

NEET-UG Biology Sample Paper-11

Duration: 1 Hour

Maximum Marks: 360

Instructions

- This paper contains a total of **90** Multiple Choice Questions.
- Each correct answer carries **+4 marks**.
- Each incorrect answer carries **-1 mark**.
- No negative marking for unattempted questions.

Q1. Which of the following is the correct scientific name of Wheat?

- (A) *Triticum aestivum*
- (B) *Triticum Aestivum*
- (C) *triticum aestivum*
- (D) *Triticum vulgare*

Q2. Methanogens belong to:

- (A) Eubacteria
- (B) Archaeobacteria
- (C) Dinoflagellates
- (D) Slime moulds

Q3. Select the wrong statement:

- (A) Cell wall is present in members of Fungi and Plantae.
- (B) Mushrooms belong to Basidiomycetes.
- (C) Pseudopodia are locomotory and feeding structures in Sporozoans.
- (D) Mitochondria are the powerhouse of the cell in all kingdoms except Monera.

Q4. An example of colonial alga is:

- (A) *Volvox*



- (B) Ulothrix
- (C) Spirogyra
- (D) Chlorella

Q5. Zygotic meiosis is characteristic of:

- (A) Fucus
- (B) Funaria
- (C) Chlamydomonas
- (D) Marchantia

Q6. Which of the following animals are true coelomates with bilateral symmetry?

- (A) Adult Echinoderms
- (B) Aschelminthes
- (C) Platyhelminthes
- (D) Annelids

Q7. Which of the following is a characteristic feature of Phylum Arthropoda?

- (A) Parapodia
- (B) Jointed appendages
- (C) Choanocytes
- (D) Metagenesis

Q8. Radial symmetry is NOT found in:

- (A) Ctenoplana
- (B) Asterias
- (C) Adamsia
- (D) Dugesia

Q9. The term 'polyadelphous' is related to:



- (A) Gynoecium
- (B) Androecium
- (C) Corolla
- (D) Calyx

Q10. Phloem in gymnosperms lacks:

- (A) Albuminous cells and sieve cells
- (B) Sieve tubes and companion cells
- (C) Albuminous cells and companion cells
- (D) Parenchyma and sieve cells

Q11. Formation of real 'wood' (secondary xylem) is a result of the activity of:

- (A) Apical meristem
- (B) Lateral meristem
- (C) Intercalary meristem
- (D) Ground meristem

Q12. The type of epithelial cells which line the inner surface of fallopian tubes and bronchioles are:

- (A) Ciliated epithelium
- (B) Squamous epithelium
- (C) Columnar epithelium
- (D) Cuboidal epithelium

Q13. The functional unit of contractile system in striated muscle is:

- (A) Sarcomere
- (B) Z-band
- (C) Cross bridges
- (D) Myofibril



- Q14.** Which of the following is correct regarding the structure of a prokaryotic cell?
- (A) They lack a cell membrane.
 - (B) Genetic material is not enveloped by a nuclear membrane.
 - (C) They possess well-defined membrane-bound organelles.
 - (D) Ribosomes are of 80S type.
- Q15.** Which of the following cell organelles is responsible for the formation of acrosome in spermatozoa?
- (A) Lysosome
 - (B) Golgi complex
 - (C) Ribosome
 - (D) Mitochondria
- Q16.** Which of the following statements about inclusion bodies is incorrect?
- (A) They are not bound by any membrane.
 - (B) They lie free in the cytoplasm.
 - (C) They represent reserve material in prokaryotic cells.
 - (D) They are involved in the ingestion of food particles.
- Q17.** Which of the following is a non-reducing sugar?
- (A) Glucose
 - (B) Fructose
 - (C) Sucrose
 - (D) Lactose
- Q18.** The most abundant organic compound on earth is:
- (A) Protein
 - (B) Cellulose
 - (C) DNA



(D) Lipids

Q19. In a cell cycle, DNA replication occurs during:

(A) G_1 phase

(B) S phase

(C) G_2 phase

(D) G_0 phase

Q20. During meiosis I, the number of chromosomes is:

(A) Doubled

(B) Halved

(C) Remains same

(D) Quadrupled

Q21. Which stage of meiosis is often called "the stage of recombination"?

(A) Zygotene

(B) Pachytene

(C) Diplotene

(D) Diakinesis

Q22. Centromere is required for:

(A) Replication of DNA

(B) Movement of chromosomes towards poles

(C) Cytoplasmic cleavage

(D) Poleward movement of chromatids

Q23. Transition state structure of the substrate formed during an enzymatic reaction is:

(A) Transient and unstable



- (B) Permanent and stable
- (C) Transient but stable
- (D) Permanent and unstable

Q24. Which of the following criteria does not pertain to facilitated transport?

- (A) High selectivity
- (B) Transport saturation
- (C) Uphill transport
- (D) Requirement of special membrane proteins

Q25. Which of the following is a limiting factor for photosynthesis in greenhouses?

- (A) Light
- (B) Water
- (C) CO_2
- (D) Chlorophyll

Q26. The final electron acceptor of the mitochondrial Electron Transport Chain is:

- (A) H_2O
- (B) NAD^+
- (C) Oxygen
- (D) Cytochrome c

Q27. Which plant hormone promotes seed dormancy?

- (A) Gibberellic acid
- (B) Abscisic acid
- (C) Ethylene
- (D) Auxin

Q28. The function of leghemoglobin in the root nodules of legumes is:



- (A) Expression of nif gene
- (B) Inhibition of nitrogenase activity
- (C) Oxygen removal
- (D) Nodal differentiation

Q29. Photosystem II occurs in:

- (A) Stroma
- (B) Grana thylakoids
- (C) Stroma lamellae
- (D) Mitochondrial matrix

Q30. Conversion of glucose to glucose-6-phosphate, the first irreversible reaction of glycolysis, is catalyzed by:

- (A) Phosphofructokinase
- (B) Aldolase
- (C) Hexokinase
- (D) Enolase

Q31. Water potential of a system is decreased by:

- (A) Addition of solute
- (B) Removal of solute
- (C) Addition of water
- (D) Increase in pressure

Q32. Which of the following terms describes human dentition?

- (A) Pleurodont, Monophyodont, Homodont
- (B) Thecodont, Diphyodont, Heterodont
- (C) Thecodont, Diphyodont, Homodont
- (D) Pleurodont, Diphyodont, Heterodont



- Q33.** What is the pO_2 and pCO_2 in the systemic arteries?
- (A) $pO_2 = 40$ mmHg, $pCO_2 = 45$ mmHg
 - (B) $pO_2 = 95$ mmHg, $pCO_2 = 40$ mmHg
 - (C) $pO_2 = 45$ mmHg, $pCO_2 = 40$ mmHg
 - (D) $pO_2 = 104$ mmHg, $pCO_2 = 40$ mmHg
- Q34.** Emphysema is a chronic condition where:
- (A) Bronchi are inflamed.
 - (B) Alveolar walls are damaged.
 - (C) Plasma protein is deficient.
 - (D) Fluid collects in lungs.
- Q35.** Erythroblastosis fetalis can occur if:
- (A) Mother is Rh+ and Fetus is Rh-
 - (B) Mother is Rh- and Fetus is Rh+
 - (C) Both are Rh-
 - (D) Both are Rh+
- Q36.** The second heart sound (Dub) is associated with the closure of:
- (A) Tricuspid valve
 - (B) Bicuspid valve
 - (C) Semilunar valves
 - (D) AV nodes
- Q37.** The part of the nephron which is impermeable to water but permeable to electrolytes is:
- (A) Proximal Convoluted Tubule
 - (B) Descending limb of Loop of Henle
 - (C) Ascending limb of Loop of Henle



(D) Collecting duct

Q38. Which hormone is responsible for the reabsorption of water from the distal parts of the nephron?

