Mangifera indica* Linn.) *(3 M)*

2. **What is systematics? How is it different from taxonomy.** ***(Re)***

Ans.
- Systematics studies the relationships between organisms. *(1 M)*
- Taxonomy deals only with classification, identification, and naming. *(1 M)*
- Systematics includes taxonomy plus evolutionary history. *(1 M)*
- Taxonomy vs. Systematics: Taxonomy classifies and names organisms, while systematics also studies their evolutionary relationships.

3. **Write a short note on International Code of Botanical Nomenclature (ICBN)?** ***(Re)***

Ans.
- ICBN stands for International Code for Botanical Nomenclature.
- Provides standardized rules for naming plants.
- Ensures each species has a unique, universally accepted name.
- Example: *Solanum tuberosum* (Potato). *(3 M)*

4. **What is nomenclature? Name the two international codes used for naming organisms?** ***(Re)***

Ans. Nomenclature is the system of assigning a standard name to an organism.

Two international codes:

- ICBN (International Code of Botanical Nomenclature) for plants.
- ICZN (International Code of Zoological Nomenclature) for animals. *(3 M)*

5. How has the basis of classification evolved over time? (*Re*)

Ans. Early classifications were based on the "uses" of organisms. Modern classifications are based on characteristics like external and internal structure, cell structure, development processes, and ecological information. *(3 M)*

Long Answer Type Questions (5 M)

1. (*a*) What are the advantages of a universally accepted classification system? (*Un*)

(*b*) Why is classification necessary in biology? (*Un*)

(*c*) Explain with an example how scientific names are written? (*Re*)

(*d*) Why is systematics important in biology? (*Re*)

Ans. (*a*)
- Avoids confusion due to local names.
- Helps in global communication among scientists.
- Provides a standardized framework for research *(1 M)*

(*b*)
- Organize the vast number of species.
- Identify relationships between organisms.
- Facilitate scientific communication *(1 M)*

(*c*) Example: The scientific name of the mango plant is *Mangifera indica*.
- *Mangifera* (Genus)
- *indica* (Species)
- Written in italics or underlined separately when handwritten. *(2 M)*

(*d*) It helps in understanding the diversity of organisms and their evolutionary connections. *(1 M)*

2. (*a*) Explain the significance of the works of Carolus Linnaeus in taxonomy. (*Re*)

(*b*) How does taxonomy contribute to the study of biodiversity? (*Un*)

Ans. (*a*) Linnaeus introduced the binomial nomenclature system and wrote "*Systema Naturae*," which laid the foundation for modern taxonomy and systematic arrangement of organisms. *(2½ M)*

(*b*) Taxonomy provides the framework for organizing and understanding biodiversity. It allows scientists to catalog and study the variety of life forms, their relationships, and their distribution, which is crucial for biodiversity research and conservation efforts. *(2½ M)*

Hints & Explanations

Multiple Choice Questions

1. (*b*) - Binomial nomenclature given by Carolus Linnaeus is being practised by biologists all over the world.

2. (*b*) ICZN stand for International Code of Zoological Nomenclature.

3. (*c*) Scientific name of mango is *Mangifera* indica. The first word denoting the genus starts with a capital letter while the specific epithet starts with a small letter.

4. (*a*) *Musca domestica*

5. (*c*) The second word starts with a small letter.

6. (*b*) The first word in a biological name represents the genus while the second component denotes the specific epithet.

7. (*b*) There is a need to standardise the naming of living organisms such that a particular organism is known by the same name all over the world. This process is called nomenclature.

8. (*b*) The number of species that are known and described range between 1.7-1.8 million. This refers to biodiversity or the number and types of organisms present on earth.

9. (*c*) *Mangifera* is the genus, *indica* is the species.

10. (*d*) Specific epithet should be written starting with small letter.

Assertion and Reason

1. (*c*) Based on characteristics, all living organisms can be classified into different taxa. This process of classification is taxonomy. External and internal structure, along with the structure of cell, development process and ecological information of organisms are essential and form the basis of modern taxonomic studies.

2. (*b*) Biological names are generally in Latin and written in italics. They are Latinised or derived from Latin irrespective of their origin. Biologists follow universally accepted principles to provide scientific names to known organisms.

3. (*d*) The scientific names ensure that each organism has only one name.

4. (*c*) Name of the author appears after the specific epithet, i.e., at the end of the biological name and is written in an abbreviated form, e.g., *Mangifera indica* Linn.

5. (*d*) For plants, scientific names are based on agreed principles and criteria, which are provided in International Code for Botanical Nomenclature (ICBN). Animal taxonomists have evolved International Code of Zoological Nomenclature (ICZN).

6. (*c*) For plants, scientific names are based on agreed principles and criteria, which are provided in International Code for Botanical Nomenclature (ICBN). Animal taxonomists have evolved International Code of Zoological Nomenclature (ICZN).

7. (*c*) Name of the author appears after the specific epithet, i.e., at the end of the biological name and is written in an abbreviated form, e.g., *Mangifera indica* Linn. It indicates that this species was first described by Linnaeus.

8. (*d*) Study of different kinds of organisms and their diversities, but also the relationships among them. This branch of study was referred to as systematics.

9. (*a*) Binomial nomenclature given by Carolus Linnaeus is being practised by biologists all over the world. The scientific namets ensure that each organism has only one name.

10. (*a*) Classification is the process by which anything is grouped into convenient categories based on some easily observable characters.

2 TAXONOMIC CATEGORIES

NCERT Definitions *(Commonly asked in 1 mark)*

- **Species:** A group of individual organisms with fundamental similarities
- **Genus:** Comprises a group of related species which has more characters in common in comparison to species of other genera.
- **Family:** A group of related genera with still less number of similarities as compared to genus and species.
- **Order:** Being a higher category, order is the assemblage of families which exhibit a few similar characters.
- **Class:** It includes related orders having common characters.
- **Phylum:** Classes having same features in common constitute the next higher category Phylum
- **Kingdom:** All animals belonging to various phyla are assigned to the highest category.

