

Plant Kingdom

Case Study Based Questions

Read the following passages and answer the questions that follow:

1. The bryophyte's primary plant body is haploid. There are no roots, but there are roof-like structures called rhizoids. Vegetative reproduction happens by fragmentation of plant body, gemmae, buds, and so on. Sexual organs are multicellular and jacketed.



(A) If the zygote of a bryophyte consists of $2x$ number of chromosomes, how many chromosomes should the sporophyte have?

- (a) $2x$
- (b) x
- (c) $4x$
- (d) None of these

(B) Female multicellular jacketed sex parts in bryophytes are referred to as:

- (a) They don't exist
- (b) Archegonium
- (c) Thallogonium
- (d) Antheridium

(C) From the given paragraph, which of the following statement(s) can you identify as incorrect?

- (a) The bryophyte's primary plant body is haploid.
- (b) There are no roots, but there are rhizoids. Sexual multicellular and jacketed.
- (c) Vegetative organs are reproduction happens by fragmentation of plant body, gemmae, buds, and so on.
- (d) All are correct.

(D) Which of the following methods are not used by bryophytes for vegetative reproduction?

- (a) Isogamous gamete transport
- (b) Fragmentation of plant body
- (c) Gemmae cup dispersal
- (d) Fragmentation of buds

(E) Which of the following statements could be false with respect to the paragraph mentioned?

- (a) Primary plant body of bryophyte is haploid.
- (b) Bryophytes organisation. have thallus-like
- (c) Bryophytes are more likely to cause erosion due to rhizoids holding onto soil instead of roots.
- (d) Bryophytes may also be used as packing material.

Ans. (A) (a) $2x$

Explanation: Zygote and sporophyte both belong to diplontic generation ($2x$), this is why the sporophytic generation would have a $2x$ chromosome number.

(B) (b) Archegonium

Explanation: The female sex organs of bryophytes are known as archegonium, and they generate a female gamete known as an egg. The primary male sexual organ is known as the antheridium, and it produces male gametes known as antherozoids.

(C) (d) All are correct.

Explanation: The bryophyte's primary plant body is haploid. There are no roots, but there are rhizoids. Vegetative reproduction happens by fragmentation of plant body, gemmae, buds, and so on. Sexual organs are multicellular and jacketed.

(D) (a) Isogamous gamete transport

Explanation: Even though bryophytes do use isogamous gamete transport, they use it for the purpose of sexual reproduction, but the most common means of reproduction in bryophytes is vegetative reproduction in which the plant body is fragmented into parts to generate new plant bodies.

(E) (c) Bryophytes are more likely to cause erosion due to rhizoids holding onto soil instead of roots.

Explanation: Bryophytes have pseudo roots, stems, and leaves-like structures and thus, are called thalloid. Although they are more distinct than thallophytes, they still are thalloid-like structures. Bryophytes securely retain soil and so prevent soil erosion. They can break down larger rocks and turn them into fine particles of soil. These are also

utilised as packing and transport materials, as these are excellent water absorbers. Thus, (c) is the incorrect option.

2. These plants have photosynthesising, "segmented," hollow stems that are sometimes filled with pith. A whorl of leaves forms the junction between each section. Plants' subsurface sections are made up of jointed rhizomes from which roots and aerial axes arise. Intercalary meristems sprout in each segment of the stem and rhizome as the plant grows taller.

(A) Which class of pteridophytes is referred to in the above mentioned case?

(B) Provide an example of species found in the above mentioned class of pteridophyte.

(C) How do the above mentioned plants differ with respect to their growth in comparison to angiosperms?

Ans. (A) Class Sphenopsida of Pteridophyta is mentioned in the above given case.

(B) A famous and commonly found example of Sphenopsida is Equisetum. The class usually represents horsetails.

(C) Most seed plants (angiosperms and gymnosperms) develop from an apical meristem, which means that new growth originates solely from growing points (and widening of stems). This is different in the case of sphenopsids, where plant proliferation occurs due to intercalary meristem growth.

3. Roots of these plants have fungal association in the form of mycorrhiza, possess needle-like leaves to reduce surface area, prevent water loss and are economically very important.



(A) Identify the species and identify the plant kingdom to which it belongs.

(B) Why are they important?

(C) What kind of leaves do plants of this kingdom possess?

Ans. (A) Pinus, Gymnosperms

(B) These are employed in the paper, furniture, and lumbering industries, e.g., Conifers.

(C) Gymnosperm leaves are well-adapted to resist extremes of temperature, humidity, and wind, and possess needle-like leaves which reduce surface area.

4. Gymnosperms belong to the kingdom 'Plantae' and sub-kingdom 'Embryophyta. The fossil evidence suggested that they originated during the Palaeozoic era, about 390 million years ago. Basically, gymnosperms are plants in which the ovules are not enclosed within the ovary wall, unlike angiosperms. It remains exposed before and after fertilisation and before developing into a seed. The stem of gymnosperms can be branched or unbranched. The thick cuticle, needle-like leaves, and sunken stomata reduce the rate of water loss in these plants. The gymnosperms consist of conifers, cycads, gnetophytes and the species of Ginkgophyta division and Ginkgo biloba.



(A) Identify the economic importance of Ginkgo biloba.

(a) In makeup

(b) In cooking

(c) In the treatment of HIV-AIDS

(d) All of the above

(B) This division of plants shows:

(a) Heterospory

- (b) Isogamy
- (c) Anisogamy
- (d) Monospory.

(C) Cycads are:

- (a) dioecious
- (b) monoecious
- (c) hermaphrodites
- (d) bisexual

(D) In which areas gymnosperms are generally found?

- (a) Colder
- (b) Moist
- (c) Hotter
- (d) Coastal

(E) Choose the correct statement regarding conifers.

- (a) These are the least common species among the gymnosperm family.
- (b) They shed their leaves in the winter.
- (c) These are mainly characterised by male and female cones which form needle-like structures.
- (d) These are usually found in tropical zones.

Ans. (A) (b) In cooking

Explanation: Ginkgo biloba trees have a large number of applications ranging from medicine to cooking. Its leaves are ingested as a remedy for memory-related disorders like Alzheimer's. These are also resilient against insect infestations.

(B) (a) Heterospory

Explanation: Gymnosperms produce two kinds of spores, i.e. haploid microspores and megaspores, therefore they are known as heterosporous. Spores are produced in sporangia that are found on sporophylls. Sporophylls are spirally arranged along an axis to form compact strobili or cones.

(C) (a) dioecious

Explanation: Cycads are dioecious which means their individual plants are either all male or female.

(D) (a) Colder

Explanation: Gymnosperms are usually found in colder regions where snowfall occurs.

However, cycads are found in dry and tropical regions.

(E) (a) These are the least common species among the gymnosperm family, and

(c) These are mainly characterised by male and female cones which form needle-like structures.

Explanation: Conifers are the most commonly known species among the gymnosperm family. They are evergreen; hence they do not shed their leaves in the winter. These are mainly characterised by male and female cones which form needle-like structures.