(A) ADH

(B) Oxytocin

(C) Glucagon

(D) Calcitonin

Q39. Which of the following is an autoimmune disorder affecting neuromuscular junction leading to fatigue?

(A) Muscular dystrophy

(B) Myasthenia gravis

(C) Arthritis

(D) Gout

Q40. The number of floating ribs in the human body is:

(A) 3 pairs

(B) 2 pairs

(C) 6 pairs

(D) 5 pairs

Q41. The chemical transmitted across the synapse is:

(A) Cholinesterase

(B) Acetylcholine

(C) ATP

(D) DNA

Q42. Cornea transplant in humans is almost never rejected. This is because:



- (A) It is composed of enucleated cells.
- (B) It has no blood supply.
- (C) It is a non-living layer.
- (D) Its cells are least penetrable by bacteria.

Q43. Which gland is known as the "Master Gland"?

- (A) Thyroid
- (B) Adrenal
- (C) Pituitary
- (D) Pancreas

Q44. Which of the following is a temporary endocrine gland in the human body?

- (A) Corpus cardiacum
- (B) Corpus luteum
- (C) Corpus allatum
- (D) Pineal gland

Q45. Proximal end of the filament of stamen is attached to the:

- (A) Connective
- (B) Placenta
- (C) Thalamus or petal
- (D) Anther

Q46. Seed coat is not thin, membranous in:

- (A) Groundnut
- (B) Gram
- (C) Maize
- (D) Coconut



- Q47.** What is the fate of the male gametes discharged in the synergid?
- (A) One fuses with the egg and other fuses with central cell nuclei.
 - (B) One fuses with the egg, other(s) degenerate(s) in the synergid.
 - (C) All fuse with the egg.
 - (D) One fuses with the egg and other(s) fuse(s) with synergid nucleus.
- Q48.** Which of the following hormone levels will cause release of ovum (ovulation) from the graafian follicle?
- (A) High concentration of Progesterone
 - (B) Low concentration of LH
 - (C) Low concentration of FSH
 - (D) High concentration of Estrogen
- Q49.** Extrusion of second polar body from egg nucleus occurs:
- (A) After entry of sperm but before fertilization.
 - (B) After fertilization.
 - (C) Before entry of sperm into ovum.
 - (D) Simultaneously with first cleavage.
- Q50.** The shared terminal duct of the reproductive and urinary system in the human male is:
- (A) Urethra
 - (B) Ureter
 - (C) Vas deferens
 - (D) Vasa efferentia
- Q51.** Which of the following is a correct statement?
- (A) IUDs once inserted need not be replaced.
 - (B) IUDs generally insert by the user herself.



- (C) IUDs increase phagocytosis of sperms in the uterus.
- (D) IUDs suppress gametogenesis.

Q52. Select the hormone-releasing Intrauterine Devices:

- (A) Lippes loop, Multiload 375
- (B) Vaults, LNG-20
- (C) Progestasert, LNG-20
- (D) Multiload 375, Progestasert

Q53. Embryo with more than 16 blastomeres formed due to in vitro fertilization is transferred into:

- (A) Uterus
- (B) Fallopian tube
- (C) Fimbriae
- (D) Cervix

Q54. Which of the following is a method of traditional contraception?

- (A) Condoms
- (B) IUDs
- (C) Lactational amenorrhea
- (D) Sterilization

Q55. A human female with Turner's syndrome:

- (A) Has 45 chromosomes with XO.
- (B) Has one additional X chromosome.
- (C) Exhibits male characters.
- (D) Is able to produce children with normal husband.

Q56. Which of the following was NOT a character studied by Mendel in garden pea?



- (A) Plant height
- (B) Trichomes (Glandular or non-glandular)
- (C) Seed color
- (D) Pod shape

Q57. In a cross between a male and female, both heterozygous for sickle cell anaemia gene, what percentage of the progeny will be diseased?

- (A) 50%
- (B) 75%
- (C) 25%
- (D) 100%

Q58. The frequency of recombination between gene pairs on the same chromosome as a measure of the distance between genes was explained by:

- (A) T.H. Morgan
- (B) Gregor J. Mendel
- (C) Alfred Sturtevant
- (D) Henking

Q59. The association of histone H1 with a nucleosome indicates that:

- (A) DNA replication is occurring.
- (B) The DNA is condensed into a chromatin fiber.
- (C) The DNA double helix is exposed.
- (D) Transcription is occurring.

Q60. In the Lac operon, the gene 'y' codes for:

- (A) Transacetylase
- (B) Permease
- (C) β -galactosidase



(D) Repressor protein

Q61. Which of the following is the start codon?

(A) UAA

(B) UAG

(C) AUG

(D) UGA

Q62. The process of translation is:

(A) DNA → RNA

(B) RNA → Protein

(C) DNA → DNA

(D) RNA → DNA

Q63. Which of the following is not a feature of Human Genome?

(A) The total number of genes is estimated at 30,000.

(B) More than 98% of the genome codes for proteins.

(C) Repetitive sequences make up a very large portion of the human genome.

(D) Chromosome 1 has the most genes.

Q64. A gene locus has two alleles A and a. If the frequency of dominant allele A is 0.4, then what will be the frequency of homozygous dominant, heterozygous and homozygous recessive individuals in the population?

(A) 0.16 (AA); 0.48 (Aa); 0.36 (aa)

(B) 0.36 (AA); 0.48 (Aa); 0.16 (aa)

(C) 0.16 (AA); 0.36 (Aa); 0.48 (aa)

(D) 0.48 (AA); 0.36 (Aa); 0.16 (aa)

Q65. The process by which different species in a given geographical area evolve starting from a point and radiating to other areas of geography is called:



- (A) Adaptive radiation
- (B) Natural selection
- (C) Migration
- (D) Divergent evolution

Q66. Presence of gills in the tadpole of frog indicates that:

- (A) Fishes evolved from frog-like ancestors.
- (B) Frogs will have gills in future.
- (C) Frogs evolved from gilled ancestors.
- (D) Fishes were precocious frogs.

Q67. Variations caused by mutation, as proposed by Hugo de Vries, are:

- (A) Small and directional
- (B) Random and directional
- (C) Random and directionless
- (D) Small and directionless

Q68. Which of the following is the correct sequence of evolution of mammals?

- (A) Synapsids → Pelycosaurs → Therapsids → Mammals
- (B) Sauropsids → Synapsids → Mammals
- (C) Synapsids → Sauropsids → Mammals
- (D) Pelycosaurs → Synapsids → Therapsids → Mammals

Q69. Which of the following is an example of an inflammatory response?