Important Facts

01 The scientific term for the convenient categories we use to classify organisms. ***~Taxa***

02 All categories together constitute the taxonomic hierarchy.

03 Each category, referred to as a unit of classification, in fact, represents a rank and is commonly termed as taxon.

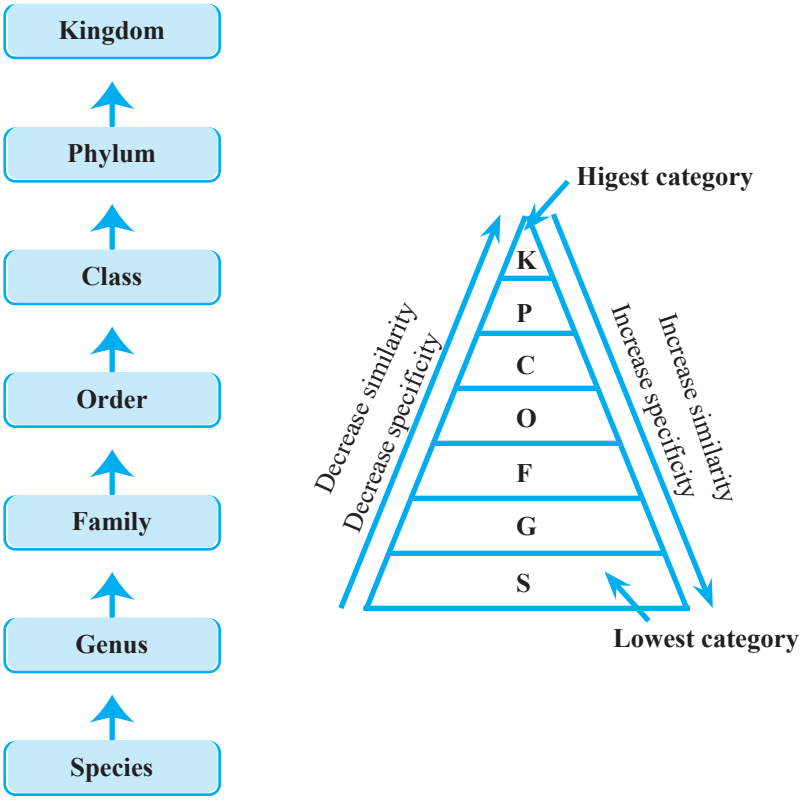
04 Genus *Panthera* and *Felis* (cats) included in the family Felidae.

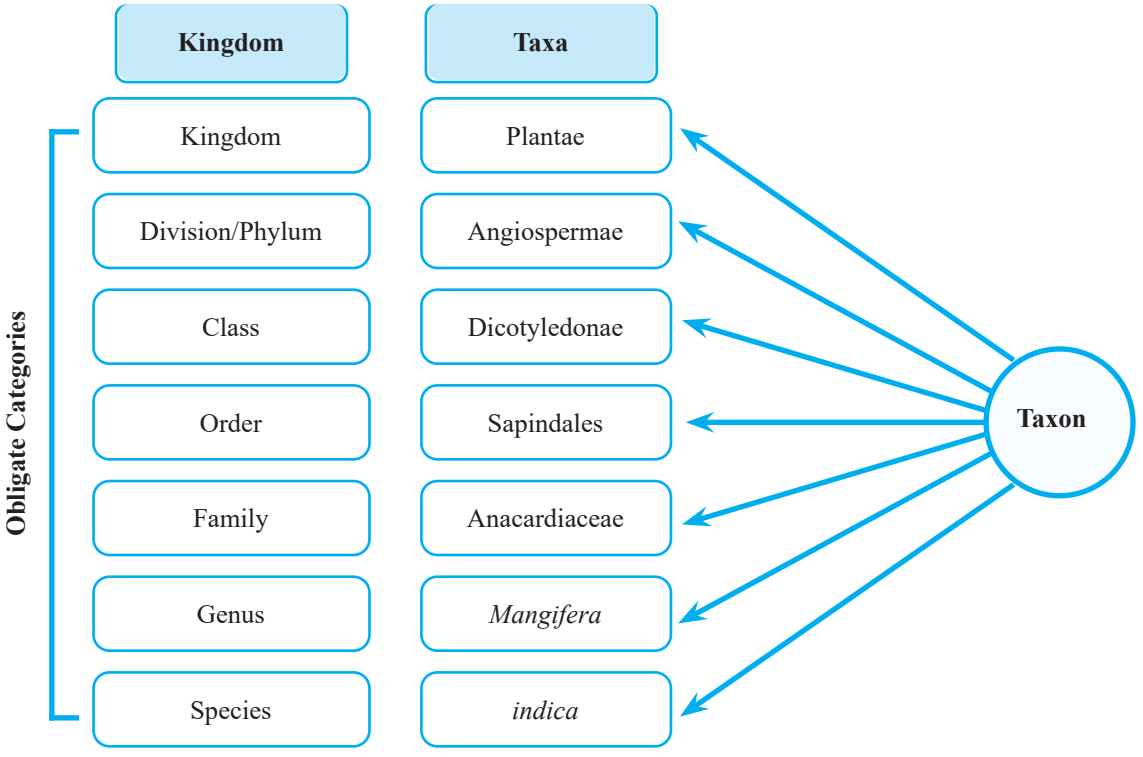
05 Plant families like Convolvulaceae, Solanaceae are included in the order Polymoniales.

