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The Living World

Multiple Choice Questions (MCQs)

Q. 1 As we go from species to kingdom in a taxonomic hierarchy, the number of common characteristics

- (a) will decrease
- (b) will increase
- (c) remain same
- (d) may increase or decrease

Ans. (a) Lower the taxa, more are the characteristic that the members within the taxon share. So, lowest taxon share the maximum number of morphological similarities, while its similarities decrease as we move towards the higher hierarchy, *i.e.*, class, kingdom. Thus, rest of the option are incorrect.

Q. 2 Which of the following 'suffixes' used for units of classification in plants indicates a taxonomic category of 'family'?

- (a) – Ales
- (b) – Onae
- (c) – Aceae
- (d) – Ae

🔍 Thinking Process

Biological classification of organism is a process by which any living organism is classified into convenient categories based on some common observable characters. The categories are known as taxons.

Ans. (c) The name of a family, a taxon, in plants always end with suffixes aceae, *e.g.*, Solanaceae, Cannaceae and Poaceae.

Ales suffix is used for taxon '**order**' while **ae** suffix is used for taxon '**class**' and **onae** suffixes are not used at all in any of the taxons.

Q. 3 The term 'systematics' refers to

- (a) identification and study of organ systems
- (b) identification and preservation of plants and animals
- (c) diversity of kinds of organisms and their relationship
- (d) study of habitats of organisms and their classification

🔍 Thinking Process

The planet earth is full of variety of different forms of life. The number of species that are named and described are between 1.7-1.8 million. As we explore new areas, new organisms are continuously being identified, named and described on scientific basis of systematics laid down by taxonomists.

Ans. (c) The word systematics is derived from Latin word 'Systema' which means systematic arrangement of organisms. Linnaeus used 'Systema Naturae' as a title of his publication. It deals with the diversity of organisms and their relationship at every level of classification.

Q. 4 Genus represents

- (a) an individual plant or animal
- (b) a collection of plants or animals
- (c) group of closely related species of plants or animals
- (d) None of the above

Ans. (c) **Genus** comprises a group of closely related species which has more characters in common in comparison to species of other genera. The other options do not define genus.

Q. 5 The taxonomic unit 'Phylum' in the classification of animals is equivalent to which hierarchical level in classification of plants.

- (a) Class
- (b) Order
- (c) Division
- (d) Family

Ans. (c) **Division** includes classes with few similar characters of group of organism. It is equivalent to 'Phylum' in case of animals.

Q. 6 Botanical gardens and Zoological parks have

- (a) collection of endemic living species only
- (b) collection of exotic living species only
- (c) collection of endemic and exotic living species
- (d) collection of only local plants and animals

Ans. (c) **Botanical gardens** and **Zoological parks** are used to restore depleted population, reintroduce species, i.e., wild and restore degraded habitats of both exotic and endemic living species. Rest of the options are incorrect.

Q. 7 Taxonomic key is one of the taxonomic tools in the identification and classification of plants and animals. It is used in the preparation of

- (a) monographs
- (b) flora
- (c) Both (a) and (b)
- (d) None of these

💡 Thinking Process

Correct identification of any living organism is important in biological classification and nomenclature. It requires some reference of already named and classified organism to check the similarity and dissimilarity of newly discovered organism.

Ans. (c) **Taxonomic keys** are tools that help in identification of organism based on the characters, which includes both monograph and flora.

Q. 8 All living organisms are linked to one another because

- (a) they have common genetic material of the same type
- (b) they share common genetic material but to varying degrees
- (c) all have common cellular organisation
- (d) All of the above

Ans. (b) All living organisms share common genetic material, *i.e.*, DNA but with variations, *e.g.*, bacteria have single stranded circular DNA while in highly evolved eukaryotic cells of plants and animals DNA is a long double stranded helix.

