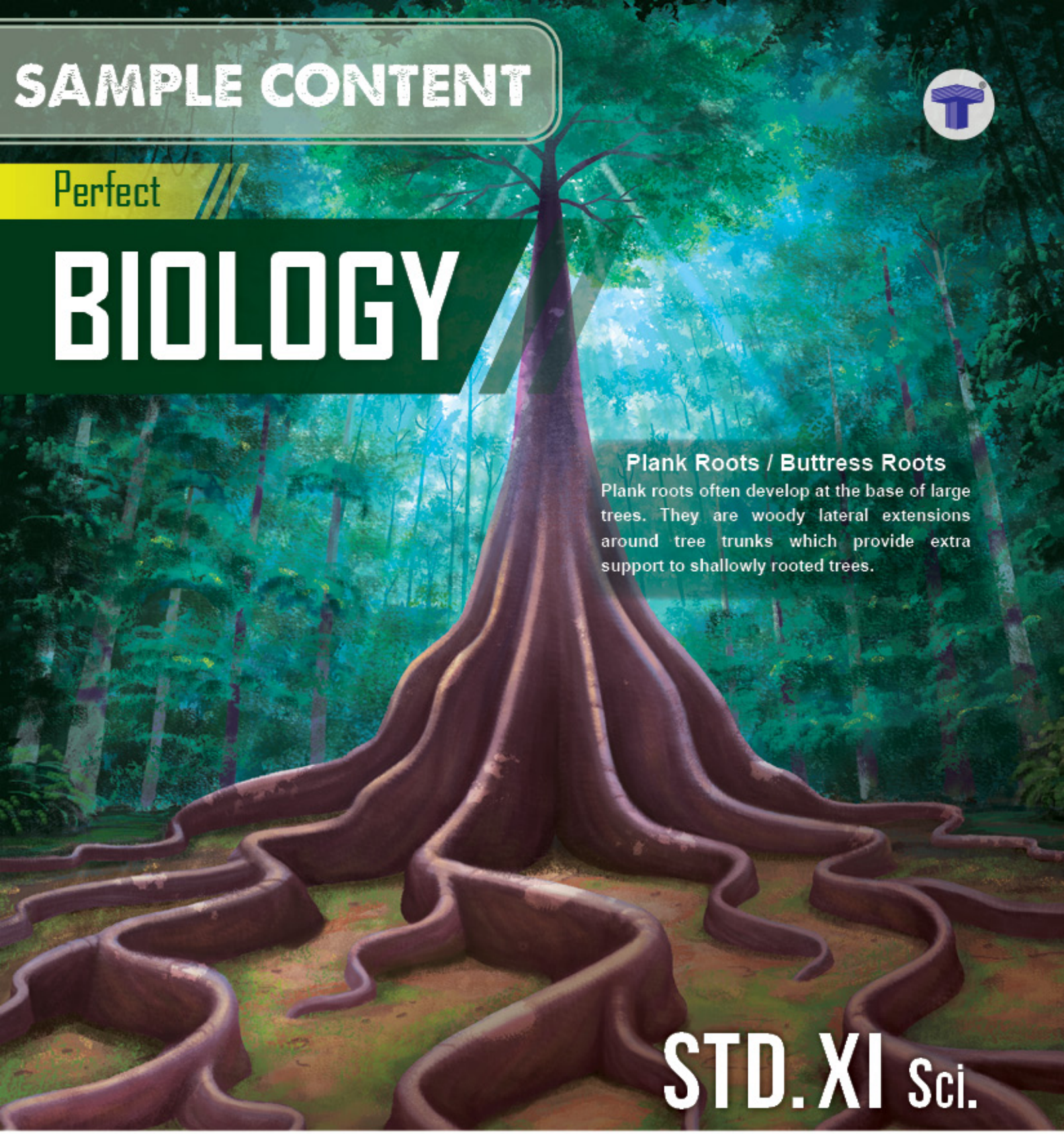
SAMPLE CONTENT

Perfect

BIOLOGY



Plank Roots / Buttress Roots

Plank roots often develop at the base of large trees. They are woody lateral extensions around tree trunks which provide extra support to shallowly rooted trees.

STD. XI Sci.

Target Publications® Pvt. Ltd.

Written as per the latest textbook prescribed by the Maharashtra State Bureau of Textbook Production and Curriculum Research, Pune.

PERFECT BIOLOGY

Std. XI Sci.

Salient Features

- Written as per the new textbook
- Subtopic-wise segregation for powerful concept building
- Complete coverage of Textual Exercise Questions and Intext Questions
- Extensive coverage of New Type of Questions
- 'Apply Your Knowledge' section for application of concepts
- 'Quick Review' at the end of every chapter facilitates quick revision
- 'Competitive Corner' presents questions from prominent Competitive Examinations
- Reading Between the Lines, Enrich Your Knowledge, Gyan Guru, Connections, NCERT Corner are designed to impart holistic education

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PREFACE

"I never teach my pupils; I only attempt to provide the conditions in which they can learn." – Albert Einstein

"Biology: Std. XI" forms a part of **'Target Perfect Notes'** prepared as per the **New Textbook**. It focuses on active learning along with making the process of education more interesting and builds up the students' knowledge quotient in the process.

The **Subtopic-wise** classified format for each chapter of this book helps the students to comprehend concepts easily. Every chapter begins with the coverage of all textual content in the format of Objectives, Question-Answers, Give Reasons, Short Notes, Diagram related questions and a host of other Objective and Subjective type of questions. The questions titled under 'Use your brain power', 'Can you tell', 'Can you recall', and various similar titles pave the way for a robust concept building. For the students to gain a better understanding of the concept behind the answer, 'Reading between the lines' (*not a part of the answer*) has been provided as deemed necessary. We have provided QR codes that provide video access for better conceptual understanding.

While ensuring complete coverage of the syllabus in an effortless and easy to grasp format, emphasis is also given on active learning. To achieve this, we have infused several sections such as, ***Gyan Guru, Enrich Your Knowledge, Connections***, ***Reading between the lines*** and ***NCERT Corner***, and additional sections such as, ***Apply Your Knowledge, Quick Review, Exercise*** and ***Competitive Corner.*** The following screenshots will walk you through the core features of this book and elucidate how they have been carefully designed to maximize the student learning.

GG - Gyan Guru

Humboldt penguin

The Humboldt penguins are native to South America and live mainly in the 'Pinguino de Humboldt National Reserve' in the North of Chile.

Gyan Guru illustrates real life applications or examples related to the concept discussed.
This is our attempt to link learning to life.

Enrich your knowledge presents fascinating information about the concept covered.
This is our attempt to create interest within the students about a concept.