06 Family Felidae and Canidae are included in the order carnivora.

07 The scientific name of human being, is *Homo sapiens*.

Taxonomic categories showing hierarchial arrangement in ascending order





Taxonomic Categories

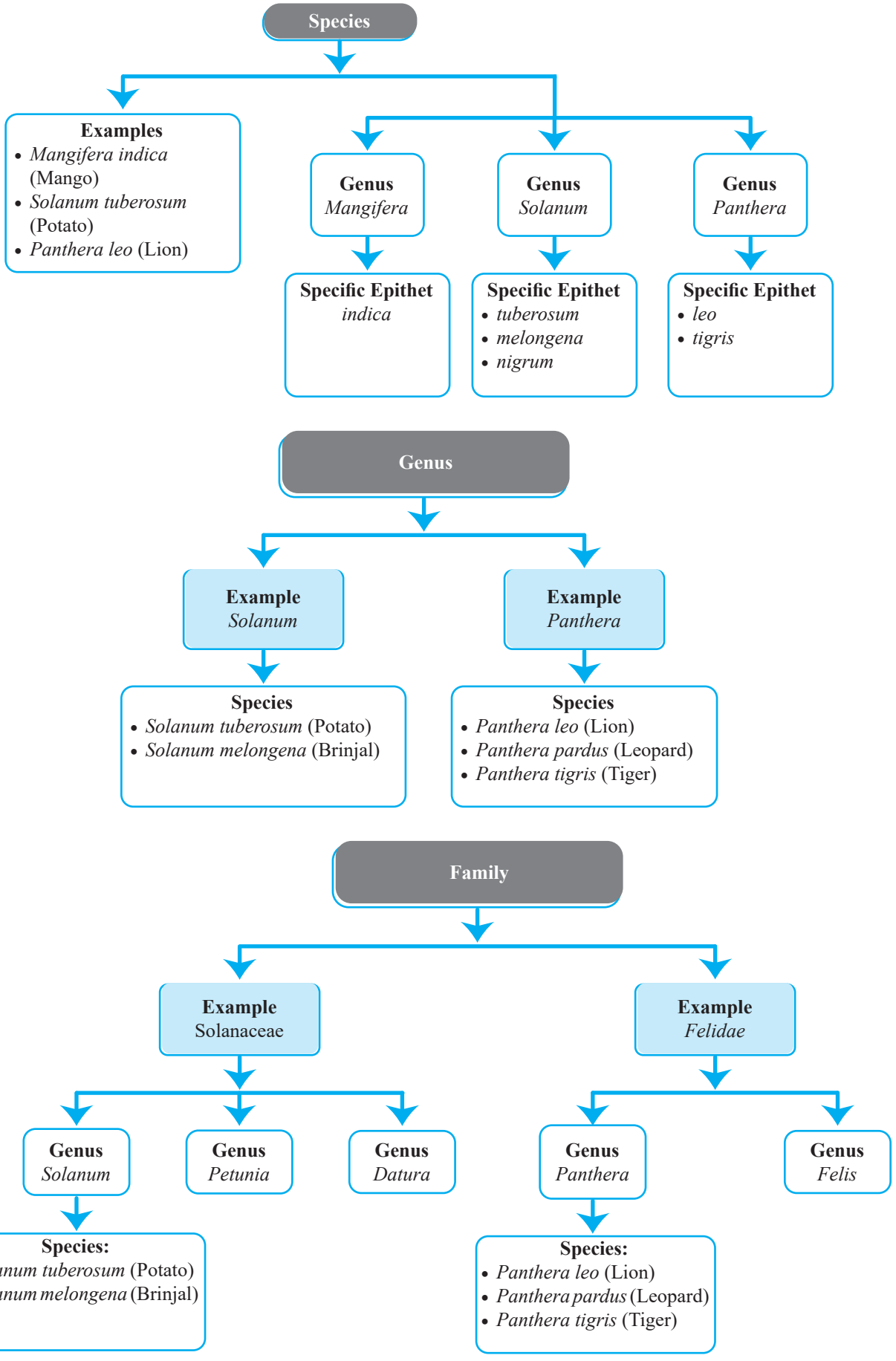
Common name	Biological name	Genus	Family	Order	Class	Phylum/ Division
Man	*Homo sapiens*	*Homo*	Hominidae	Primata	Mammalia	Chordata
Housefly	*Musca domestica*	*Musca*	Muscidae	Diptera	Insecta	Arthropoda
Mango	*Mangifera indica*	*Mangifera*	Anacardiaceae	Sapindales	Dicotyledonae	Angiospermae
Wheat	*Triticum aestivum*	*Triticum*	Poaceae	Poales	Monocotyledonae	Angiospermae