Q. 9 Which of the following is a defining characteristic of living organisms?

- (a) Growth (b) Ability to make sound
(c) Reproduction (d) Response to external stimuli

Ans. (d) **Response to external stimuli** or to the environment in which an organism lives, is the most important characteristic of any living organism, besides growth and reproduction.

Growth and ability to make sound are some properties that can also be observed in non-living things. While virus (which is not included under living organisms) also show growth and reproduction.

Hence, these options are not true.

Q. 10 Match the following and choose the correct option.

Column I		Column II	
A.	Family	1.	<i>Tuberosum</i>
B.	Kingdom	2.	Polymoniales
C.	Order	3.	<i>Solanum</i>
D.	Species	4.	Plantae
E.	Genus	5.	Solanaceae

Codes

- | | | | | | | | | | | | |
|-----|---|---|---|---|---|-----|---|---|---|---|---|
| | A | B | C | D | E | | A | B | C | D | E |
| (a) | 4 | 3 | 5 | 2 | 1 | (b) | 5 | 4 | 2 | 1 | 3 |
| (c) | 4 | 5 | 2 | 1 | 3 | (d) | 5 | 3 | 2 | 1 | 4 |

Ans. (b) The all options show the classification of the plant-potato-*Solanum tuberosum*.

The correct options matching with the columns represent the taxonomic classification of plant potato are

- Family – Solanaceae
Kingdom – Plantae
Order – Polymoniales
Genus – *Solanum*
Species – *tuberosum*

Very Short Answer Type Questions

Q. 1 Linnaeus is considered as Father of Taxonomy. Name two other botanists known for their contribution to the field of plant taxonomy.

Ans. Carolus Linnaeus (1707-1778), a Swedish botanist is regarded as Father of Plant Taxonomy. He published his work in book *Genera Plantarum* in (1737). Other two botanist are **G Bentham** and **Joseph Dalton Hooker**. Both are famous for their work on classification of plants based on natural characteristics.

Q. 2 What does ICZN stand for?

Ans. ICZN stand for **International Code of Zoological Nomenclature**. It ensures that scientific name assigned to any animal has only one name and will be recognised by that name all over the world by scientific community.

Q. 3 Couplet in taxonomic key means

💡 Thinking Process

The renowned taxonomist have already named and classified a good number of known biological objects. Their character and phylogeny has already been documented and is available for further reference to help in the identification of newly discovered biological objects.

Ans. Couplet is a pair of contrasting characters used as tool for identification key to help in identification of newly discovered organism.

Q. 4 What is a monograph?

Ans. Monograph is a specialist work of writing or information on a particular taxon, *i.e.*, family or genus or on aspect of subject, usually by a single author. Main purpose of monograph is to present primary research and original work and thus is non-serial publication, complete in one book (volume) of a finite number of volumes.

Q. 5 *Amoeba* multiplies by mitotic cell division. Is this phenomena growth or reproduction? Explain.

Ans. *Amoeba* multiplies by simple mitotic cell divisions giving rise to two daughter *Amoebae*. Here, the growth is synchronous with reproduction, *i.e.*, increase in number.

Q. 6 Define metabolism.

Ans. **Metabolism** is total sum of all biological reactions occurring in any living cell, which are absolutely controlled by enzymes. These reactions are of two types breaking down reactions (catabolism, *e.g.*, cell respiration) and synthesising reactions (anabolism, *e.g.*, photosynthesis).

Q. 7 Which is the largest botanical garden in the world? Name a few well known Botanical gardens in India.

💡 Thinking Process

A botanical garden is dedicated to collection, cultivation and display of wide range of plants labelled with their botanical names. Try to find out International and National Botanical Gardens.

Ans. The largest botanical garden in the world is Royal Botanical Garden (RBG, Kew, London)
The famous well known botanical gardens in India are

- (i) Indian Botanical Garden, Sibpur, Kolkata.
- (ii) Lloyd Botanical Garden, Darjeeling.
- (iii) Botanical Garden of FRI, Dehradun (UK).
- (iv) National Botanical Garden (NBG) Lucknow, UP.