Enrich Your Knowledge

Endosymbiont theory:

Both mitochondria and chloroplast are double walled organelles, they have DNA and ribosomes and can duplicate within the cell on their own! It is considered that primitive eukaryotic cell engulfed an aerobic non-photosynthetic prokaryotic cell.

Connections

In chapter 13, you will learn about how mitochondria act as a powerhouse of cell, in more detail.

Connections enable students to interlink concepts covered in different chapters.
This is our attempt to enable students to comprehend the subject as a whole.

Reading between the lines provides for concept elaboration
This is our attempt to help students to understand the underlying concept behind an answer.

Reading between the lines

Cyclic photophosphorylation:

i. Cyclic photophosphorylation involves pigment system I, i.e. the reaction centre is made by P_{700} chlorophyll.

ii. When light falls on PS-I, it gets excited.

NCERT Corner

External morphology of cockroah

i. Sclerites are joined to each other by a thin and flexible articular membrane known as arthrodial membrane.

NCERT Corner covers additional information from NCERT textbook relevant to the topic.
This is our attempt to bridge the gap between NCERT and State Board textbook, thereby helping students to prepare for National level competitive examinations.

QR codes provide access to videos that boost conceptual understanding.

This is our attempt to facilitate learning with visual aids.

[Note:** Students can scan the adjacent QR code to get conceptual clarity with the aid of a relevant video.**]

Apply Your Knowledge

Q. A person visited a pediatrician with his one-year old child complaining about the child's weight loss and diarrhoea. The doctor examines the child and finds that his limbs have become thin, the skin has become dry as well as thin and wrinkled but there is no oedema on the body.

Apply your knowledge includes challenging questions.
This is our attempt to take students one step further and challenge their conceptual understanding.

Quick review includes tables/ flow chart to summarize the key points in a chapter.
This is our attempt to help students to reinforce key concepts

Quick Review

Plant tissues

- **Meristematic tissue** (Cells have the power of cell division)
- ***Planck*** (Cells have lost the power of cell division)

Exercise

4.2 Animal Body Plan

1. Give the difference between diploblastic and triploblastic animals?

Ans: *Refer Q.6 (ii)*

Exercise includes subtopic-wise additional questions and problems.

This is our attempt to provide additional practice questions that involve conceptual application from the topics across the entire chapter.

Competitive Corner presents questions from prominent competitive exams based entirely on the syllabus covered in the chapter.
This is our way of providing students a competitive edge.

Competitive Corner

1. Placentation in which ovules develop on the inner wall of the ovary or in peripheral part is:
[NEET (UG) 2019]
(A) Parietal (B) Free central
(C) Basal (D) Axile

The journey to create a complete book is strewn with triumphs, failures and near misses. If you think we've nearly missed something or want to applaud us for our triumphs, we'd love to hear from you.
Please write to us on: mail@targetpublications.org

A book affects eternity; one can never tell where its influence stops.

Best of luck to all the aspirants!

From,
Publisher

CONTENTS

Note: 1. * mark represents Textual question.

2. # mark represents Intext question.

3. +mark intext problems

4. 🔔 symbol represents textual questions that need external reference for an answer

1 Living World

Contents and Concepts

1.0 Introduction

Q.1. Can you recall? *(Textbook page no. 01)*
Whether all organism are similar? Justify your answer.

Ans: No, all organisms are not similar.

i. Organisms on the earth exhibit great diversity.

ii. Organisms are grouped as microbes, plants (autotrophs), animals (heterotrophs) and decomposers.

iii. Different microbes and decomposers have various shapes and sizes.

iv. Plants can be further classified on their shape, size, structure, mode of reproduction, etc. Plants also differ greatly based on the locations in which they are found. e.g. Snowy, desert, forest, aquatic, etc.

v. Even animals show a high degree of variation. They are classified as unicellular, multicellular, invertebrates, vertebrates, etc. Also, based on the environment in which they live, they are classified as terrestrial, aerial, aquatic and amphibians.

Q.2. Can you tell? *(Textbook page no. 01)*
Whether all organisms prepare their own food?

Ans: No, all organisms do not prepare their own food. Organisms that prepare their own food are known as autotrophs (e.g. Green plants, certain microbes). These organisms prepare their own food in the presence of sunlight, water and carbon dioxide.

1.1 Basic principles of Life

Q.3. What are the basic principles of life?

Ans: The basic principles of life are as follows:

i. **Metabolism:** Metabolism is breaking of molecules (catabolism) and making of new molecules (anabolism). An organism performs metabolism in order to obtain energy and various chemical molecules essential for survival.

ii. **Growth and development:** Organisms tend to grow and develop in a well-orchestrated process from birth onwards.

iii. **Ageing:** It is the process during which molecules, organs and systems begin to lose their effective working and become old.

iv. **Reproduction:** For continuity of race (species), organisms reproduce (asexually or sexually) to produce young ones like themselves. However, mules and worker bees do not reproduce, yet are living.

v. **Death:** As the body loses its capacity to perform metabolism, an organism dies.

vi. **Response to change in surrounding:** Living organisms respond to thermal, chemical or biological changes in their surroundings.

Q.4. Can you recall? *(Textbook page no. 01)*

i. What is the difference between living and non-living things?

Ans:

	Living Things	Non-living Things
a.	Living things show growth from within.	Non-living things show growth by accumulation of materials on their surface.
b.	They reproduce asexually or sexually, except mules, sterile worker bees, infertile males.	They do not reproduce.
c.	They perform metabolism in order to obtain energy.	No metabolic changes occur in non-living things.
d.	They show irritability and respond to changes in their surroundings.	They do not show irritability.
e.	They undergo ageing and eventually die.	Non-living things do not have a finite life span.

ii. Enlist the characters of living organisms.

Ans: *Refer Q.3.*

#Q.5. Can we call reproduction as inclusive character of life? *(Textbook page no. 01)*

Ans: No, we cannot call reproduction as an inclusive character of life. Certain organisms like mules and worker bees do not reproduce and are still living. Thus, reproduction cannot be considered as an all inclusive defining characteristic of living organisms.

NCERT Corner

Reproduction in lower organisms

i. Apart from the fact that certain living organisms do not reproduce, in unicellular organisms like bacteria, unicellular algae or *Amoeba*, reproduction occurs by cell division, which is synonymous with growth (increase in number of cells).

ii. This is also another reason why reproduction cannot be considered as an all-inclusive defining characteristic of living organisms.

Q.6. Can you tell? *(Textbook page no.01)*

Which feature can be considered as all-inclusive characteristic of life? Why?