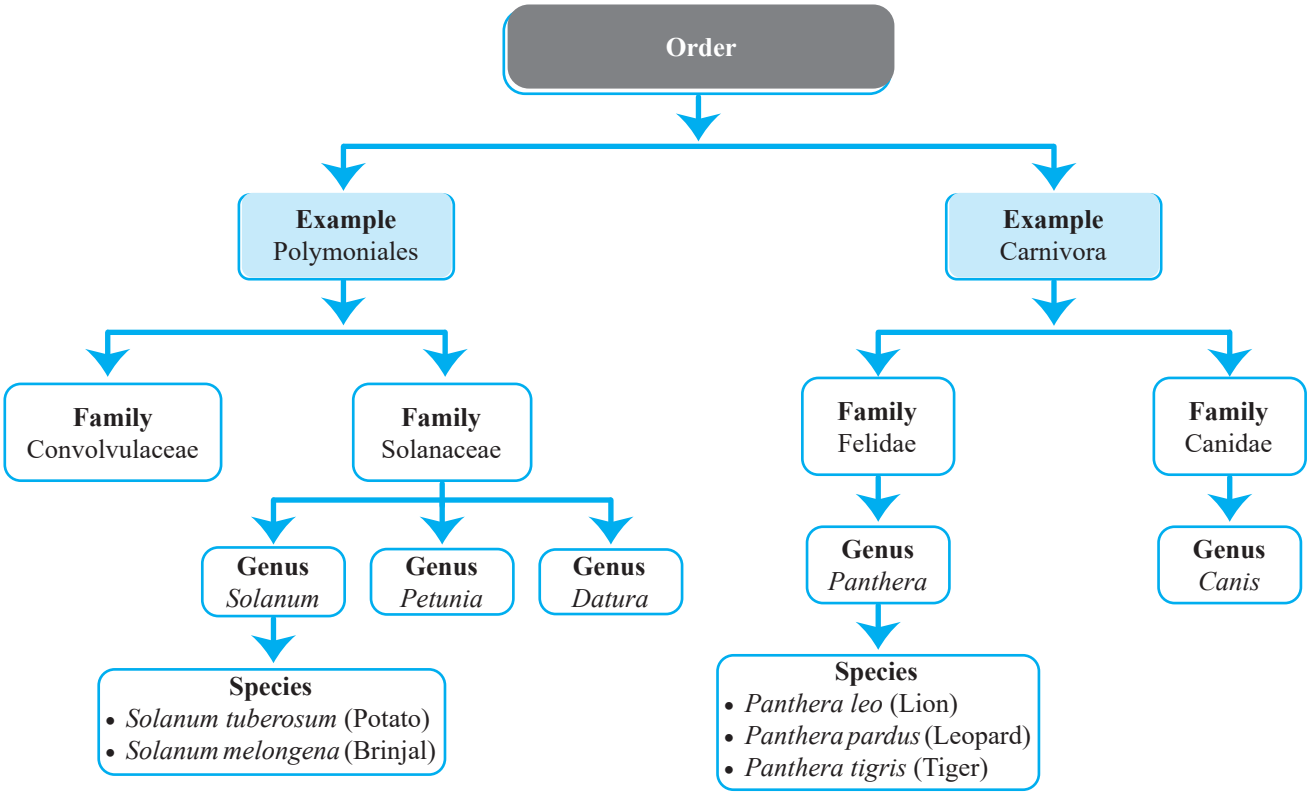
Plants

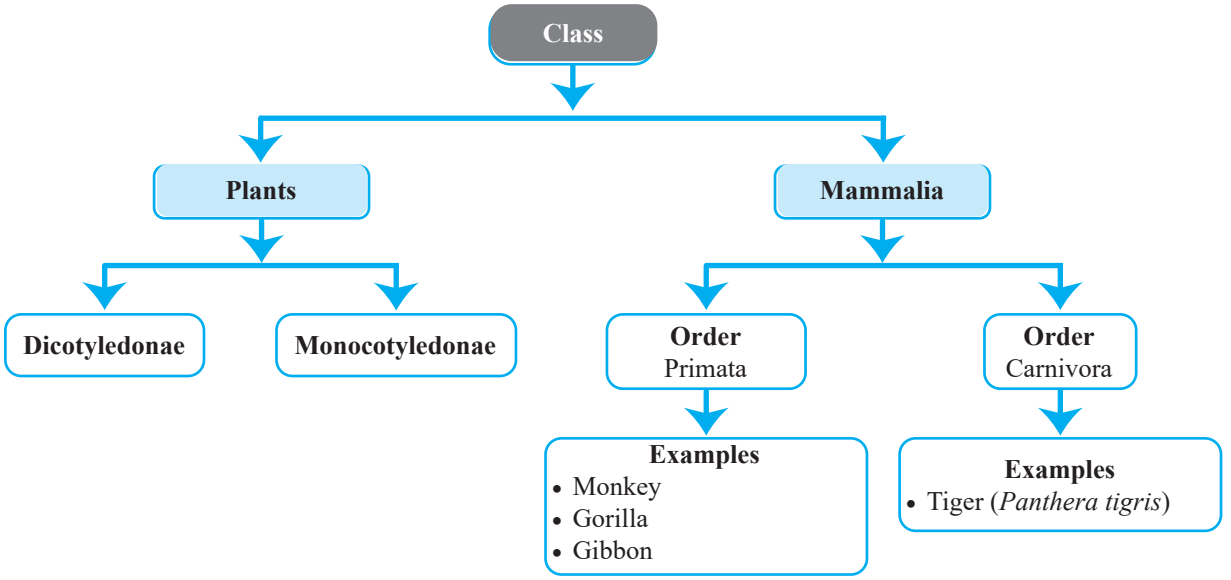
Genus	Family	Order	Class	Division	Kingdom
Mangifera	Anacardiaceae	Sapindales	Dicotyledonae	Angiospermae	Plantae
Solanum *Petunia* *Datura*	Solanaceae	Polymoniales	Dicotyledonae	Angiospermae	Plantae

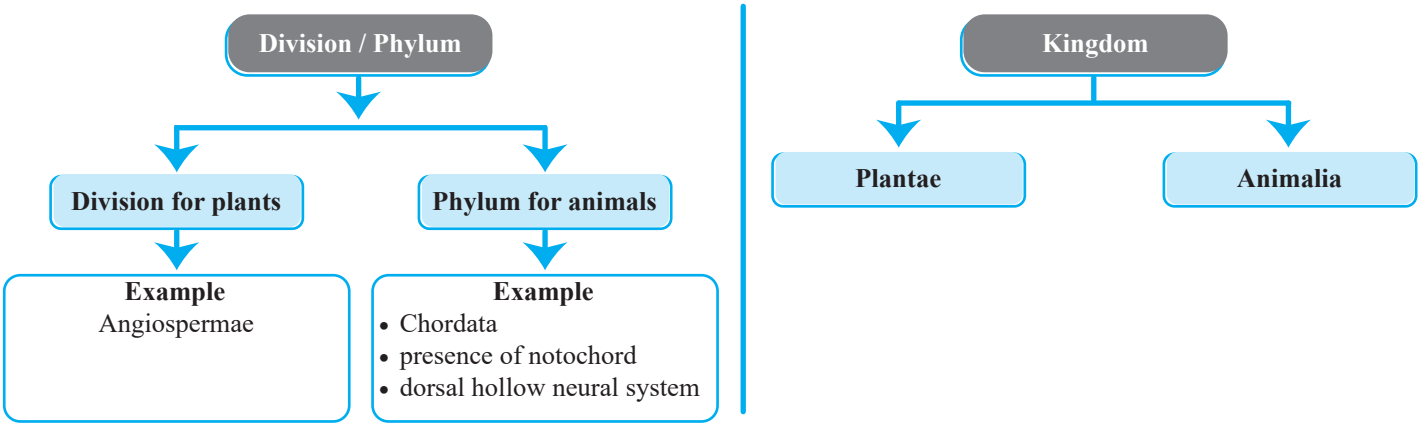
Animals

Genus	Family	Order	Class	Phylum	Kingdom
Panthera, *Felis*	Fedidae	Carnivora	Mammalia	Chordata	Animalia
Canis	Canidae	Carnivora	Mammalia	Chordata	Animalia
Homo	Hominidae	Primata	Mammalia	Chordata	Animalia


Species
Examples
• Mangifera indica (Mango)
• Solanum tuberosum (Potato)
• Panthera leo (Lion)
Genus Mangifera
Genus Solanum
Genus Panthera
Specific Epithet indica
Specific Epithet
• tuberosum
• melongena
• nigrum
Specific Epithet
• leo
• tigris
Genus
Example Solanum
Example Panthera
Species
• Solanum tuberosum (Potato)
• Solanum melongena (Brinjal)
Species
• Panthera leo (Lion)
• Panthera pardus (Leopard)
• Panthera tigris (Tiger)
Family
Example Solanaceae
Example Felidae
Genus Solanum
Genus Petunia
Genus Datura
Genus Panthera
Genus Felis
Species:
• Solanum tuberosum (Potato)
• Solanum melongena (Brinjal)
Species:
• Panthera leo (Lion)
• Panthera pardus (Leopard)
• Panthera tigris (Tiger)