Short Answer Type Questions

Q. 1 A ball of snow when rolled over snow increases in mass, volume and size. Is this comparable to growth as seen in living organisms? Why?

💡 Thinking Process

Think about living and non-living objects around you. Try out to make differences between them. Living organisms grow, have metabolism and respond to external stimuli and also reproduce. These characteristics are not shown by non-living objects.

Ans. Growth in biological terms is characteristic feature of all living organisms. It relates to increase in size by accumulation of protoplasm in the cell thus results in increase in size of the cell. Whereas increase in number of cell by cell division results in the size of individual organism.

Snow is an inanimate (non-living) object, while rolling over snow, it gathers more snow on its surface thus, it increases in size by physical phenomenon but not by biological phenomenon. So, this growth cannot be compared to that seen in living organisms.

Q. 2 In a given habitat we have 20 plant species and 20 animal species. Should we call this as 'diversity or biodiversity'? Justify your answer.

Ans. In a given habitat, there are existing 20 plant species and 20 animal species. They will of course exhibit the biodiversity of that given habitat because **diversity** refers to variation in a broad term and can be applied to any area. Whereas **biodiversity** is a degree of variation of life forms within a specified area.

Q. 3 International Code of Botanical Nomenclature (ICBN) has provided a code for classification of plants. Give hierarchy of units of classification, botanists follow while classifying plants and mention different 'suffixes' used for the units.

💡 Thinking Process

There are 1.7-1.8 million known living organisms in the world, out of which there are 422,000 known species of plants.

ICBN provides the scientifically agreed principles and criteria for identification, classification and scientific nomenclature, discuss taxonomic hierarchy while classifying any plant.

Ans. ICBN has specified certain rules and principles in order to facilitate the study of plants by botanists. It helps in correct positioning of any newly discovered organism through proper identification and nomenclature.

Given below is the taxonomic hierarchy, which is used while classifying any plant

Kingdom–Plantae

Division–phyta

Class–ae

Order–ales

Family–eae/ceae

Genus–First name of organism usually carrying Latin word and written in italics.

Species–Second word of scientific name, also written in italics.

Q. 4 A plant species shows several morphological variations in response to altitudinal gradient. When grown under similar conditions of growth, the morphological variations disappear and all the variants have common morphology. What are these variants called?

Ans. These variants are called **biotypes**. It is a group of genetically similar plants showing similarity when grown in same environmental and geographical regions. The same environment provide them the similar abiotic factors like soil, pH, temperature, etc.

When they are grown in two different geographical regions, they are exposed to different abiotic characters thus, it affects their growth and development bringing changes in their external morphological features but, they have the same genetic constitution.

Q. 5 How do you prepare your own herbarium sheets? What are the different tools you carry with you while collecting plants for the preparation of a herbarium? What information should a preserved plant material on the herbarium sheet provide for taxonomical studies?

💡 Thinking Process

Herbarium is a collection of preserved plant specimen, which are often used as reference material in describing plant taxa.

Ans. For preservation of plant material on a herbarium sheet the following tools and steps are required to be followed.

Tools Digger and pruning knife, sickle with long handle, vasculum, polythene bags, magazines or newspapers, blotting papers, plant press, field notebook, herbarium sheets, glue, labels, small transparent polythene bags.

One can prepare herbarium sheets by cutting papers of size 29×41.5 cm ($11\frac{1}{2} \times 16\frac{1}{2}$)".

The preparation of a herbarium specimen required following steps

- (i) **Collection** of plant or plant parts.
- (ii) **Pressing** It involves the spreading and pressing of collected specimen over a newspaper so as to preserve its all parts.
- (iii) **Drying** It involves the drying of the specimen between the folds of newspaper.
- (iv) **Poisoning** Antifungal (dipping in 2% HgCl_2) and pesticidal (DDT) treatment of the dried specimen.
- (v) **Mounting** It involves mounting of the specimen over a herbarium sheet.
- (vi) **Labelling** and identification of the dried specimen are the last steps, while preparing a herbarium sheet.