- (A) Fever
- (B) Swelling and redness
- (C) Production of antibodies
- (D) Both A and B



- Q70.** Which of the following is not an autoimmune disease?
- (A) Psoriasis
 - (B) Rheumatoid arthritis
 - (C) Alzheimer's disease
 - (D) Vitiligo
- Q71.** Which of the following is used in the production of Roquefort cheese?
- (A) Bacteria
 - (B) Yeast
 - (C) Fungi
 - (D) Algae
- Q72.** The large holes in "Swiss Cheese" are due to:
- (A) A bacterium producing a large amount of CO_2 .
 - (B) A fungus that releases metabolic gases.
 - (C) A machine that punctures the cheese.
 - (D) Use of yeast during fermentation.
- Q73.** Testing of "Protoplast fusion" is primarily done in:
- (A) Tissue culture
 - (B) Mutation breeding
 - (C) Conventional breeding
 - (D) Polyploidy breeding
- Q74.** Which of the following is a bioactive molecule used as an immunosuppressant?
- (A) Statin
 - (B) Streptokinase
 - (C) Cyclosporin A



(D) Citric acid

Q75. Which of the following is used as a 'biological scissor' in genetic engineering?

(A) Ligase

(B) Polymerase

(C) Restriction endonuclease

(D) Helicase

Q76. DNA fragments are:

(A) Positively charged

(B) Negatively charged

(C) Neutral

(D) Either positive or negative

Q77. The sequence of DNA that is read the same way in both forward and backward directions is called:

(A) Palindromic sequence

(B) Repetitive sequence

(C) Consensus sequence

(D) Coding sequence

Q78. Which of the following is not a requirement for PCR?

(A) DNA Template

(B) Primers

(C) Taq Polymerase

(D) DNA Ligase

Q79. The first transgenic cow, Rosie, produced milk which was enriched with:

(A) Human alpha-lactalbumin



- (B) Human beta-globulin
- (C) Insulin
- (D) Growth hormone

Q80. Presence of gills in the tadpole of frog indicates that:

- (A) Fishes evolved from frog-like ancestors.
- (B) Frogs will have gills in future.
- (C) Frogs evolved from gilled ancestors.
- (D) Fishes were precocious frogs.

Q81. RNA interference (RNAi) involves:

- (A) Silencing of specific mRNA due to a complementary dsRNA.
- (B) Interference with the DNA replication.
- (C) Silencing of protein synthesis at ribosome.
- (D) Synthesis of cDNA from RNA.

Q82. Which of the following was the first clinical gene therapy given for?

- (A) Cancer
- (B) Adenosine deaminase (ADA) deficiency
- (C) Cystic fibrosis
- (D) Diabetes

Q83. Biopiracy is:

- (A) Use of bioresources without authorization.
- (B) Use of bioresources with authorization.
- (C) Exploitation of local people.
- (D) Protecting the rights of indigenous people.

Q84. Which of the following is a primary consumer in a pond ecosystem?



- (A) Phytoplankton
- (B) Zooplankton
- (C) Small fish
- (D) Large fish

Q85. The amount of living matter (biomass) present at a trophic level at a given time is called:

- (A) Standing crop
- (B) Standing state
- (C) Primary productivity
- (D) Net productivity

Q86. Decomposition of organic matter is slower if it is rich in:

- (A) Nitrogen and sugar
- (B) Lignin and chitin
- (C) Phosphorus and calcium
- (D) Cellulose and starch

Q87. The most effective way to conserve biodiversity is:

- (A) In situ conservation
- (B) Ex situ conservation
- (C) Botanical gardens
- (D) Zoos

Q88. The 'Evil Quartet' is a term used to describe:

- (A) Four major causes of biodiversity loss.
- (B) Four types of ecosystems.
- (C) Four major greenhouse gases.
- (D) Four stages of ecological succession.



Q89. Which of the following is not a greenhouse gas?

(A) CO_2

(B) CH_4

(C) N_2O

(D) SO_2

Q90. World Ozone Day is celebrated on:

(A) 16th September

(B) 21st April

(C) 5th June

(D) 22nd April



Detailed Solutions

Q1.

Solution

Concept: Scientific names follow binomial nomenclature. The genus name begins with a capital letter, while the species name begins with a small letter. The scientific name is usually written in italics.

Solution: Step 1: **Rule of binomial nomenclature:** A scientific name has two parts: genus and species. The first word represents the genus and must start with a capital letter. The second word represents the species and must start with a lowercase letter.

Step 2: **Checking the options:** In *Triticum aestivum*, *Triticum* is the genus and *aestivum* is the species. This follows the correct scientific naming rule.

Step 3: **Eliminating wrong options:** *Triticum Aestivum* is incorrect because the species name is capitalized. *triticum aestivum* is incorrect because the genus name is not capitalized. *Triticum vulgare* is not the accepted scientific name of common wheat in this context.

Final Answer:

Triticum aestivum

Answer: (A)

Q2.

Solution

Concept: Methanogens are primitive prokaryotes that produce methane gas. They are placed under Archaeobacteria because they survive in extreme anaerobic environments.

Solution: Step 1: **Understanding methanogens:** Methanogens are microorganisms that produce methane as a metabolic by-product under anaerobic conditions.

Step 2: **Habitat and nature:** They are commonly found in marshy areas, sewage, rumen of cattle, and other oxygen-deficient environments. Their cell wall and membrane structure are different from typical eubacteria.

Step 3: **Classification:** Due to their primitive nature and ability to survive in extreme conditions, methanogens are grouped under **Archaeobacteria**.

Final Answer:

Archaeobacteria

Answer: (B)



Q3.

Solution

Concept: Kingdom classification is based on cellular organization, cell wall composition, mode of nutrition, and other structural features.

Solution: Step 1: **Checking option A:** Cell wall is present in members of Fungi and Plantae. Fungi have chitinous cell walls, while plants have cellulose cell walls. So, this statement is correct.

Step 2: **Checking option B:** Mushrooms belong to Basidiomycetes. This is correct because mushrooms are club fungi.

Step 3: **Checking option C:** Pseudopodia are locomotory and feeding structures in Amoeboid protozoans, not in Sporozoans. Sporozoans are generally parasitic and do not use pseudopodia for locomotion and feeding. Hence, this statement is wrong.

Step 4: **Checking option D:** Mitochondria are present in eukaryotic kingdoms, but absent in Monera because Monera are prokaryotic. So, this statement is correct.

Final Answer:

Pseudopodia are locomotory and feeding structures in Sporozoans.

Answer: (C)

Q4.

Solution

Concept: Algae show different types of organization such as unicellular, colonial, filamentous, and thalloid forms.

Solution: Step 1: **Understanding colonial algae:** Colonial algae are algae in which many cells live together in a definite colony and show coordinated movement or function.

Step 2: **Example of colonial form:** *Volvox* is a green alga that forms spherical colonies containing many flagellated cells arranged on the surface of a hollow sphere.

Step 3: **Eliminating other options:** *Ulothrix* and *Spirogyra* are filamentous algae, while *Chlorella* is unicellular. Therefore, the colonial alga among the given options is *Volvox*.

Final Answer:

Volvox

Answer: (A)



Q5.

Solution

Concept: Zygotic meiosis occurs in organisms with a haplontic life cycle. In this type of life cycle, the zygote is the only diploid stage and undergoes meiosis to produce haploid spores.

Solution: Step 1: **Meaning of zygotic meiosis:** Zygotic meiosis means meiosis occurs in the zygote immediately after fertilization. This restores the haploid condition in the life cycle.

Step 2: **Life cycle in Chlamydomonas:** *Chlamydomonas* shows a haplontic life cycle. Its dominant plant body is haploid, and the diploid zygote undergoes meiosis.