Order
Example
Polymoniales
Example
Carnivora
Family
Convolvulaceae
Family
Solanaceae
Family
Felidae
Family
Canidae
Genus
Solanum
Genus
Petunia
Genus
Datura
Genus
Panthera
Genus
Canis
Species
• Solanum tuberosum (Potato)
• Solanum melongena (Brinjal)
Species
• Panthera leo (Lion)
• Panthera pardus (Leopard)
• Panthera tigris (Tiger)


Class
Plants
Mammalia
Dicotyledonae
Monocotyledonae
Order
Primata
Order
Carnivora
Examples
• Monkey
• Gorilla
• Gibbon
Examples
• Tiger (Panthera tigris)


Division / Phylum
Division for plants
Phylum for animals
Example
Angiospermae
Example
• Chordata
• presence of notochord
• dorsal hollow neural system
Kingdom
Plantae
Animalia

COMPETENCY BASED SOLVED EXAMPLES

Multiple Choice Questions (1 M)

1. **The order Carnivora includes which family?** *(Re)*
   (*a*) Hominidae (*b*) Felidae
   (*c*) Anacardiaceae (*d*) Poaceae
2. **Which genus includes both potato and brinjal?** *(Re)*
   (*a*) *Panthera* (*b*) *Solanum*
   (*c*) *Felis* (*d*) *Homo*
3. **Which family includes lion, tiger, and leopard?** *(Re)*
   (*a*) Canidae (*b*) Felidae
   (*c*) Hominidae (*d*) Muscidae
4. **Which of the following is the correct order of taxonomic hierarchy?** *(Re)*
   (*a*) Species → Genus → Family → Order
   (*b*) Genus → Species → Family → Order
   (*c*) Family → Genus → Species → Order
   (*d*) Family → Order → Genus → Species
5. **Which of the following is a plant family?** *(Re)*
   (*a*) Felidae (*b*) Solanaceae
   (*c*) Canidae (*d*) Hominidae
6. **In animals, the equivalent of the plant category "division" is:** *(Re)*
   (*a*) Family (*b*) Phylum
   (*c*) Class (*d*) Order
7. **The scientific name of wheat is:** *(Re)*
   (*a*) *Oryza sativa*
   (*b*) *Triticum aestivum*
   (*c*) *Zea mays*
   (*d*) *Solanum tuberosum*
8. **Which of the following genera belongs to the family Anacardiaceae?** *(Re)*
   (*a*) *Musca* (*b*) *Mangifera*
   (*c*) *Homo* (*d*) *Triticum*
9. **The correct hierarchical rank of humans is:** *(Re)*
   (*a*) Chordata → Mammalia → Hominidae → *Homo* → *Homo sapiens*
   (*b*) *Homo* → *sapiens* → Mammalia → Chordata
   (*c*) Mammalia → Hominidae → *Homo* → Chordata
   (*d*) *Homo* → Mammalia → Homonidae → Chordata
10. **Which taxonomic division includes both *Mangifera indica* and *Triticum aestivum*?** *(Re)*
    (*a*) Arthropoda
    (*b*) Chordata
    (*c*) Angiospermae
    (*d*) Mammalia

Assertion and Reason (1 M)

Direction: The following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:

(*a*) Both A and R are true, and R is the correct explanation of A.

(*b*) Both A and R are true, but R is not the correct explanation of A.

(*c*) A is true, but R is false.

(*d*) A is false, but R is true.

1. **Assertion (A):** The family Felidae includes animals such as lions, tigers, and leopards.
   Reason (R): All members of the family Felidae belong to the genus *Panthera*. *(Re)*
2. **Assertion (A):** The number of shared characteristics decreases as we move up the taxonomic hierarchy.
   Reason (R): Higher taxonomic ranks include a broader range of organisms with fewer common traits. *(Un)*
3. **Assertion (A):** These taxonomic groups / categories are distinct biological entities and merely morphological aggregates.
   Reason (R): Each rank or *taxon*, represents a unit of classification. *(Re)*
4. **Assertion (A):** Wheat (*Triticum aestivum*) belongs to the class Monocotyledonae.
   Reason (R): Higher the taxa, more are the characteristics that the members within the taxon share. *(Re)*
5. **Assertion (A):** Phylum Chordata includes animals with notochords.
   Reason (R): Phyla are lower categories than classes. *(Re)*
6. **Assertion (A):** *Solanum tuberosum* and *Solanum melongena* belong to the same family.
   Reason (R): Families are based on vegetative and reproductive features. *(Un)*
7. **Assertion (A):** Species is the lowest taxonomic category.
   Reason (R): Members of a species share fundamental similarities. *(Un)*
8. **Assertion (A):** Family is a higher category than genus.
   Reason (R): Families are based on fewer similarities than genera. *(Re)*

Subjective Questions

Very Short Answer Type Questions (2 M)

1. Define taxon and give two examples. (*Re*)

Ans. A taxon is a unit of classification at any level in the taxonomic hierarchy. . *(1 M)*

Example:

- *Homo sapiens* (Species level)
- *Felis* (Genus level) . *(1 M)*

2. Write the class ,order , family and genus of Mango.(*Re*)

Ans. For Mango (*Mangifera indica*):

- Species: *indica*
- Genus: *Mangifera*
- Family: Anacardiaceae
- Order: Sapindales
- Class: Dicotyledonae *(2 M)*

3. (*a*) Why is Latin used in scientific names? (*Re*)

(*b*) What is the difference between family and order? (*Re*)

Ans. (*a*) Latin is used because it is a dead language, meaning it does not change over time, ensuring consistency in scientific names. *(1 M)*

(*b*)

- Family: A group of related genera.
- Order: A group of related families.

Example: Felidae (cats) is a family placed in the Carnivora order. *(1 M)*

4. (*a*) What is a phylum? (*Re*)

(*b*) Write the taxonomic category Class ,order, family of humans? (*Re*)

Ans. (*a*) A phylum is a group of related classes. Example: Chordata includes Mammalia. *(1 M)*

(*b*)

- Class: Mammalia
- Order: Primata
- Family: Hominidae
- Genus: *Homo*
- Species: *Homo sapiens* *(1 M)*

5. (*a*) Give an example of an animal belonging to Phylum Chordata. (*Re*)

(*b*) Give an example of a plant belonging to Division Angiospermae. (*Re*)

Ans. (*a*) *Homo sapiens* (Humans) and *Panthera leo* (Lion) belong to Phylum Chordata. *(1 M)*

(*a*) *Mangifera indica* (Mango) and *Triticum aestivum* (Wheat) belong to Division Angiospermae. *(1 M)*

Short Answer Type Questions (3 M)

1. What is a family? Give an example from plants and animals. (*Re*)

Ans. Family, has a group of related genera with still less number of similarities as compared to genus and species. Families are characterised on the basis of both vegetative and reproductive features of plant species. *(1.5 M)*

Example:

Plant: Solanaceae (Potato, Tomato).