Tools/equipments required for the collection of herbarium specimens are as follows

- (i) A tin or aluminium container of $50 \times 30 \times 15$ cm size.
- (ii) Collection bags/plastic/polythene bags.
- (iii) Digger for digging roots.
- (iv) Magnifying lens of at least 10X magnification.
- (v) Field note book.

A preserved plant material on the herbarium sheet may provide information about the family, genus, species, date of collection, area of collection, etc., for taxonomic studies.

Q. 6 What is the difference between flora, fauna and vegetation? *Eichhornia crassipes* is called as an exotic species, while *Rauwolfia serpentina* is an endemic species in India. What do these terms exotic and endemic refer to?

Ans. The difference between flora, fauna and vegetation are as below

Flora	Fauna	Vegetation
Flora is a plant life occurring in a particular region or time, generally the naturally occurring indigenous native plant life.	Fauna is total number of animals found in a particular region at particular time.	It refers to the plant forms of region. It is broad and general term used for a plant forms, which does not include particular taxa or any botanical characteristics.

The terms exotic and endemic refers to

Exotic Species	Endemic Species
Any species of a plant living in any other place except its native place is said to be exotic species . e.g., <i>Eichhornia crassipes</i> is native of Amazonian basin but it was introduced in India, so it is a exotic species in India.	Endemic species are restricted to a particular area, e.g., <i>Rauwolfia serpentina</i> is found only in India, so it is an endemic species found only in India.

Q. 7 A plant may have different names in different regions or the country of world. How do botanists solve this problem?

💡 Thinking Process

Single plant may be known by many common names in a region or even universally or single name may be given to many plants. Think the importance of scientific method of identification, nomenclature and classification of plants.

Ans. 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. Botanists have solved this problem by setting International Code for Botanical Nomenclature (ICBN).

Scientific naming ensures that each organism has only one name in any part of the world. ICBN ensures that such name has not been used for any other organism.

Each name has two components the generic name and the specific epithet. This system of naming is called binomial nomenclature given by **Carolus Linnaeus**. e.g., mango has the scientific name *Mangifera indica* and potato is known as *Solanum tuberosum*.

Q. 8 Brinjal and potato belong to the same genus *Solanum*, but to two different species. What defines them as separate species?

💡 Thinking Process

Genus (plural genera) is a taxonomic rank used in binomial nomenclature. It comprises of a group of related species sharing few common characters. Discuss common characters of *Solanum* exhibited by brinjal and potato.

Ans. *Solanum* is the largest genus of flowering plants which includes few economically important plants, e.g., potato, tomato, tobacco and brinjal. All these plants show some common morphological structures related to vegetative and reproductive similarities. So, they have the same common name of genus *Solanum*.

Q. 9 Properties of cell organelles are not always found in the molecular constituents of cell organelles. Justify.

Ans. Cell, the basic structural and functional unit is composed of many cell organelles, i.e., ER, Golgi apparatus, ribosomes, mitochondria, chloroplasts etc., each with a specific function. Each of these organelles are made up of various molecules such as proteins, lipids, enzymes, metallic ions like Mg^{2+} , Ca^{2+} , Mn^{2+} , Na^+ etc, which helps in the functioning of cell organelles.

e.g., molecular constituents like proteins (60-70%), lipids (25-30%), RNA (5-7%) DNA, Mn^{2+} ETS, ATP synthase, etc. found in mitochondria function together in a coordinated way to carry out cellular respiration and release energy, thus making it power house of cell.

Thus, the molecular constituents of a cell organelle, forms the basis of its functioning irrespective of its individual molecular properties.