Ans: Metabolism can be considered as an all-inclusive (defining) feature of life since it is exhibited by all living organisms and does not take place in non-living things.

Another all-inclusive characteristic of life is response to the surrounding or irritability. This is a unique property of living beings since all living beings are conscious of their surroundings.

Q.7. Think about it. *(Textbook page no. 01)*

i. Can metabolic reactions demonstrated in a test tube (called '*in vitro*' tests) be called living?

Ans: a. The sum total of all the chemical reactions occurring in the body is known as metabolism and no non-living object exhibits metabolism.

b. However, metabolic reactions can be demonstrated outside the body in a test tube (cell-free medium).

c. Thus, isolated metabolic reaction (s) outside the body of an organism, performed in a test tube is neither living nor non-living.

d. Metabolic reactions occurring *in vitro* are living reactions but not living things.

ii. Now a days patients are declared 'brain dead' and are on life support. They do not show any sign of self-consciousness. Are they living or non-living?

Ans: The brain controls all life processes. Hence, when a patient is declared as 'brain dead', he does not carry out any of the inclusive defining characters of living things (e.g. metabolism, consciousness, etc.) and is completely dependent on machines. Since, such patients do not show any sign of self-consciousness, these patients cannot exactly be called as living.

Q.8. What are taxonomical aids? Give examples.

Ans: Taxonomical aids are used to study biodiversity. e.g. Herbaria, botanical gardens, museums, biodiversity parks, etc.

Q.9. Can you tell? *(Textbook page no.01)*
How can we study large number of organisms at a glance?

Ans: Systematic study of organisms with the help of taxonomical aids can be used to study a large number of organisms at a glance.

1.2 Herbarium

Q.10. What is a herbarium?

Ans: Herbarium is a dried plant specimen that is pressed, treated and mounted on a standard size sheet in order to preserve it.
[Note:** Herbarium is a collection of dried, pressed and labelled plant specimens arranged by a classification system.**]

Q.11. Can you tell? *(Textbook page no. 03)*
What are the essentials of a good herbarium?

Ans: The essentials of a good herbarium are as follows:

i. It is essential to identify and label the collected specimen correctly.
ii. Specimens should be stored in a dry place.
iii. The plants are usually pressed and mounted on the sheet of paper known as herbarium sheets. Some plants are not suitable for pressing or mounting, like succulents, seeds, cones, etc. They need to be preserved in suitable liquid like formaldehyde, acetic alcohol, etc.
iv. In order to preserve the specimen for longer durations, acid-free paper, special glues and inks must be used to mount the specimen so that the specimen does not deteriorate.
v. The specimens should be dried well before preparing a herbarium in order to prevent rotting of specimen.
vi. It is also essential to record the date, place of collection along with detailed classification and highlighting with its ecological peculiarities, characters of the plant on a sheet. Local names of plant specimens and name of the collector may be added. This information is given at lower right corner of sheet and is called 'label'.

Q.12. What information is mentioned in the label of a plant specimen preserved in herbarium?

Ans: *Refer Q.11. (vi)*

Q.13. Riya found a peculiar plant on her visit to Himachal Pradesh. What are the ways she can show it to her biology teacher and get information about it?

Ans:

i. Riya can press and mount the plant specimen on a herbarium sheet and preserve the dried plant material, until she returns back from her visit.
ii. She can also write any available information regarding the collected specimen on the herbarium sheet, which can be useful for further studies with her biology teacher.
iii. Various taxonomical aids can be useful to get information about this peculiar plant.

1.3 Botanical Gardens

Q.14. What are botanical gardens?

Ans: Botanical gardens are places where plants of different varieties collected from different parts of the world are grown *in vivo* in a scientific and systematic manner.

Q.15. Why do we have green house in botanical gardens?

Ans:

i. Greenhouse is a structure with suitable walls and a roof in which plants are grown under regulated climatic conditions.
ii. Most botanical gardens exhibit ornamental plants which require stringent/ optimum climatic conditions for their growth and/or flowering.
iii. The greenhouse associated with botanical gardens are also used to grow and propagate those plants that may not survive seasonal changes.

Hence, in order to provide optimum temperature for better growth and flowering and also to protect the plants from certain diseases, there are greenhouses in botanical gardens.

Q.16. Write short note: Importance of botanical garden

Ans: The importance of botanical gardens is as follows:

i. It is a place where there is an assemblage of living plants maintained for botanical teaching and research purpose.

ii. Botanical gardens are important for their records of local flora.

iii. Botanical gardens provide facilities for the collection of living plant materials for botanical studies.

iv. Botanical gardens also supply seeds and material for botanical investigations.

v. The development of botanical gardens in any country is associated with its history of civilization, culture, heritage, science, art, literature and various other social and religious expressions.

vi. Botanical gardens besides possessing an outdoor garden may contain herbaria, research laboratory, greenhouses and library.

vii. Botanical gardens are not only important for botanical studies, but also to develop tourism in the country.

Enrich Your Knowledge

i. The first university botanical garden (Orto Botanico di Pisa) was established (Founded in 1543) by Prof. Luca Ghini (A.D. 1490-1556) at Pisa, Italy. It is the oldest garden of the world which still exists. It houses plants from 5 continents.

ii. The botanical garden at Kew in England is known for its largest collection of more than 30,000 specimens (preserved plants) and more than 7 million herbaria.
[Note:** The herbarium at the Royal Botanic Gardens, Kew, houses approximately seven million plant specimens, collected from all around the world.**]

Q.17. Define biodiversity.

Ans: Biodiversity is the degree of variation of life forms in an ecosystem.

Q.18. Define conservation.

Ans: Conservation involves attempting to slow down, stop or even reverse the loss in the natural habitat of an organism.

#Q.19. Why does the loss of biodiversity matter? *(Textbook page no. 03)*

Ans:

i. The loss of biodiversity is an moral and ethical issue.

ii. Biodiversity helps to maintain stability in an ecosystem.

iii. Humans share the environment with various other organisms and harm to these species can result in loss of biodiversity.

iv. The loss of even one variety of organisms can affect the entire ecosystem.

Hence, due to all these reasons, loss of biodiversity matters.

Q.20. Write a short note on role of human being in biodiversity conservation.

Ans:

i. Due to rapid increase in human population and industrialization, humans have over utilized natural resources; leading to degradation of the environment and hence only humans can help conserve the ecosystem.

ii. Humans are capable of conserving and improving the quality of nature and thus, can play a major role in biodiversity conservation.

iii. In order to conserve biodiversity and its environmental resources, humans must use the resources rationally and avoid excessive degradation of environment.

iv. Human beings are stakeholders of the environment and need to come together to overcome pollution and improve the environment quality in order to conserve biodiversity. E.g. Ban or limit on use of harmful products (plastic, chemicals, etc.) that are toxic to various birds, animals, etc.

v. Human beings also play a role in conservation of biodiversity by establishment of various sites for *in situ* (national parks, wildlife sanctuaries and biosphere reserves) and *ex situ* (botanical gardens, culture collections and zoological parks) conservation.