Step 3: **Eliminating other options:** *Fucus* shows a diplontic life cycle, while *Funaria* and *Marchantia* are bryophytes with alternation of generations. Hence, zygotic meiosis is characteristic of *Chlamydomonas*.

Final Answer:

Chlamydomonas

Answer: (C)

Q6.

Solution

Concept: Coelom is the body cavity lined by mesoderm. Animals with a true coelom are called coelomates, and bilateral symmetry means the body can be divided into two equal halves only through one plane.

Solution: Step 1: **Analyzing adult echinoderms:** Adult echinoderms are true coelomates, but they show radial symmetry in the adult stage. Hence, they do not satisfy both conditions.

Step 2: **Analyzing Aschelminthes and Platyhelminthes:** Aschelminthes are pseudocoelomates, while Platyhelminthes are acoelomates. Therefore, they are not true coelomates.

Step 3: **Analyzing annelids:** Annelids possess a true coelom lined by mesoderm and show bilateral symmetry. Hence, they are true coelomates with bilateral symmetry.

Final Answer:

Annelids

Answer: (D)



Q7.

Solution

Concept: Phylum Arthropoda is the largest phylum of the animal kingdom. Its members are characterized by segmented body, chitinous exoskeleton, and jointed appendages.

Solution: Step 1: **Meaning of Arthropoda:** The word Arthropoda means jointed feet. This name itself indicates the presence of jointed appendages.

Step 2: **Characteristic feature:** Arthropods such as insects, prawns, spiders, and scorpions possess jointed legs or appendages that help in locomotion, feeding, and other activities.

Step 3: **Eliminating other options:** Parapodia are found in annelids, choanocytes are found in poriferans, and metagenesis is seen in cnidarians. Therefore, jointed appendages are the correct arthropod feature.

Final Answer:

Jointed appendages

Answer: (B)

Q8.

Solution

Concept: Radial symmetry means the body can be divided into equal halves through any plane passing through the central axis. Bilateral symmetry means only one plane divides the body into two equal halves.

Solution: Step 1: **Checking radial animals:** *Ctenoplana* belongs to Ctenophora and shows radial or biradial symmetry. *Asterias*, an adult echinoderm, shows radial symmetry. *Adamsia*, a sea anemone, also shows radial symmetry.

Step 2: **Checking Dugesia:** *Dugesia* is a flatworm belonging to Platyhelminthes. It has bilateral symmetry, not radial symmetry.

Step 3: **Conclusion:** Since radial symmetry is not found in *Dugesia*, it is the correct answer.

Final Answer:

Dugesia

Answer: (D)



Q9.

Solution

Concept: The androecium is the male reproductive whorl of a flower and consists of stamens. The arrangement and fusion of stamens are described using terms such as monadelphous, diadelphous, and polyadelphous.

Solution: Step 1: **Meaning of polyadelphous:** Polyadelphous condition refers to stamens whose filaments are united into more than two bundles.

Step 2: **Relation with floral whorl:** Since stamens are the units of the androecium, the term polyadelphous is related to the androecium.

Step 3: **Eliminating other options:** Gynoecium is the female reproductive whorl, corolla consists of petals, and calyx consists of sepals. These are not related to the term polyadelphous.

Final Answer:

Androecium

Answer: (B)

Q10.

Solution

Concept: Gymnosperms have conducting tissues, but their phloem differs from angiosperm phloem. Gymnosperm phloem contains sieve cells and albuminous cells but lacks sieve tubes and companion cells.

Solution: Step 1: **Phloem in gymnosperms:** In gymnosperms, food conduction is performed mainly by sieve cells. These sieve cells are associated with albuminous cells.

Step 2: **Phloem in angiosperms:** Angiosperms possess sieve tubes and companion cells, which are more advanced conducting elements.

Step 3: **Key difference:** Gymnosperms do not have sieve tubes and companion cells. Therefore, phloem in gymnosperms lacks these two structures.

Final Answer:

Sieve tubes and companion cells

Answer: (B)



Q11.

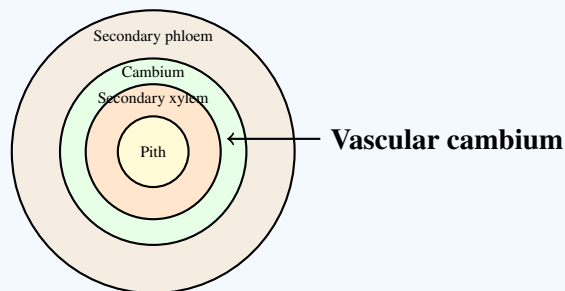
Solution

Concept: Secondary xylem is commonly called wood. It is produced during secondary growth by the activity of lateral meristems, especially vascular cambium.

Solution: Step 1: **Understanding secondary growth:** Secondary growth increases the girth or thickness of plant organs. It is mainly seen in dicot stems and gymnosperms.

Step 2: **Role of vascular cambium:** Vascular cambium is a lateral meristem. It cuts off secondary xylem towards the inner side and secondary phloem towards the outer side.

Step 3: **Formation of wood:** The secondary xylem deposited towards the inside forms the real wood of the plant. Therefore, wood formation is due to the activity of lateral meristem.



Final Answer:

Lateral meristem

Answer: (B)



Q12.

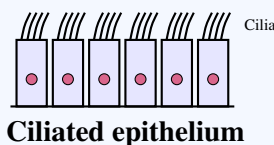
Solution

Concept: Ciliated epithelium is a specialized epithelial tissue in which cells bear hair-like projections called cilia. These cilia help in movement of substances over the epithelial surface.

Solution: Step 1: **Location in fallopian tubes:** The fallopian tubes are lined by ciliated epithelium. The cilia help move the ovum or zygote towards the uterus.

Step 2: **Location in bronchioles:** Bronchioles also contain ciliated epithelial cells. Their cilia help move mucus and trapped particles away from the respiratory passage.

Step 3: **Eliminating other options:** Squamous epithelium is thin and flat, columnar epithelium is mainly secretory or absorptive, and cuboidal epithelium is found in ducts and glands. The presence of cilia makes ciliated epithelium the correct answer.

**Final Answer:**

Ciliated epithelium

Answer: (A)

Q13.

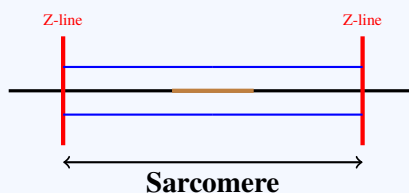
Solution

Concept: Striated muscle fibres show alternating dark and light bands. The functional unit responsible for contraction is the sarcomere.

Solution: Step 1: **Structure of striated muscle:** A striated muscle fibre contains many myofibrils. Each myofibril shows repeated units between two successive Z-lines.

Step 2: **Definition of sarcomere:** The region between two successive Z-lines is called a sarcomere. It contains actin and myosin filaments arranged in an organized pattern.

Step 3: **Functional role:** During muscle contraction, actin filaments slide over myosin filaments within the sarcomere. Therefore, sarcomere is the functional unit of the contractile system in striated muscle.

**Final Answer:**

Sarcomere

Answer: (A)

Q14.

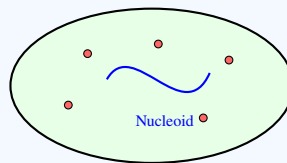
Solution

Concept: Prokaryotic cells are primitive cells that lack a true nucleus and membrane-bound organelles. Their genetic material lies freely in the cytoplasm in a region called the nucleoid.