Q. 10 The number and kinds of organism is not constant. How do you explain this statement?

💡 Thinking Process

Change is law of nature. Nothing is constant or forever in the world. There are approximately 5-7 million living organism of which nearly 1.2-1.5 million have been scientifically described. Imply the role of sexual reproduction and evolution in evolving a new species. Simultaneously factors like environmental threats, loss of habitat etc., are continuously depleting the different life forms.

Ans. The number and kind of organism is not constant, because of the following reasons
Mechanisms adding new organisms by

- (i) Sexual reproduction
- (ii) Mutation
- (iii) Evolution

Mechanisms reducing the number of organisms are

- (i) Environmental threats
- (ii) Loss of habitat
- (iii) Anthropogenic activities

Long Answer Type Questions

Q. 1 What is meant by living? Give any four defining features of life forms.

Ans. The living organism exhibit distinctive characteristics, which are as follows

- (i) **Growth** All living organisms grow in size as well as in number. Plants show growth all through their life whereas animals up to a certain growth period after which growth ceases.
- (ii) **Reproduction** The process of reproduction is essential for the continuity of life on earth. Every organism whether unicellular or multicellular gives rise to an individual of its own kind. Lower organisms usually reproduce asexually, e.g., *Hydra*, fungi, yeast, etc.
Sexual reproduction is found in advanced group of organisms, which involves two parents. In *Amoeba* growth and reproduction however is synonymous.
- (iii) **Metabolism** There are thousands of enzymatically controlled reactions occurring in all living cells. These are synthesising (anabolic) and breaking down (catabolic) reactions. Hence, it is the most important characteristic of living organisms.

- (iv) **Response to stimuli** Consciousness and response to stimulus is the defining property of all living organisms. Plants respond to light, water temperature. Unicellular organisms also sense their environment and respond accordingly.
- (v) **Cellular organisation** The cellular organisation of the body is the defining feature of life forms. Cells work together in hierarchical manner group of cells make tissues, tissues make organs, organs make systems, systems when work in co-ordination form an individual.
So, we can say living organisms are self replicating, evolving and capable of responding to external stimuli.

Q. 2 A scientist has come across a plant, which he feels is a new species. How will he go about its identification, classification and nomenclature?

Ans. Newly discovered plant can be identified with the help of taxonomic keys, herbaria, monographs and preserved plant specimen.

The scientist has to study the morphological and anatomical characters of the plants/plant parts, compare the characteristic features with the similar information available in the scientific literature and after that he can decide the exact systematic position of the plant, name it according to the rules of binomial nomenclature and fix its systemic position.

Q. 3 *Brassica campestris* Linn

- (a) Give the common name of the plant.
- (b) What do the first two parts of the name denote?
- (c) Why are they written in italics?
- (d) What is the meaning of Linn written at the end of the name?

Ans. *Brassica campestris* Linn

- (a) Common name of the plant is mustard.
- (b) The first part of the name denotes the generic name and the second part is the species name of the plant.
- (c) According to ICBN, all scientific names are comprised of one generic name followed by a species name, which have to be written in italics always. It is a rule of binomial nomenclature.
- (d) Linn means Linnaeus was the first to discover the plant. He identified, named and classified the plant, so credit is given to him by adding suffix 'Linn', after the scientific name *B. campestris* Linn.

Q. 4 What are taxonomical aids? Give the importance of herbaria and museums. How are Botanical gardens and Zoological parks useful in conserving biodiversity?

Ans. The taxonomic aids are the aids which help in identification, classification and naming of a newly discovered organisms (plant or animal).

It could be in the form of preserved document like **herbaria** or **specimen** kept at museums or scientific institutions. Other aids can be in the form of written document like **monograph**, **taxonomic keys**, **couplets**, etc.

A new organism found can be studied while comparing it with living plants and animals living in protected areas like Botanical gardens, Zoological parks, etc.