Q.21. How can you, as an individual, prevent the loss of biodiversity?

Ans: As individuals, we can prevent loss of biodiversity in the following ways:

i. Increasing awareness about environmental issues. Making posters that provide more information about biodiversity conservation, to raise public awareness.
ii. Increased support and/ or active participation in government policies and actions laid down for conservation of biodiversity.
iii. Protect various plant and animal species in our surrounding.
iv. Set up bird and bat houses wherever possible.
v. Prevent felling of trees especially native plants or trees in a particular area.
vi. Reduce, recycle and reuse resources. Especially, reduce pollution and use of plastic bags and other materials that are potential threats for the environment.
vii. Use environment friendly products, segregate and dispose garbage correctly.
viii. Convince people about the importance of trees and the need to participate in tree plantation campaign.
ix. Obey the rules that fall under Biodiversity Act.

[Students can use the given points as reference and mention additional preventive measures on their own.]

Q.22. Find out. *(Textbook page no. 04)*

Human being is at key position in maintaining biodiversity of earth. Find out more information about the following.

i. Laws to protect and conserve biodiversity in India.

Ans: a. Forest (Conservation) Act, 1980 b. Biological Diversity Act, 2002
c. Wildlife (Protection) Act, 1972 d. Environment Protection Act, 1986

ii. Environmental effects of ambitious projects like connecting rivers or connecting cities by constructing roads.

Ans: Connecting rivers or connecting cities by constructing roads have the following environmental effects:

a. They form barriers to animals.
b. Construction of roads requires cutting down of trees and results in large scale deforestation.
c. They occupy large land resources resulting in loss of habitat of various species.
d. It can alter the water flow pattern and damage many ecosystems.
e. Increase in air, water, soil and noise pollution can disturb various animals and birds, thus affecting their behavioural pattern.

iii. Did bauxite mining in Western Ghats affect critically endangered species like – Black panther, different *Ceropegia spp., Eriocaulon spp.*?

Ans: a. The Western Ghats, is one of the global biodiversity hotspots and retains more than 30% of all plant, aquatic, reptile, amphibian and mammal species found in India.
b. Recently, this ecologically sensitive region has been subjected to various developmental activities that have adversely affected the flora and fauna of the region.
c. Bauxite mining is one such activity which has had significant negative impact on the local environment. To access bauxite ore deposits, the above-ground vegetation needs to be completely removed, causing large scale deforestation. The vegetation in the adjoining area is also affected due to dumping.
d. The major threats of this activity include vegetation loss, forest fragmentation and biodiversity loss.
e. Since most mines fall in Eco-Sensitive Zones (ESZ), it has seriously affected the flora and fauna of the Western Ghats.
f. Black panthers have frequently been spotted at various locations in the Western Ghats and mining in these areas can seriously affect their health and numbers.
g. Certain species of *Ceropegia* and *Eriocaulon* that are endemic in the area have been reported to be critically endangered.

[Source:** Chandore A. (2015) Endemic and threatened flowering plants of Western Ghats with special reference to Konkan region of Maharashtra. Journal of Basic Sciences.2 (21-25)**]

Hence it is most likely that bauxite mining in Western Ghats has adversely affected the critically endangered species like – Black panther, different *Ceropegia spp., Eriocaulon spp.*

Q.23. At Andaman, authorities do not allow tourists to collect shells from beaches. Why must it be so?

Ans:

i. Seashells are an important part of the coastal ecosystem and are crucial for the survival of various marine creatures.
ii. They provide material for building nests of birds and also act as a substratum for attachment of algae, sea grass, sponges and various microbes.

iii. Fishes use shells for hiding from predators, whereas hermit crabs use shells as temporary shelters.
iv. Removal of seashells from seashores may also indirectly affect the rate of shoreline erosion.

Hence, in an attempt to protect the ecosystem, authorities in Andaman do not allow tourists to collect shells from beaches.

Q.24. Internet my friend. *(Textbook page no.02)*
Collect information about Prof. Almeida, Prof. V. N. Naik, Dr. A. V. Sathe, Dr. P. G. Patwardhan with reference to their taxonomic work and biodiversity conservation.

Ans:

i. Prof. Almeida:
Prof. (Dr.) Marselin R. Almeida was a renowned Plant Taxonomist and Medicinal Plant Consultant of India. He was a curator at the Blatter Herbarium (Mumbai). He discovered four new species of pteridophytes from Bombay presidency. His work includes - Pteridophytes of Maharashtra and Flora of Mahabaleshwar. He has contributed to the Flora of Maharashtra, Sawantwadi and its adjoining areas along with Dr. S. M. Almeida.

ii. Prof. V. N. Naik:
Prof. V. N. Naik is a renowned 'Angiosperms Taxonomist' of India. He completed the Flora of Marathwada. He has produced 15 Ph.D., 110 research articles and 6 books. His book on 'Taxonomy of Angiosperms' (Tata McGraw-Hill Education, 1984) is widely used throughout the world. He is currently a faculty of Dr. Babasaheb Ambedkar Marathwada University, Aurangabad.
[Source:** http://www.bamu.ac.in/dept-of-botany/Achievements.aspx**]

iii. Dr. A. V. Sathe:
Collection and taxonomic studies of mushrooms in Maharashtra started around 1974. Prof. A.V. Sathe and his team were amongst the first to begin these studies. They recorded 75 species distributed in 43 genera. These species were collected from Maharashtra, Karnataka and Kerala. The collection of these species was documented in the form of a Monograph on Agaricales.
[Source:** Borkar P., Doshi A., Navathe D. (2015) Mushroom diversity of Konkan region of Maharashtra, India. Journal of Threatened Taxa. 7(10): 7625–7640**]

iv. Dr. P. G. Patwardhan:
Dr. Patwardhan and his associates at the M.A.C.S. Research Institute, Pune-renamed as Agharkar Research Institute (ARI), Pune have performed detailed studies on lichens. His school is in possession of over 600 species of crustose lichens, obtained after intensive collection programmes. These specimens have been deposited in the Ajarekar Mycological Herbarium in the Department of Mycology and Plant Pathology at the M.A.C.S. Research Institute, Pune.
[Source:
*http://lib.unipune.ac.in:8080/xmlui/bitstream/handle/123456789/7451/07_introduction.pdf?sequence=7&isAllowed=y**]***
[Students are expected to find more information on their own.]