Solution: Step 1: **Cell membrane in prokaryotes:** Prokaryotes do possess a plasma membrane. Therefore, the statement that they lack a cell membrane is incorrect.

Step 2: **Nuclear membrane:** In prokaryotes, genetic material is not enclosed by a nuclear membrane. Hence, they do not have a true nucleus.

Step 3: **Organelles and ribosomes:** Prokaryotes lack well-defined membrane-bound organelles. Their ribosomes are 70S type, not 80S type. Thus, the correct statement is that genetic material is not enveloped by a nuclear membrane.



Prokaryotic cell: no nuclear membrane

Final Answer:

Genetic material is not enveloped by a nuclear membrane.

Answer: (B)



Q15.

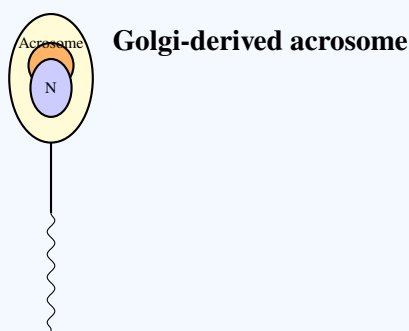
Solution

Concept: Acrosome is a cap-like structure present at the anterior end of the sperm head. It contains enzymes required for penetration of the ovum.

Solution: Step 1: **Function of acrosome:** The acrosome contains hydrolytic enzymes such as hyaluronidase and acrosin. These enzymes help sperm penetrate the coverings of the ovum during fertilization.

Step 2: **Origin of acrosome:** During spermiogenesis, the Golgi complex forms vesicles that accumulate and develop into the acrosome.

Step 3: **Eliminating other organelles:** Mitochondria form the middle piece of sperm and provide energy. Ribosomes synthesize proteins. Lysosomes contain digestive enzymes but do not form the acrosome directly in spermatozoa. Therefore, Golgi complex is responsible.

**Final Answer:**

Golgi complex

Answer: (B)

Q16.

Solution

Concept: Inclusion bodies are non-living reserve deposits found freely in the cytoplasm of prokaryotic cells. They are not membrane-bound.

Solution: Step 1: **Nature of inclusion bodies:** Inclusion bodies are not surrounded by any membrane and lie freely in the cytoplasm.

Step 2: **Function:** They store reserve materials such as phosphate granules, glycogen granules, cyanophycean granules, and gas vacuoles in some prokaryotes.

Step 3: **Incorrect statement:** Inclusion bodies are not involved in ingestion of food particles. Food ingestion is not their function. Therefore, the statement saying they are involved in ingestion of food particles is incorrect.

Final Answer:

They are involved in the ingestion of food particles.

Answer: (D)



Q17.

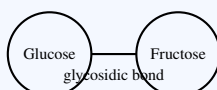
Solution

Concept: Reducing sugars have a free aldehyde or ketone group that can reduce mild oxidizing agents. Non-reducing sugars do not have a free reducing group.

Solution: Step 1: **Reducing sugars:** Glucose, fructose, and lactose are reducing sugars because they can form a free aldehyde or ketone group in solution.

Step 2: **Structure of sucrose:** Sucrose is formed by glucose and fructose. In sucrose, the reducing carbon of glucose and the reducing carbon of fructose are both involved in the glycosidic bond.

Step 3: **Conclusion:** Since no free reducing group is available in sucrose, it is a non-reducing sugar.



Sucrose: no free reducing end

Final Answer:

Sucrose

Answer: (C)

Q18.

Solution

Concept: Cellulose is the major structural polysaccharide of plant cell walls. Since plants are the most abundant producers of biomass, cellulose is the most abundant organic compound on earth.

Solution: Step 1: **Nature of cellulose:** Cellulose is a polymer of glucose units joined by beta-1,4 glycosidic bonds. It forms strong fibres in plant cell walls.

Step 2: **Abundance in plants:** Plant bodies contain huge amounts of cellulose because every plant cell has a cellulose-rich cell wall.

Step 3: **Comparison with other compounds:** Proteins, DNA, and lipids are important biomolecules, but they are not as abundant globally as cellulose. Hence, cellulose is the most abundant organic compound on earth.

Final Answer:

Cellulose

Answer: (B)



Q19.

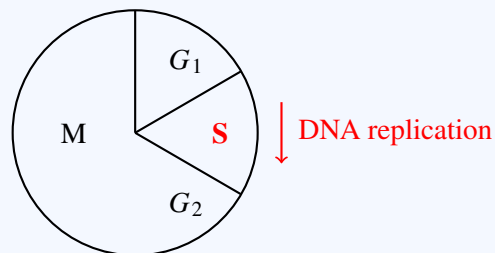
Solution

Concept: The cell cycle has two main phases: interphase and M phase. Interphase includes G_1 , S, and G_2 phases. DNA replication occurs specifically in the S phase.

Solution: Step 1: **Role of G_1 phase:** During G_1 phase, the cell grows and synthesizes proteins required for DNA replication. DNA is not replicated here.

Step 2: **Role of S phase:** S phase is called the synthesis phase. In this phase, DNA replication occurs and the amount of DNA doubles.

Step 3: **Role of G_2 and G_0 :** In G_2 phase, the cell prepares for mitosis. G_0 is a resting or quiescent stage. Therefore, DNA replication occurs during S phase.



Final Answer:

S phase

Answer: (B)



Q20.

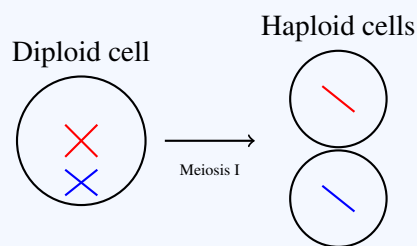
Solution

Concept: Meiosis I is called reductional division because homologous chromosomes separate from each other, reducing the chromosome number from diploid to haploid.

Solution: Step 1: **Before meiosis I:** The cell is diploid and contains pairs of homologous chromosomes. DNA has already replicated before meiosis begins, but chromosome number remains diploid.

Step 2: **During meiosis I:** Homologous chromosomes separate and move to opposite poles during anaphase I. This reduces the chromosome number to half in each daughter cell.

Step 3: **Result:** After meiosis I, each daughter cell receives only one chromosome from each homologous pair. Therefore, the number of chromosomes is halved.



Final Answer:

Halved

Answer: (B)



Q21.

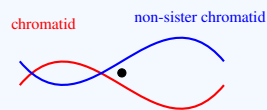
Solution

Concept: Meiosis I includes prophase I, which is divided into leptotene, zygotene, pachytene, diplotene and diakinesis. Crossing over and recombination occur during pachytene.

Solution: Step 1: **Understanding recombination:** Recombination means exchange of genetic material between non-sister chromatids of homologous chromosomes. This produces new combinations of genes.

Step 2: **Stage identification:** During zygotene, homologous chromosomes pair by synapsis. During pachytene, crossing over occurs between non-sister chromatids.

Step 3: **Conclusion:** Since recombination occurs due to crossing over in pachytene, pachytene is often called the stage of recombination.



Crossing over in Pachytene

Final Answer:

Pachytene

Answer: (B)



Q22.