Botanical gardens helps in conservation of plants by

- (i) Growing important local plant species and keeping record of them.
- (ii) Growing and maintaining rare and endangered species.
- (iii) Supplying seeds for different aspects of botanical research.

Whereas zoological parks also contribute in conserving biodiversity by

- (i) Providing natural environment and open space to animals, *i.e.*, wild life species.
- (ii) Keeping them safe from their predators ensuring protection, food and shelter.
- (iii) Providing home to different native and exotic wild animals.
- (iv) Involving in the rescue of endangered species.
- (v) Facilitating breeding of animals and releasing them free.

Thus, both botanical gardens and zoological parks play an important role in conservation of biodiversity.

Q. 5 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 numbers of shared characters as we go up the taxonomical hierarchy?

Ans. Taxon is a scientific term used for different categories of classification.

Taxonomic hierarchy is position of different taxonomic categories in ascending order, which describes the complete systematic position of any living organism.

Given below is the flow diagram of taxonomic hierarchy

Taxon	Plant	Animal
<p>Kingdom</p> <p>↑ This is the highest category of classification, which includes all organisms that share a set of distinguishing common characters.</p>	Kingdom-Plantae	<i>e.g.</i> , kingdom-Animalia.
<p>Phylum/Division</p> <p>↑ It includes different classes having a few common characters.</p>	Division is used in plants.	Phylum is used in animals <i>e.g.</i> , Chordata includes classes like Pisces, Amphibia, Reptilia, Aves and Mammalia.
<p>Class</p> <p>↑ Represents organisms of related orders.</p>	Found only in flowering plants, <i>i.e.</i> , Monocotyledoneae and dicotyledoneae.	Comprises of related orders <i>i.e.</i> , class-Mammalia
<p>Order</p> <p>↑ It is an assemblage of families resembling one another in few characters. These characters are less similar as compared to characters of many genera placed in a family.</p>	<i>e.g.</i> , dicotyledoneae consists of order rosales polemoniales, sapindales, ranales etc. on the basis of floral characters.	<i>e.g.</i> , class-Mammalia includes order chiroptera, marsupialia, rodentia, cetacea, carnivora.
<p>Family</p> <p>↑ It includes one or more genera differentiated from others related families by certain characteristic differences (both vegetative and reproductive).</p>	<i>e.g.</i> , Order Polemoniales comprises families like Solanaceae and Convolvulaceae	<i>e.g.</i> , order carnivore include families like Felidae (cats), canidae (dogs, foxes), ursidae (bears) etc.

Taxon	Plant	Animal
<p>Genus</p> <p>↑ It is the first higher category above the species level. It is a group of species, which are related and have fewer characters in common as compared to species.</p>	<p>e.g., Family–Solanaceae comprises of genus <i>Solanum</i>.</p>	<p>e.g., Huidae comprises of genus <i>Panthera</i> (lion, tiger) and <i>Felis</i> (cats)</p>
<p>Species</p> <p>↑ It is a group of individuals with similar morphological characters, which are able to interbreed and produce individuals of their own kind.</p>	<p>e.g., <i>Solanum nigrum</i> (brinjal) and <i>Solanum tuberosum</i>. Here <i>nigrum</i> and <i>tuberosum</i> are two species of <i>Solanum</i> genus.</p>	<p>e.g., The genus <i>Panthera</i> includes species <i>leo</i> (lion) and <i>Panthera tigris</i> (tiger).</p>

As we move up in the taxonomic hierarchy the number of shared characters become less.

Q. 6 A student of taxonomy was puzzled when told by his professor to look for a key to identify a plant. He went to his friend to clarify what 'key' the professor was referring to? What would the friend explain to him?

Ans. Identification of a plant is a scientific process. One has to study the general morphological characters along with its habitat, place of collection, time of flowering, etc., for identification. Several reference materials are available in the form of taxonomic keys. Professor meant to refer to these keys to help the student to identify the plant.