1.4 Museum

Q.25. What is a museum? What are the various specimens found in a museum?

Ans:

i. **Museums** are places where collections of preserved plant and animal specimens are kept.
ii. The different types of specimens found in a museum include;
   a. Plant and animal specimens preserved in formalin (10% to 40% formaldehyde) in transparent jars.
   b. Larger animals like birds and mammals, usually stuffed and preserved.
   c. Certain specimens in dried forms are also kept in a museum.
   d. Systematic collections of shells, skeletons of animals and insect boxes are also found in museums.

Reading between the lines

Plants like algae, fungi, mosses and ferns are also preserved in museums since they cannot be maintained in botanical gardens.

Q.26. What is taxidermy?

Ans: Taxidermy is a science in which larger animals like birds and mammals are usually stuffed and preserved.

1.5 Zoological Parks

Q.27. Write a note on zoological park.

Ans:

i. **Zoological park (zoo)** is a place where wild animals are kept in captivity.

ii. Wild animals are kept in a protected environment and care is taken to provide conditions similar to their natural habitat.

iii. It is a form of *ex situ* conservation of species i.e. away from their natural habitat.

iv. A naturalist can study the food habits and behaviour of animals in a zoological park.

GG - Gyan Guru

Zoo authorities in India

The Central Zoo Authority of India (CZA) is the governing authority of all zoos in India. It enforces minimum standards and norms for the upkeep and health care of animals in Indian zoos. It also regulates the exchange of animals of endangered category (Wildlife Protection Act) among zoos. Exchange of animals between Indian and foreign zoos is also approved by the Authority.

Q.28. Jijamata Udyan, the famous zoo in Mumbai has acclimatised Humboldt penguins. Why should penguins be acclimatised when kept at a place away from their natural habitat?

Ans:

i. Zoological park (zoo) is a type of *ex-situ* conservation in which wild animals are kept in captivity.

ii. Humboldt penguins are native to South America and the surrounding environment differs significantly at Jijamata Udyan (zoo) in Mumbai.

iii. In order to ensure that these penguins survive longer and are healthy they need to be acclimatised (adjust) to their new environment slowly.

iv. If they are not acclimatised or the facilities in the zoo where the penguins are kept are not optimal/ suitable, they may develop abnormal stress and exhibit unusual behaviours due to it.

v. These penguins may also be more prone to contracting certain diseases, since they are suited to living in a particular climatic condition.

vi. The enclosure of these penguins consists of water pool, air handling units and a chiller system to maintain temperatures between 12 – 14ºC, where the penguins were kept for around 8 to 10 days to get acclimatised to their new environment before allowing any visitors inside the zoo.

Hence, Humboldt penguins need to be acclimatised to their new surroundings, when kept at a place away from their natural habitat.

GG - Gyan Guru

Humboldt penguin

The Humboldt penguin are native to South America and live mainly in the 'Pinguino de Humboldt National Reserve' in the North of Chile. These penguins can reach the speed of 20 to 30 miles per hour, and dive to a depth of 492 feet to find food.

Q.29. Can you tell? *(Textbook page no. 03)*

Why should we visit botanical gardens, museums and zoo?

Ans:

i. Botanical gardens, museums and zoos are taxonomical aids which can be use to study biodiversity.

ii. **Botanical gardens** have a wide range of plant species that are protected and preserved which can be observed and studied.

iii. **Museums** help gain information about various plants and animals that are preserved and may even be extinct. They act as reference hubs for biodiversity studies.

iv. **Zoos** provide information about various animals. They also harbour certain endangered animals and help us understand the role of biodiversity conservation. They can also be visited to study the food habits and behaviour of animals.

Hence, we should visit botanical gardens, museums and zoos.

Q.30. Mention some tools of maintaining biodiversity records.
Ans: Flora, manuals, monographs and catalogues are some tools of maintaining biodiversity records.

Q.31. Explain the different tools used for maintaining biodiversity records.
Ans: The different tools used for maintaining biodiversity records are as follows:
i. **Flora:** It is the plant life occurring in a particular area at a particular time.
ii. **Monograph:** It describes any one selected biological group.
iii. **Manual:** It provides information and keys about identification of species found in a particular area.

1.6 Biodiversity Parks

Q.32. Define biodiversity park.
Ans: **Biodiversity park** is an ecological assemblage of species that form self-sustaining communities on degraded/ barren landscape. e.g. Uttamrao Patil Biodiversity Park, Gureghar, Mahabaleshwar.

Q.33. What do you understand from terms like *in situ* and *ex situ* conservation?
Ans:
i. ***In situ* conservation:** It includes conservation of species in their natural habitats. Grazing, cultivation and collection of products from the forests is banned in such areas. Legally protected areas include national parks, wildlife sanctuaries and biosphere reserves.
ii. ***Ex situ* conservation:** It includes conservation of species outside their natural habitats. Species are conserved in botanical gardens, culture collections and zoological parks.

Q.34. Can you tell? *(Textbook page no. 03)*
What is *'ex-situ'* and *'in-situ'* conservation?
Ans: *Refer Q.33.*

Enrich Your Knowledge

Sacred groves are places where plants are conserved in the name of a holy place. These places are also considered as sacred natural sites by IUCN. Maharashtra has the highest number of documented sacred groves in India.

***Q.35. Distinguish between botanical gardens, zoological parks and biodiversity parks with reference to characteristics.**
Ans:

	Botanical Gardens	Zoological Parks	Biodiversity Parks
i.	Plants of different varieties collected from different parts of the world are grown *in vivo* in a scientific and systematic manner in a botanical garden.	Zoological parks are places where wild animals are kept in captivity.	It is an assemblage of species that form self-sustaining communities on degraded/ barren landscape.
ii.	It is a type of *ex situ* conservation	It is a type of *ex situ* conservation	It is a type of *in situ* conservation
iii.	It is related to conservation of various flora.	It is related to conservation of various fauna.	It is related to conservation of all biodiversity.

Enrich Your Knowledge

i. Dr. S. P. Agharkar is one the leading botanists of India. He was born in November 1884 in Malvan, Maharashtra. He discovered a species of freshwater jellyfish in the Western Ghats, which was previously found only in Africa and published his findings in the journal Nature in 1912.
ii. Dr. Agharkar collected, preserved and conducted microscopic examinations of animals and plants with the help of Dr. Annadale, the Superintendent of the Indian Museum in Kolkata.
iii. Agharkar also studied the flora of Nepal and the Western Ghats and was a scholar on gymnosperms and angiosperms.
iv. Agharkar played an important role in laying the foundations for premier Indian scientific institutions like the Indian National Science Academy, Indian Science Congress the Maharashtra Association for Cultivation of Sciences (MACS) in Pune. MACS has been renamed as ARI (Agharkar Research Institute) after Dr. S. P. Agarhkar.