Animal: Felidae (Lion, Tiger, Cat). *(1.5 M)*

2. Explain the concept of taxonomic categories with an example. (*Un*)

Ans. Taxonomic categories are hierarchical ranks used to classify organisms. For example, insects represent a group sharing common features like three pairs of jointed legs, which can be classified into various ranks. *(3 M)*

3. (*a*) What is a species? How is it identified? (*Re*)

(*b*) Give two example of species? (*Re*)

Ans. (*a*) A species is a group of individual organisms with fundamental similarities. It is identified based on distinct morphological differences from other closely related species. *(2 M)*

(*b*) *Panthera leo*-Lion and *Solanum tuberosum* -potato. *(1 M)*

4. Differentiate between Phylum and Class.

Ans. **(*Re*)**

Aspects	Phylum	Class
Definition	A phylum is a higher taxonomic category that includes a group of related classes.	A class is a taxonomic category that includes a group of related orders within a phylum.
Hierarchy Level	Phylum is a broader category than class and ranks above class in the taxonomic hierarchy.	Class is a category below phylum and ranks above order in classification.
Basis of Classification	Organisms in a phylum share fundamental body structure and major characteristics, such as the presence of a notochord in Phylum Chordata.	Organisms in a class share more specific characteristics, such as mammary glands in Class Mammalia.
Example (Animal Kingdom)	Phylum Chordata includes Class Mammalia	Class Mammalia includes Order Primata.

(2 M)

Long Answer Type Questions (5 M)

1. Give an example of a taxonomic hierarchy for a plant and an animal. *(Re)*

Ans. Plant - Wheat (*Triticum aestivum*)

Kingdom-Plantae

Division- Angiospermae

- Class: Monocotyledonae
- Order: Poales
- Family: Poaceae
- Genus: *Triticum*
- Species: *Triticum aestivum* *(2.5 M)*

Animal - Human (*Homo sapiens*)

- Kingdom: Animalia
- Phylum: Chordata
- Class: Mammalia
- Order: Primata
- Family: Hominidae
- Genus: *Homo*
- Species: *Homo sapiens* *(2.5 M)*

2. Define and explain the following taxonomic categories: Class, Family, Order, Genus,species? *(Re)*

Ans. *Class: A group of related orders. Example-order Primata comprising monkey, gorilla is placed in class Mammalia along with order Carnivora that includes animals like tiger, cat and dog.

*Order: A group of related families. Example- Families like Felidae and Canidae included in the animal order Carnivora.

*Family: A group of related genera. Example-genus *Panthera*, comprising lion, tiger, leopard is put along with genus, *Felis* (cats) in the family Felidae.

Genus: A group of related species. Example- *Panthera leo*, *P. pardus* and *P. tigris* with several common features, are all species of the genus *Panthera*.

Species- Taxonomic studies consider a group of individual organisms with fundamental similarities as a species. Example-*Mangifera indica*, and *Panthera leo* (lion). *(5 M)*

Hints & Explanations

Multiple Choice Questions

1. (*b*) Order Carnivora includes which family Felidae.

2. (*b*) Genus *Solanum* includes both potato and brinjal.

3. (*b*) For example, genus *Panthera*, comprising lion, tiger, leopard is put along with genus, *Felis* (cats) in the family Felidae.

4. (*a*) Species → Genus → Family → Order

5. (*b*) Plant family -Solanaceae

Cat family -Felidae

Dog family- Canidae

Man family- Hominidae

6. (*b*) In animals, the equivalent of the plant category "division" is Phylum.

7. (*b*) The scientific name of wheat is *Triticum aestivum*.

8. (*b*) **Mangifera* belongs to the family Anacardiaceae.

**Triticum* belongs to the family Poaceae.

Musca belongs to the family Muscidae.

9. (*a*) Chordata → Mammalia → Hominidae → *Homo* → *sapiens*

10. (*c*) Angiospermae division includes both *Mangifera indica* and *Triticum aestivum*.

Assertion and Reason

1. (*c*) Felidae includes both *Panthera* and *Felis* genera.

2. (*a*) Lower the taxa, more are the characteristics that the members within the taxon share. Higher the category, greater is the difficulty of determining the relationship to other taxa at the same level. Hence, the problem of classification becomes more complex.

3. (*d*) Taxonomic groups/categories are distinct biological entities and not merely morphological aggregates.

4. (*c*) Wheat (*Triticum aestivum*) belongs to the class Monocotyledonae. Lower the taxa, more are the characteristics that the members within the taxon share.

5. (*c*) Phylum are higher categories than classes.

6. (*a*) Families are characterised on the basis of both vegetative and reproductive features of plant species.

7. (*a*) Taxonomic studies consider a group of individual organisms with fundamental similarities as a species.

8. (*a*) Family, has a group of related genera with still less number of similarities as compared to genus and species.

MISCELLANEOUS EXERCISE

Multiple Choice Questions (1 M)