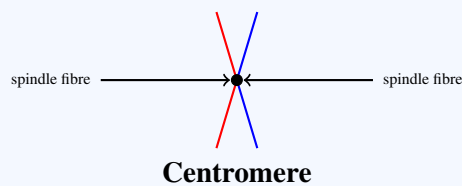
Solution

Concept: Centromere is the primary constriction of a chromosome. It holds sister chromatids together and provides the site for kinetochore formation.

Solution: Step 1: **Role of centromere:** The centromere is the region where spindle fibres attach through kinetochores during cell division.

Step 2: **Chromosome movement:** During anaphase, spindle fibres shorten and pull chromosomes or chromatids towards opposite poles. This poleward movement depends on centromere-kinetochore attachment.

Step 3: **Eliminating other options:** DNA replication occurs during S phase, cytoplasmic cleavage is due to cytokinesis, and the best general function of centromere among the given options is movement of chromosomes towards poles.



Final Answer:

Movement of chromosomes towards poles

Answer: (B)



Q23.

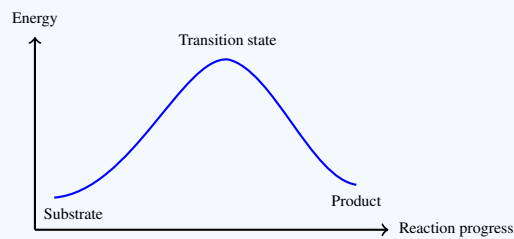
Solution

Concept: During an enzymatic reaction, the substrate changes into a high-energy transition state before forming the product. This transition state is temporary and unstable.

Solution: Step 1: **Enzyme-substrate interaction:** The substrate binds to the active site of the enzyme and forms an enzyme-substrate complex.

Step 2: **Transition state formation:** The substrate is converted into a transition state. This state has high energy and exists only for a very short duration.

Step 3: **Nature of transition state:** Since the transition state is short-lived and high-energy, it is transient and unstable, not permanent or stable.



Final Answer:

Transient and unstable

Answer: (A)



Q24.

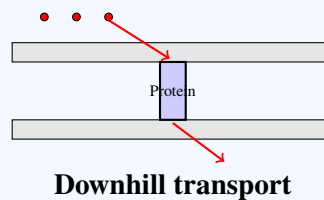
Solution

Concept: Facilitated transport is a passive transport process in which substances move across the membrane with the help of specific membrane proteins, without using ATP.

Solution: Step 1: **Features of facilitated transport:** Facilitated transport shows high selectivity because carrier or channel proteins recognize specific molecules.

Step 2: **Saturation property:** Since transport proteins are limited in number, facilitated transport shows saturation when all carriers are occupied.

Step 3: **Direction of movement:** Facilitated transport occurs down the concentration gradient. It does not move substances uphill against the gradient. Uphill transport requires active transport and energy.



Final Answer:

Uphill transport

Answer: (C)



Q25.

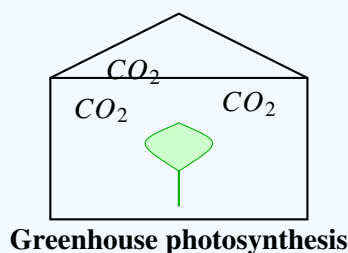
Solution

Concept: The rate of photosynthesis is controlled by limiting factors such as light, carbon dioxide concentration, temperature, and water. In greenhouses, carbon dioxide often becomes limiting.

Solution: Step 1: **Photosynthesis requirement:** Plants require CO_2 , water, light, and chlorophyll for photosynthesis. If any one factor is present in low amount, the rate becomes limited.

Step 2: **Greenhouse condition:** In greenhouses, light, temperature, and water can often be controlled. But the concentration of CO_2 may fall because plants continuously use it during photosynthesis.

Step 3: **Conclusion:** Increasing CO_2 concentration in greenhouses increases photosynthetic rate and yield. Therefore, CO_2 is a limiting factor in greenhouses.



Final Answer:

CO_2

Answer: (C)

Q26.

Solution

Concept: The mitochondrial electron transport chain transfers electrons through a series of carriers. The final electron acceptor combines with electrons and protons to form water.

Solution: Step 1: **Electron flow:** Electrons from $NADH$ and $FADH_2$ pass through electron carriers present in the inner mitochondrial membrane.

Step 2: **Final acceptor:** At the end of the chain, oxygen accepts electrons and protons. This produces water.

Step 3: **Conclusion:** Oxygen is the terminal or final electron acceptor in aerobic respiration. Without oxygen, the electron transport chain stops.



Final Answer:

Oxygen

Answer: (C)



Q27.

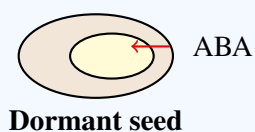
Solution

Concept: Abscisic acid is a plant growth regulator associated with stress responses, seed dormancy, stomatal closure, and inhibition of growth.

Solution: Step 1: **Seed dormancy:** Dormancy prevents seeds from germinating under unfavorable conditions. This helps seeds survive drought, cold, or other stress conditions.

Step 2: **Role of ABA:** Abscisic acid promotes seed dormancy by inhibiting germination and reducing metabolic activity in the seed.

Step 3: **Contrast with gibberellin:** Gibberellic acid breaks seed dormancy and promotes germination. Therefore, the hormone promoting seed dormancy is abscisic acid.

**Final Answer:**

Abscisic acid

Answer: (B)

Q28.

Solution

Concept: Leghemoglobin is an oxygen-binding pigment present in root nodules of leguminous plants. It protects nitrogenase enzyme from oxygen.

Solution: Step 1: **Nitrogenase sensitivity:** Nitrogenase enzyme fixes atmospheric nitrogen but is highly sensitive to oxygen. Excess oxygen inhibits its activity.

Step 2: **Role of leghemoglobin:** Leghemoglobin binds oxygen and keeps its concentration low inside root nodules. This creates a suitable anaerobic environment for nitrogenase.

Step 3: **Conclusion:** The function of leghemoglobin is oxygen removal or oxygen scavenging in root nodules.

**Final Answer:**

Oxygen removal

Answer: (C)



Q29.

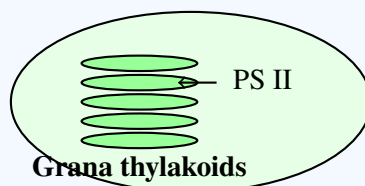
Solution

Concept: Photosystems are pigment-protein complexes present in chloroplast thylakoid membranes. Photosystem II is mainly located in the appressed regions of grana thylakoids.

Solution: Step 1: **Chloroplast structure:** Chloroplast has stacks of thylakoids called grana and connecting membranes called stroma lamellae.

Step 2: **Location of photosystems:** Photosystem II is mainly present in grana thylakoids, while Photosystem I is more abundant in stroma lamellae and non-appressed regions.

Step 3: **Conclusion:** Since Photosystem II occurs in grana thylakoids, option B is correct.



Final Answer:

Grana thylakoids

Answer: (B)

Q30.

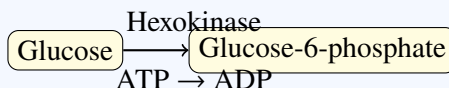
Solution

Concept: Glycolysis begins with phosphorylation of glucose. The first irreversible reaction converts glucose into glucose-6-phosphate.