1.7 Key

Q.36. Write a note on 'key' used as a taxonomical aid.

Ans:

i. Key is a taxonomical aid used in the classification of plants and animals.

ii. Keys are based on contrasting characters. One of the contrasting characters gets accepted and the other gets rejected.

iii. The statement in a key is called a lead.

iv. Normally keys are analytical in nature.

*[**Note:** Students are expected to refer the given QR code for additional information on the topic.]*

Q.37. Name the following.

i. A collection of dried plant specimen that are pressed, treated and mounted on a standard size sheet in order to preserve it.

ii. Places where collections of preserved plant and animal specimens are kept.

iii. Taxonomical aid used for classification of plants and animals which is based on contrasting characters.

Ans:

i. Herbarium ii. Museum iii. Key

Q.38. Fill in the blanks:

i. The extent of complexity and density of _____ can be regarded as a measure of health of an ecosystem.

ii. In a museum, plant and animal specimens are preserved in _____ in transparent jars.

iii. A naturalist can study food habits and behaviour of animals in a _____.

iv. Study of _____ is a must, to understand interrelations between organisms and maintain harmony on planet earth.

v. The statement in a key is called a _____.

Ans:

i. biodiversity ii. formalin iii. zoo/ zoological park

iv. biodiversity v. lead

Q.39. Internet my friend. *(Textbook page no. 04)*

i. Collect information about botanical gardens, zoological parks and biodiversity hotspots in India.

Ans: a. Botanical gardens in India:

No.	Botanical Gardens of India	Location
1.	Acharya Jagadish Chandra Bose Indian Botanic Garden	Kolkata
2.	Lloyd Botanical Garden	Darjeeling
3.	National Botanical Research Institute	Lucknow
4.	Botanical Garden of the Forest Research Institute	Dehradun
5.	The State Botanical Garden	Odisha
6.	Botanical Garden	Saharanpur
7.	Government Botanical Garden	Ootacamund

b. Zoological Parks in India:

No.	Zoological parks	Location	Type of animals
1.	Rajiv Gandhi Zoological Park	Pune [Katraj]	Reptiles, mammals, birds. They have a snake park.
2.	Jijamata Udyan	Mumbai	Endangered species of animals and birds.
3.	Nehru Zoological Park	Hyderabad	3500 species of birds, animals and reptiles.
4.	Indira Gandhi Zoological Park	Vishakhapatanam	Primates, carnivores, small mammals, reptiles and birds.
5.	Padmja Naidu Himalayan Zoological Park	Darjeeling	Endangered animals like snow leopards, red pandas, gorals (mountain goat), Siberian tigers and a variety of endangered bird species.

6.	Allen Forest Zoo	Kanpur	Hyena, Bear, Rhinoceros, Hippopotamus, Langoor, Musk deer, Ostrich, Emu, Crane etc.
7.	Lucknow Zoo	Lucknow	Royal Bengal Tiger, White Tiger, Gibbon, Black Bear, Asiatic Elephant, Great pied, Horn Bill etc.
8.	Alipore Zoological Gardens	Kolkata	Royal Bengal Tiger, African Lion, Hippopotamus, Great Indian One-horned Rhinoceros.
9.	The Madras Crocodile Bank Trust	Chennai	Crocodiles and many species of turtles, snakes and lizards.
10.	Parassinikkadavu Snake Park	Kannur	Spectacled Cobra, King Cobra, Russell's Viper, Krait and Pit Viper.

c. Biodiversity hotspots in India:

No.	Biodiversity Hotspots
1.	The Eastern Himalayas (Arunachal Pradesh, Bhutan, Eastern Nepal)
2.	Indo - Burma (Purvanchal Hills, Arakan Yoma, Eastern Bangladesh)
3.	The Western Ghats and Srilanka

[Students are expected to use the given table as reference and collect more information on their own.]

ii. Collect information of endemic flora and fauna of India.

Ans: a. Endemic flora:

Albizia sikharamensis (Mimosaceae), *Argyreia arakuensis* (Convolvulaceae), *Arundinella setosa* (Poaceae), *Acacia diadenia* (Mimosaceae), *Citrus assamensis* (Rutaceae), *Magnolia bailloni* (Magnoliaceae), etc.

[Source:** http://www.bsienvis.nic.in/Database/E_3942.aspx**]

b. Endemic fauna:

Bare Bellied Hedgehog (*Paraechinus nudiventris*), Andaman Shrew (*Crocidura andamanensis*), Aruanchal Macaque (*Macaca munzala*), Car Nicobar Rat (*Rattus palmarum*), Peter's Tube-nosed Bat (*Harpiola grisea*) etc.

[Source:** http://faunaofindia.nic.in/PDFVolumes/spb/056/index.pdf**]

[Students are expected to use the given sources and find more information on their own.]

Practical / Project

***Q.40. Make a herbarium under the guidance of your teacher.**

[Students are expected to perform the given activity by themselves under the guidance of their teacher.]

Q.41. Find out information about any one sacred grove (Devrai) in Maharashtra.

Ans: Sacred groves in Maharashtra are located in districts like Ahmednagar, Bhandara, Chandrapur, Jalgaon, Kolhapur, Nashik, Pune, Raigad, Ratnagiri, Sangli, Satara, Sindhudurg, Thane, Yavatmal.

[Source:** Data as per C.P.R. Environment Education Centre, Chennai.**]

e.g. Sacred grove of Parinche valley, Pune district of Maharashtra:

The Parinche valley region is comprised of the inaccessible rear part of the Purandhar fort and its surrounding valley region and is situated about 63 km to the southeast of Pune city and 18 km from Saswad town. The total area of the valley region is about 132 sq. km. Parinche is the biggest village and a nodal place in the valley. The majority (12) of the documented groves are located in the Kaldari and Pangare zones. The size of the sacred groves has however reduced due to various human related activities that have taken place in recent years. The biggest sacred grove in the Parinche valley belongs to Buvasaheb of Tonapewadi and spreads over an area of 4.80 hectares. The forest types are unique to the groves. Presence of key species in the sacred groves varies from region to region. Two key tree species, i.e. *Terminalia bellerica* and *Ficus* spp., are present in these sacred groves which have almost disappeared from the surrounding areas. Large buttressed trees are another important feature of well-preserved sacred groves. The presence of these tree species indicates the vegetation of the past and also the type of potential vegetation that can be regenerated in these regions.