1. Which of the following is **NOT** a universal rule of nomenclature? *(Re)*
   (*a*) Biological names are written in italics.
   (*b*) The first word starts with a capital letter.
   (*c*) The first word in biological name represent the species.
   (*d*) The specific epithet starts with a small letter.
2. Which of the following organisms belongs to the order Poales? *(Re)*
   (*a*) Man (*b*) Housefly
   (*c*) Wheat (*d*) Mango
3. The housefly (*Musca domestica*) belongs to which family? *(Re)*
   (*a*) Poaceae (*b*) Muscidae
   (*c*) Hominidae (*d*) Anacardiaceae
4. Which of the following organisms is grouped under the order Primata? *(Re)*
   (*a*) *Homo sapiens*
   (*b*) *Musca domestica*
   (*c*) *Mangifera indica*
   (*d*) *Triticum aestivum*
5. Which of the following correctly pairs an organism with its respective family? *(Re)*
   (*a*) *Homo sapiens* - Muscidae
   (*b*) *Triticum aestivum* - Poaceae
   (*c*) *Mangifera indica* - Hominidae
   (*d*) *Musca domestica* - Anacardiaceae
6. Which of the following correctly represents an order-family pair? *(Re)*
   (*a*) Sapindales - Anacardiaceae
   (*b*) Diptera - Hominidae
   (*c*) Poales - Muscidae
   (*d*) Primata - Arthropoda
7. Which of the following organisms belongs to class Insecta? *(Re)*
   (*a*) *Triticum aestivum* (*b*) *Mangifera indica*
   (*c*) *Musca domestica* (*d*) *Homo sapiens*
8. Which of the following genera belongs to phylum Chordata? *(Re)*
   (*a*) *Homo* (*b*) Musca
   (*c*) *Mangifera* (*d*) *Triticum*
9. If an organism is classified under order Poales, which family is it most likely associated with? *(Re)*
   (*a*) Poaceae (*b*) Muscidae
   (*c*) Hominidae (*d*) Anacardiaceae

Assertion and Reason (1 M)

Direction: The following questions consist of two statements – Assertion (A) and Reason (R). Answer these questions by selecting the appropriate option given below:

(*a*) Both A and R are true, and R is the correct explanation of A.
(*b*) Both A and R are true, but R is not the correct explanation of A.
(*c*) A is true, but R is false.
(*d*) A is false, but R is true.

1. **Assertion (A):** The name of the author who first described a species appears after the scientific name.
   Reason (R): This provides credit and helps track original classifications. *(Re)*
2. **Assertion (A):** Ernst Mayr contributed significantly to evolutionary biology.
   Reason (R): He defined the biological species concept. *(Re)*
3. **Assertion (A):** The Order Polymoniales includes families like Convolvulaceae and Solanaceae.
   Reason (R): These families are grouped together based on floral characteristics. *(Re)*
4. **Assertion (A):** The Order Carnivora includes only the family Felidae.
   Reason (R): Felidae consists of carnivorous animals like lions, tigers, and leopards. *(Re)*
5. **Assertion (A):** Potato and brinjal belong to the same genus, *Solanum*.
   Reason (R): The genus *Solanum* consists of closely related species with similar morphological traits. *(Re)*
6. **Assertion (A):** *Musca domestica* (housefly) belongs to the class Mammalia.
   Reason (R): Houseflies are invertebrates and belong to the phylum Arthropoda. *(Re)*

Subjective Questions

Very Short Answer Type Questions (2 M)

1. What does the author's name after the specific epithet indicate? Give an example. *(Re)*
2. From which language is the word 'systema' derived? What does it mean? *(Re)*
3. How are different orders placed in the same class? Give an example? *(Re)*

4. In the context of classification, how do scientists use similarities and dissimilarities between organisms. *(Re)*

5. Explain how different orders are placed in the same class. Give an example. *(Re)*

Short Answer Type Questions (3 M)

1. Distinguish between 'taxonomy' and 'systematics', highlighting their key differences in scope and approach. *(Re)*

2. A plant may have different names in different regions of the country or world. How do botanists solve this problem. *(Un) (NCERT Exemplar)*

3. How is a species defined in biological terms? Explain the criteria used to differentiate one species from another, and why this definition can sometimes be challenging to apply. *(Re)*

Long Answer Type Questions (5 M)

1. Define a taxon. What is meant by taxonomic hierarchy? Give a flow diagram from the lowest to highest category for a plant and an animal. What happens to the number of individuals and number of shared characters as we go up the taxonomical hierarchy? *(NCERT Exemplar)*

Case Based Questions

Case Based-I

Scientists use a standard method called binomial nomenclature to name organisms. This system, developed by Carolus Linnaeus, ensures that each species has a unique name consisting of two parts: genus and species. For example, the scientific name of a tiger is *Panthera tigris*. *(Re)*

(i) What is binomial nomenclature? Why is it important?

(ii) What are the rules of binomial nomenclature? *(Re)*

(iii) Write the scientific names of humans, housefly, and wheat. *(Re)*

OR

(iii) Who introduced binomial nomenclature, and why is it widely accepted. *(Re)*

Case Based-II

Taxonomy is the science of classifying organisms based on their similarities and differences. Carolus Linnaeus introduced binomial nomenclature, a system where each organism has a two-part name: genus and species. This classification system follows a taxonomic hierarchy, including categories such as species, genus, family, order, class, phylum, and kingdom. The study of classification helps in identifying new species, understanding evolutionary relationships, and conserving biodiversity. *(Re)*

(i) Define taxonomy and explain why it is important in biological studies. *(Re)*

(ii) What is binomial nomenclature? Write the correct scientific name of mango following binomial nomenclature rules? *(Re)*

(iii) Arrange the following taxonomic categories in ascending order: Family, Kingdom, Species, Class, Phylum, Genus, Order? *(Re)*

OR

(iii) Explain the role of systematics in the classification of living organisms. *(Re)*

ANSWER KEYS

Multiple Choice Questions

1. (*c*) **2.** (*c*) **3.** (*b*) **4.** (*a*) **5.** (*b*) **6.** (*a*) **7.** (*c*) **8.** (*a*) **9.** (*a*)

Assertion and Reason

1. (*a*) **2.** (*a*) **3.** (*a*) **4.** (*d*) **5.** (*a*) **6.** (*d*)

HINTS & EXPLANATIONS

Multiple Choice Questions

1. (*c*) Biological names are generally in Latin and written in italics. They are Latinised or derived from Latin irrespective of their origin..
2. (*c*) Wheat belongs to the order Poales.
3. (*b*) The housefly (*Musca domestica*) belongs to family Muscidae.
4. (*a*) *Homo sapiens* is grouped under the order Primata.
5. (*b*) *(a) Homo sapiens* - Hominidae
   (b) Triticum aestivum - Poaceae
   (c) Mangifera indica - Anacardiaceae
   (d) Musca domestica - Muscidae
6. (*a*)
   - Diptera -Muscidae
   - Poales - Poaceae
   - Primata - Hominidae
7. (*c*) belongs to class Insecta
8. (*a*) *Homo* genera belongs to phylum Chordata.
9. (*a*) Poaceae family.