Solution: Step 1: **First reaction of glycolysis:** Glucose is phosphorylated to glucose-6-phosphate using ATP.

Step 2: **Enzyme involved:** This reaction is catalyzed by hexokinase. In liver cells, a related enzyme called glucokinase performs this function.

Step 3: **Eliminating other enzymes:** Phosphofruktokinase catalyzes conversion of fructose-6-phosphate to fructose-1,6-bisphosphate. Aldolase splits fructose-1,6-bisphosphate. Enolase forms phosphoenolpyruvate. Therefore, hexokinase is correct.



Final Answer:

Hexokinase

Answer: (C)



Q31.

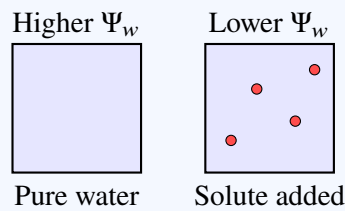
Solution

Concept: Water potential is the tendency of water to move from one region to another. Pure water has the highest water potential, and addition of solute lowers the water potential.

Solution: Step 1: **Understanding water potential:** Water potential is represented by Ψ_w . It depends mainly on solute potential and pressure potential.

Step 2: **Effect of solute:** When solute is added to water, the concentration of free water molecules decreases. This makes the water potential more negative.

Step 3: **Conclusion:** Therefore, addition of solute decreases the water potential of a system.



Final Answer:

Addition of solute

Answer: (A)

Q32.

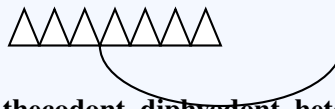
Solution

Concept: Human dentition is described using three terms: thecodont, diphyodont, and heterodont.

Solution: Step 1: **Thecodont dentition:** In humans, teeth are embedded in sockets of the jaw bones. This condition is called thecodont.

Step 2: **Diphyodont dentition:** Humans develop two sets of teeth in life: milk teeth and permanent teeth. This condition is called diphyodont.

Step 3: **Heterodont dentition:** Human teeth are of different types: incisors, canines, premolars, and molars. This condition is called heterodont.



Human dentition: thecodont, diphyodont, heterodont

Final Answer:

Thecodont, Diphyodont, Heterodont

Answer: (B)



Q33.

Solution

Concept: Systemic arteries carry oxygenated blood from the left side of the heart to body tissues. Therefore, they have high oxygen pressure and comparatively lower carbon dioxide pressure.

Solution: Step 1: **Systemic arterial blood:** Blood in systemic arteries has just been oxygenated in the lungs and pumped by the left ventricle.

Step 2: **Partial pressure values:** In systemic arteries, the partial pressure of oxygen is about 95 mmHg and the partial pressure of carbon dioxide is about 40 mmHg.

Step 3: **Conclusion:** Therefore, the correct values are $pO_2 = 95$ mmHg and $pCO_2 = 40$ mmHg.

→ Systemic artery →

$pO_2 = 95$ mmHg, $pCO_2 = 40$ mmHg

Final Answer:

$pO_2 = 95$ mmHg, $pCO_2 = 40$ mmHg

Answer: (B)

Q34.

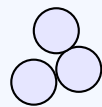
Solution

Concept: Emphysema is a chronic respiratory disorder in which the alveolar walls are damaged. This reduces the surface area available for gaseous exchange.

Solution: Step 1: **Normal alveoli:** Alveoli are thin-walled air sacs where exchange of oxygen and carbon dioxide occurs.

Step 2: **Condition in emphysema:** In emphysema, the walls separating adjacent alveoli are damaged. This forms larger air spaces and reduces respiratory surface area.

Step 3: **Effect on breathing:** Due to reduced elasticity and surface area, the patient has difficulty in expiration and gaseous exchange becomes inefficient.



Normal alveoli Damaged alveolar wall

Final Answer:

Alveolar walls are damaged.

Answer: (B)



Q35.

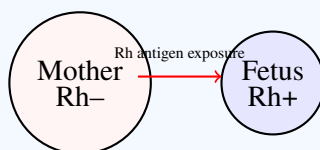
Solution

Concept: Erythroblastosis fetalis is an Rh incompatibility disorder. It occurs when an Rh-negative mother carries an Rh-positive fetus.

Solution: Step 1: **Rh incompatibility:** If the mother is Rh-negative and the fetus is Rh-positive, fetal Rh antigens may enter the maternal blood during delivery or pregnancy.

Step 2: **Antibody formation:** The mother's immune system may produce anti-Rh antibodies. In a subsequent Rh-positive pregnancy, these antibodies can cross the placenta.

Step 3: **Effect on fetus:** Anti-Rh antibodies destroy fetal RBCs, causing erythroblastosis fetalis. Thus, the condition can occur when the mother is Rh-negative and the fetus is Rh-positive.



Final Answer:

Mother is Rh- and Fetus is Rh+

Answer: (B)

Q36.

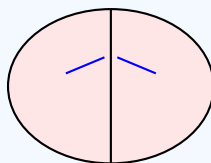
Solution

Concept: Heart sounds are produced by the closure of valves during the cardiac cycle. The first sound is "Lub" and the second sound is "Dub".

Solution: Step 1: **First heart sound:** The first heart sound, Lub, is produced by closure of atrioventricular valves, namely tricuspid and bicuspid valves.

Step 2: **Second heart sound:** The second heart sound, Dub, is produced by closure of semilunar valves at the beginning of ventricular diastole.

Step 3: **Conclusion:** Therefore, the Dub sound is associated with closure of semilunar valves.



Dub = closure of semilunar valves

Final Answer:

Semilunar valves

Answer: (C)



Q37.

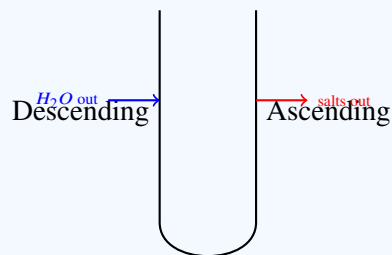
Solution

Concept: The loop of Henle plays an important role in concentrating urine. Its descending and ascending limbs differ in permeability.

Solution: Step 1: **Descending limb:** The descending limb of the loop of Henle is permeable to water but relatively impermeable to electrolytes.

Step 2: **Ascending limb:** The ascending limb is impermeable to water but allows transport of electrolytes such as Na^+ and Cl^- .

Step 3: **Conclusion:** Hence, the nephron part that is impermeable to water but permeable to electrolytes is the ascending limb of the loop of Henle.



Ascending limb: water impermeable

Final Answer:

Ascending limb of Loop of Henle

Answer: (C)



Q38.

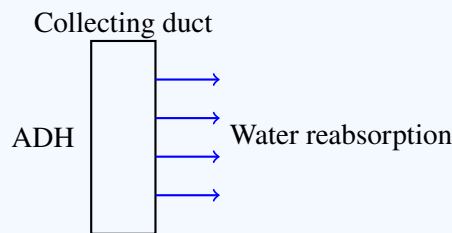
Solution

Concept: Antidiuretic hormone, or ADH, regulates water balance by increasing water reabsorption in the distal parts of the nephron.

Solution: Step 1: **Source of ADH:** ADH is released from the posterior pituitary. It acts mainly on the distal convoluted tubule and collecting duct.

Step 2: **Action of ADH:** ADH increases the permeability of these nephron segments to water by promoting insertion of aquaporins.