[Source:** Waghchaure, C. K., Tetali, P., Gunale, V. R., Antia, N. H., & Birdi, T. J. (2006). Sacred Groves of Parinche Valley of Pune District of Maharashtra, India and their Importance. Anthropology & Medicine, 13(1), 55–76**]

[Students can refer the given answer and search for more information about other sacred groves on their own.]

Apply Your Knowledge

Q.42. Rakesh went for a study tour to the nearest national park. There he found some different plant species. He was not aware about their names and family. He wanted to bring that plants to his college and keep them for longer period of time, so that he can study them thoroughly. What should he do in such a situation?

Ans:

i. Rakesh can press and mount the plant specimen on the herbarium sheet and can preserve the dried plant material.

ii. He can also write any information he knows about the plant on herbarium sheet, which can be used for further studies.

Q.43. While doing his Ph.D. in Plant Taxonomy your friend has come across a plant, which he feels is a new species. How can he confirm the same?

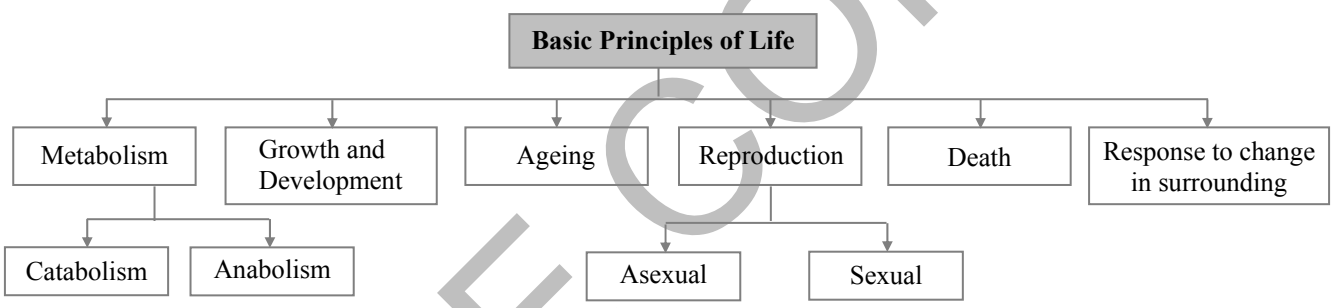
Ans:

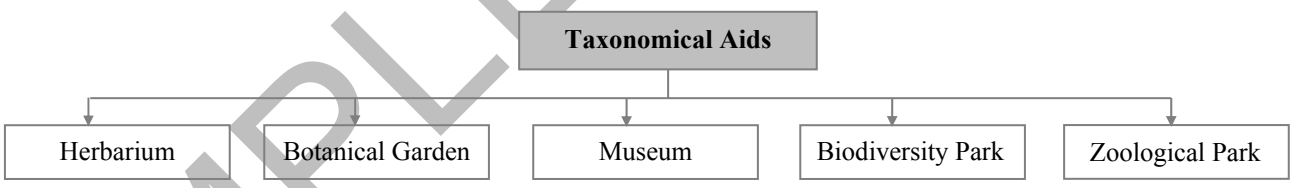
i. The newly discovered plant can be identified with the help of taxonomic keys, monographs, floras, herbaria and preserved plant specimens.

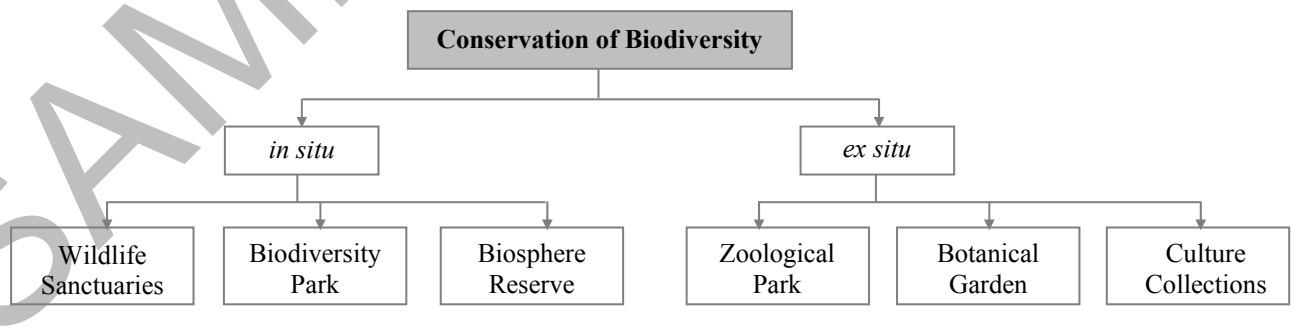
ii. A separate taxonomic key is available for each taxonomic category.

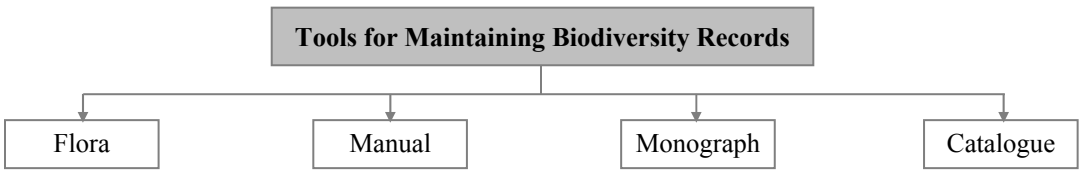
iii. The individual would have to study the morphological and anatomical features of the plant and compare it with the existing information available in the scientific literature.

Quick Review









Exercise

1.1 Basic Principles of Life

1. Define metabolism.
Ans: *Refer Q.3. (i)*

2. Enlist the basic principles of life.
Ans: *Refer Q.3.*

3. Reproduction is not an inclusive character of life. Explain.
Ans: *Refer Q.5.*

4. Define taxonomical aids and give two examples
Ans: *Refer Q.8.*

1.2 Herbarium

5. i. Define herbarium.
ii. Mention any four essentials of a good herbarium.

Ans:
i. *Refer Q.10.*
ii. *Refer Q.11.* *[Any four points]*

6. Shanaya found a unfamiliar plant on her visit to Tamil Nadu. She wants to study the plant thoroughly in her laboratory? How can she do so?
Ans: *Refer Q.13.*

7. Manas wants to prepare a herbarium of plants.
i. What is a herbarium?
ii. What are the essentials he should keep in mind to prepare a good herbarium?
iii. What information should be added on the label of a herbarium?