Assertion and Reason

1. (*a*) Name of the author appears after the specific epithet, i.e., at the end of the biological name and is written in an abbreviated form, e.g., *Mangifera indica* Linn

.

2. (*a*) Ernst Mayr pioneered the currently accepted definition of a biological species.
3. (*a*) Plant families like Convolvulaceae, Solanaceae are included in the order Polymoniales mainly based on the floral characters.
4. (*d*) The animal order, Carnivora, includes families like Felidae and Canidae.
5. (*a*) Potato and brinjal are two different species but both belong to the genus *Solanum*.
6. (*d*) *Musca domestica* (housefly) belongs to the class Insecta.

Subjective Questions

Very Short Answer Type Questions

1. It indicates who first described the species. *(1 M)*
   Example: *Mangifera indica* Linn. *(1 M)*
2. It is derived from the Latin language. *(1 M)*
   It means the systematic arrangement of organisms. *(1 M)*
3. Based on related characteristics. *(1 M)*
   Example: Primata and Carnivora in class Mammalia. *(1 M)*
4. Similarities are used to group organisms into the same taxa, while dissimilarities are used to distinguish between different taxa. *(2 M)*
5. Different orders are placed in the same class based on shared or related characteristics. *(1 M)*
   Example: Orders Primata and Carnivora are placed in the class Mammalia. *(1 M)*

Short Answer Type Questions

1. Taxonomy is concerned with characterization, identification, classification, and nomenclature. *(1 M)*
   Systematics includes taxonomy and also focuses on the evolutionary relationships between organisms, using phylogenetic analysis and other methods. *(2 M)*
2. There is a need to standardise the naming of living organisms such that a particular organism is known by the same all over the world. Botanists have solved this problem by setting International Code for Botanical Nomenclature (ICBN). *(1 M)*
   Scientific naming ensures that each organism has only name in any part of the world. ICBN ensures that such name has not been used for any other organism. *(1 M)*
   Each name has two components the generic name and the specific epithet. This system of naming is called bionomial nomenclature given by Carolus Linnaeus. e.g., mango has the scientific name *Mangifera indica*. *(1 M)*
3. A species is defined as a group of individual organisms with fundamental similarities capable of interbreeding and producing fertile offspring, and are reproductively isolated from other such groups. *(2 M)*
   Differentiation criteria: Distinct morphological, physiological, and reproductive differences. *(1 M)*

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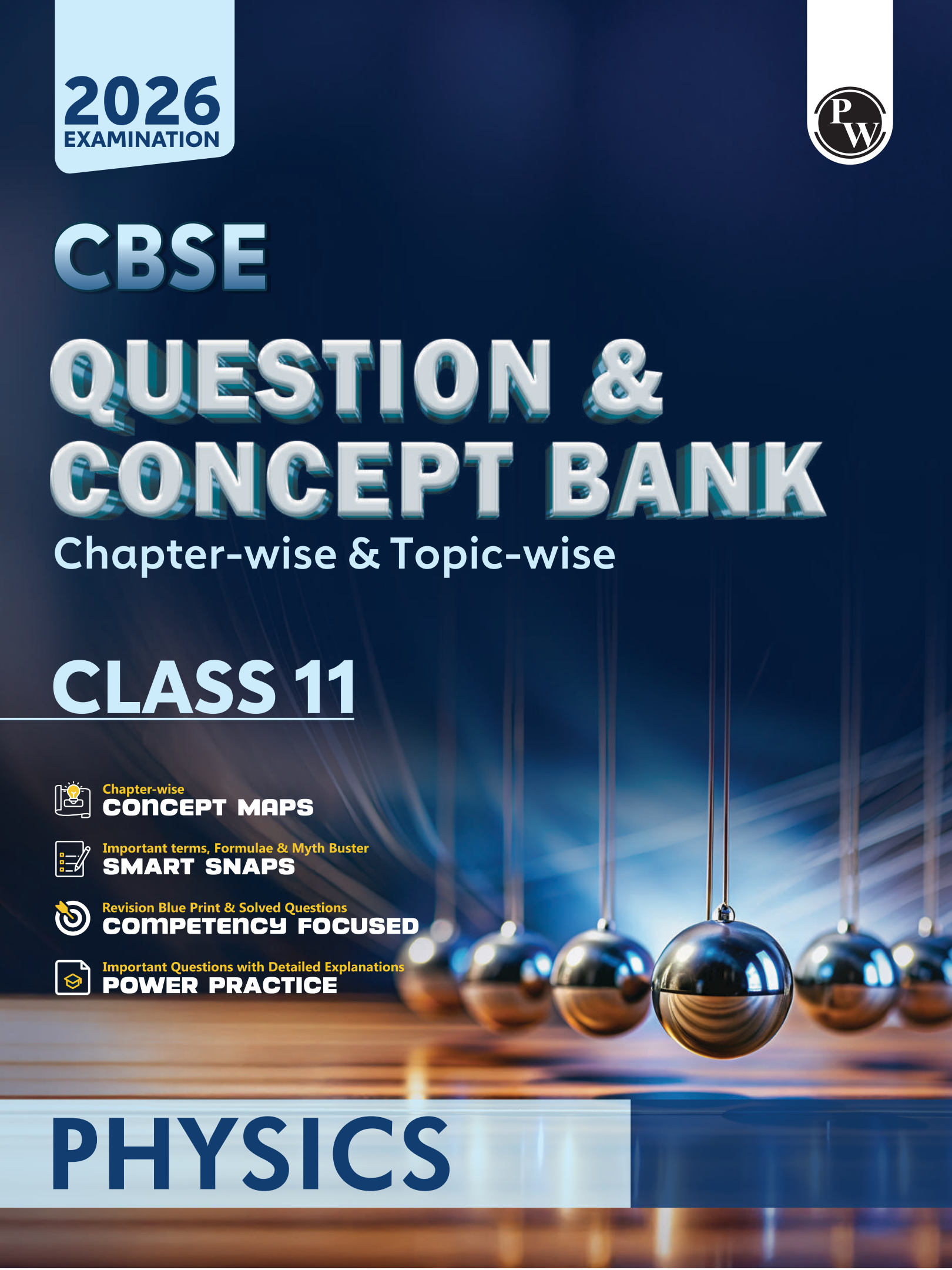
Revision Blue Print & Solved Questions
COMPETENCY FOCUSED

Important Questions with Detailed Explanations
POWER PRACTICE



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