This concept of key was introduced by Ray. Separate taxonomic keys are required for each taxonomic category. Keys are analytical in nature and are used as reference to help in identification of a newly discovered plant.

Q. 7 Metabolism is a defining feature of all living organisms without exception. Isolated metabolic reactions *in vitro* are not living things but surely living reactions. Comment.

Ans. Metabolism is the sum of all synthesizing (anabolic) and breaking down (catabolic) reactions. These are highly specific and enzymatically controlled reactions, which take place inside all the individual cells of unicellular or multicellular organisms.

These are in fact the basis of life. These reactions help organism to grow, reproduce, maintain their steady state and respond to stimuli. It can be understood by taking example of digestion.

All organisms need nutrition in the form of food, which is digested by metabolic reactions either intracellularly or extracellularly depending upon the type of organisms. So, all reactions which help the organisms to breakdown food molecules and then assimilate them for their growth and reproduction are metabolic reactions.

Few reactions may be performed outside the cells, under controlled conditions, Chemical reactions usually involve specific set of conditions to take place. All biological reactions are highly specific, selective and are enzyme catalysed.

Q. 8 Do you consider a person in coma-living or dead?

Ans. **Consciousness** is a defining property of all living organisms. Whereas coma is profound or deep state of unconsciousness lasting more than six hours, in which person can not be awakened, fails to respond normally to painful stimuli, light or sound.

Such person exhibit complete absence of wakefulness and unable to consciously feel, speak, hear or move. Such person is brain dead and we consider such person as living dead.

Q. 9 What is the similarity and dissimilarity between 'whole moong daal' and 'broken moong daal' in terms of respiration and growth? Based on these parameters classify them into living or non-living?

💡 Thinking Process

Daal as a whole grain is a seed of a leguminous plant. Seed is a miniature plant, which when given suitable conditions, germinate and develop into a plant. Discuss structure of a seed viability and process of germination in terms of metabolism and growth.

Ans. The similarity and dissimilarity between whole moong daal and broken moong daal is as follows

S.N.	Whole Moong Daal	Broken Moong Daal
1.	Whole moong dal is a intact seed of a plant.	It is not intact seed.
2.	When given all suitable conditions for germination, it germinates.	Unable to germinate as vital seed part such as embryo and cotyledons are destroyed.
3.	During germination, it resumes metabolic activity.	Unable to resume metabolic activity.
4.	Due to metabolism activated enzymes hydrolyse stored food in the cotyledons.	Broken seed will imbibe water, enzyme will get activated but will not lead to growth.
5.	Uses oxygen and respire as a result emits CO ₂ .	Because of destruction of embryo, no respiration, so no CO ₂ emission.
6.	As seed resumes active metabolism the embryo gives rise to plumule (shoot) and radicle (root).	No such growth seen, but broken daal has nourishment value for human as its cotyledons have stored food material rich in protein.

So, we can conclude that broken moong daal does not have viable embryo so does not germinate and does not show any metabolism and growth, but it has great nutritive value as it has good amount of protein and minerals.

Q. 10 Some of the properties of tissues are not the constituents of its cells. Give three examples to support the statement.

💡 Thinking Process

The cell is structural and functional unit of life. Cellular organisation of the body is the defining feature of life forms which involves interactions at molecular, cell, tissue and organ level in a living organism.

Ans. Cell in any multicellular organism is the smallest functional living entity. When many morphologically and functionally similar cells start functioning as a group. They form a tissue, which makes an organ performing a special function.

e.g., properties of tissues of stomach and intestine of digestive system is a co-ordinated function of different tissues to perform the functions of digestion of food material. So, this property of digestion is the property of tissues and the organ, i.e., stomach, but not the property of individual cells which make the tissue and organ of the digestive system.

Similarly, many neurons make nervous system and muscles make muscular system, but individual nerve cell/muscle cell can not perform the function of control, coordination and locomotion.