Ans:
i. *Refer Q.10.* ii. *Refer Q.11.*
iii. *Refer Q.11. (vi)*

1.3 Botanical Garden

8. Can humans help in conservation of biodiversity? Explain your answer.
Ans: *Refer Q.20.*

9. Write a note on botanical gardens.
Ans: *Refer Q.14. and 16.*

10. Botanical gardens are important in botanical studies. Justify.
Ans: *Refer Q.16. (i–vi)*

11. Suggest any three measures you can take to prevent loss of biodiversity.
Ans: *Refer Q.21.*

12.
i. Define biodiversity.
ii. How does loss of biodiversity affect the ecosystem?

Ans:
i. *Refer Q.17.* ii. *Refer Q.19.*

13. Define botanical garden and write a note on importance of greenhouses in botanical gardens.
Ans: *Refer Q.14 and 15.*

1.4 Museum

14. Which science is used to preserve larger animals at museums?
Ans: *Refer Q.26.*

15. What is a museum?
Ans: *Refer Q.25. (i)*

16. What chemical is used to preserve plant and animal specimens in transparent jars at museums?
Ans: *Refer Q.25. (ii-a)*

1.5 Zoological Park

17. Define the following terms:
i. Flora ii. Monograph
iii. Manual
Ans: *Refer Q.31.*

1.6 Biodiversity Parks

18. Define the following terms:
i. Botanical garden
ii. Zoological parks
iii. Biodiversity parks
iv. Museum
v. Herbarium

Ans:
i. *Refer Q.14.* ii. *Refer Q.27. (i)*
iii. *Refer Q.32.* iv. *Refer Q.25. (i)*
v. *Refer Q.10.*

1.7 Key

19. On what characters is the taxonomical aid 'key' based on?
Ans: *Refer Q.36.*

Multiple Choice Questions

*1. Which is NOT a property of living beings?
(A) Metabolism (B) Decay
(C) Growth (D) Reproduction

2. Which one of the following aspects is an inclusive characteristic of living things?
(A) Isolated metabolic reactions occurring *in vitro*
(B) Reproduction
(C) Irritability
(D) Increase in mass by accumulation of material on surface

3. Which of the following property is shown by both living and non-living things?
(A) Growth (B) Consciousness
(C) Ageing (D) Metabolism

*4. A group of students found two cockroaches in the classroom. They had a debate whether they are alive or dead. Which life property will help them to do so?
(A) Metabolism (B) Growth
(C) Irritability (D) Reproduction

*5. A particular plant is strictly seasonal plant. Which one of the following is best suited if it is to be studied in the laboratory?
(A) Herbarium
(B) Museum
(C) Botanical garden
(D) Flower exhibition

6. Herbarium is
(A) a collection of living plants which are medicinally important
(B) a place where plants collected from different parts of the world are grown
(C) a garden where herbs are cultivated
(D) a collection of dried and preserved plants

7. A zoological park does not
(A) have wild animals in captivity under human care.
(B) provide conditions similar to their natural habitat of animals.
(C) have a systematic collection of shells and skeletons of animals
(D) enable naturalists to study the food habits and behaviour of wild animals.

8. A naturalist can study food habits and behaviour of animals in a
(A) museum (B) zoological park
(C) botanical garden (D) herbarium

9. Which of the following is NOT a tool of maintaining biodiversity records?
(A) Flora (B) Monograph
(C) Fauna (D) Manual

10. Which of the following tools provides information for identification of names of species found in a particular area?
(A) Catalogues (B) Manuals
(C) Flora (D) Monographs

11. Keys are taxonomical aids that
(A) are used to identify plants and animals based on similarities and dissimilarities.
(B) contains the account of habitat and distribution of plants in a given area.
(C) provides an index to the plant species found in a particular area.
(D) provide information for identification of species found in an area.

Answers to Multiple Choice Questions

1.	(B)	2.	(C)	3.	(A)	4.	(C)
5.	(A)	6.	(D)	7.	(C)	8.	(B)
9.	(C)	10.	(B)	11.	(A)		

Competitive Corner

1. Match the items given in Column I with those in Column II and select the correct option given below: **[NEET (UG) 2018]**

	Column I		Column II
i.	Herbarium	a.	It is a place having a collection of preserved plants and animals
ii.	Key	b.	A list that enumerates methodically all the species found in an area with brief description aiding identification
iii.	Museum	c.	It is a place where dried and pressed plant specimens mounted on sheets are kept
iv.	Catalogue	d.	A booklet containing a list of characters and their alternates which are helpful in identification of various taxa.

(A) i-b, ii-d, iii-c, iv-a
(B) i-c, ii-b, iii-a, iv-d
(C) i-a, ii-d, iii-c, iv-b
(D) i-c, ii-d, iii-a, iv-b

2. The label of a herbarium sheet does not carry information on **[NEET P-II 2016]**
(A) height of the plant
(B) date of collection
(C) name of collector
(D) local names

3. Which one of the following is NOT a correct statement? **[NEET 2013]**
(A) Herbarium houses dried, pressed and preserved plant specimens.
(B) Botanical gardens have collection of living plants for reference.
(C) A museum has collection of photographs of plants and animals.
(D) Key is a taxonomic aid for identification of specimens.

Std. XI

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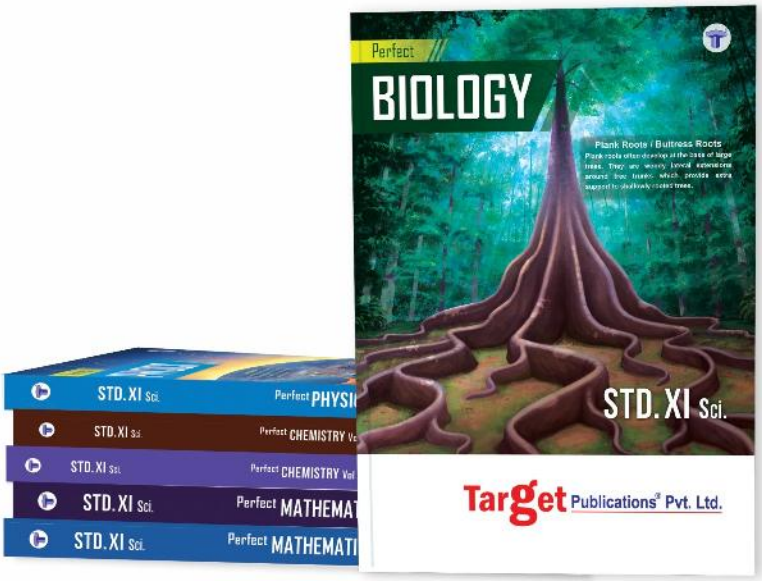

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