Step 3: **Result:** More water is reabsorbed into blood, urine becomes concentrated, and water loss is reduced. Therefore, ADH is responsible for water reabsorption from distal parts of the nephron.



Final Answer:

ADH

Answer: (A)

Q39.

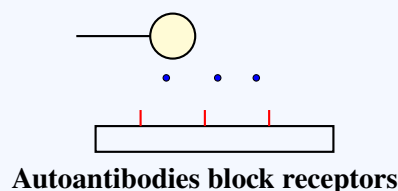
Solution

Concept: Myasthenia gravis is an autoimmune disorder in which antibodies affect neuromuscular transmission, causing muscle weakness and fatigue.

Solution: Step 1: **Neuromuscular junction:** At the neuromuscular junction, acetylcholine released from the nerve ending binds to receptors on the muscle membrane.

Step 2: **Autoimmune action:** In myasthenia gravis, antibodies are produced against acetylcholine receptors. This reduces the ability of muscles to receive nerve impulses.

Step 3: **Clinical result:** Due to poor neuromuscular transmission, skeletal muscles show weakness and fatigue. Therefore, the correct disorder is myasthenia gravis.



Final Answer:

Myasthenia gravis

Answer: (B)



Q40.

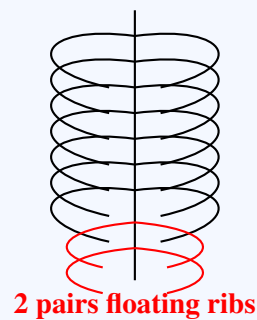
Solution

Concept: The human rib cage has 12 pairs of ribs. The last two pairs are called floating ribs because they are not attached anteriorly to the sternum.

Solution: Step 1: **Types of ribs:** First 7 pairs are true ribs because they attach directly to the sternum. The 8th, 9th, and 10th pairs are false ribs.

Step 2: **Floating ribs:** The 11th and 12th pairs do not attach to the sternum in front. Therefore, they are called floating ribs.

Step 3: **Counting floating ribs:** Since the 11th and 12th pairs are floating ribs, the human body has 2 pairs of floating ribs.



Final Answer:

2 pairs

Answer: (B)



Q41.

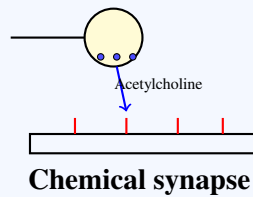
Solution

Concept: A synapse is a junction between two neurons or between a neuron and an effector. In a chemical synapse, the nerve impulse is transmitted through a chemical neurotransmitter.

Solution: Step 1: **Synaptic transmission:** When an impulse reaches the axon terminal, synaptic vesicles release neurotransmitter into the synaptic cleft.

Step 2: **Chemical involved:** In many synapses, especially at the neuromuscular junction, the chemical neurotransmitter released is acetylcholine.

Step 3: **Eliminating other options:** Cholinesterase breaks down acetylcholine. ATP is an energy molecule and DNA is genetic material. Therefore, the chemical transmitted across the synapse is acetylcholine.

**Final Answer:**

Acetylcholine

Answer: (B)

Q42.

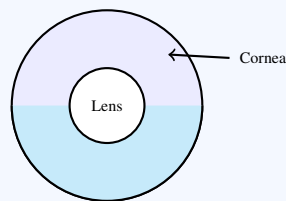
Solution

Concept: Tissue rejection usually occurs when immune cells and antibodies reach the transplanted tissue through blood supply. Cornea has very poor or no direct blood supply.

Solution: Step 1: **Cornea structure:** The cornea is the transparent anterior part of the eye. It receives oxygen directly from air and nutrients from aqueous humour rather than blood vessels.

Step 2: **Immune privilege:** Since the cornea lacks blood vessels, immune cells have very limited access to it. This reduces the chance of immune rejection after transplantation.

Step 3: **Conclusion:** Corneal grafts are rarely rejected mainly because the cornea is avascular, meaning it has no blood supply.



Cornea: avascular tissue

Final Answer:

It has no blood supply.

Answer: (B)



Q43.

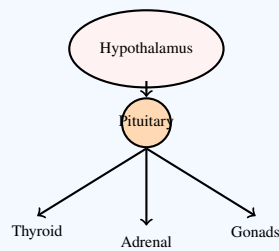
Solution

Concept: The pituitary gland is called the master gland because it secretes several tropic hormones that regulate the activity of other endocrine glands.

Solution: Step 1: **Location and control:** The pituitary gland is located below the hypothalamus and is controlled by hypothalamic releasing and inhibiting hormones.

Step 2: **Hormones secreted:** It secretes hormones such as TSH, ACTH, FSH, LH, GH and prolactin. TSH controls thyroid gland, ACTH controls adrenal cortex, and FSH/LH control gonads.

Step 3: **Reason for name:** Since it regulates many other endocrine glands, the pituitary gland is known as the master gland.

**Final Answer:**

Pituitary

Answer: (C)



Q44.

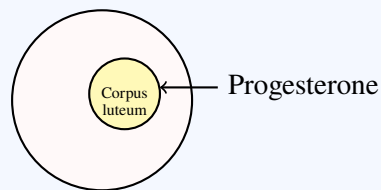
Solution

Concept: A temporary endocrine gland is a gland that forms for a limited period and secretes hormones only during a particular physiological phase.

Solution: Step 1: **Formation of corpus luteum:** After ovulation, the ruptured Graafian follicle changes into the corpus luteum.

Step 2: **Endocrine function:** Corpus luteum secretes progesterone, which maintains the endometrium and supports early pregnancy.

Step 3: **Temporary nature:** If fertilization does not occur, corpus luteum degenerates. Therefore, it is a temporary endocrine gland in the human body.



Temporary endocrine gland

Final Answer:

Corpus luteum

Answer: (B)



Q45.

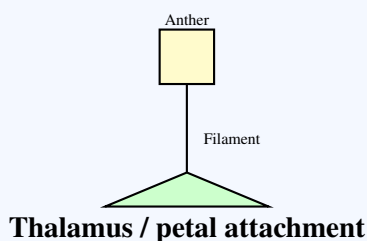
Solution

Concept: A stamen has two main parts: filament and anther. The proximal end is the lower end near the base, while the distal end is the upper end.

Solution: Step 1: **Structure of stamen:** A stamen consists of a long stalk called filament and a terminal fertile part called anther.

Step 2: **Attachment of filament:** The distal end of the filament bears the anther, while the proximal end is attached to the thalamus or sometimes to the petal.

Step 3: **Conclusion:** Therefore, the proximal end of the filament of stamen is attached to the thalamus or petal.



Final Answer:

Thalamus or petal

Answer: (C)

Q46.

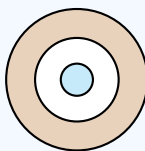
Solution

Concept: In many seeds, the seed coat is thin and membranous. However, in some fruits and seeds, protective coverings are thick and hard.

Solution: Step 1: **Seed coat in legumes:** Groundnut and gram have seed coats that are relatively thin compared with hard-shelled fruits.

Step 2: **Seed coat in maize:** In maize, the seed coat is fused with the fruit wall because maize grain is a caryopsis.

Step 3: **Condition in coconut:** Coconut has a hard protective covering and the seed coat is not thin and membranous. Therefore, coconut is the correct option.



Coconut: thick protective covering

Final Answer:

Coconut

Answer: (D)



Q47.

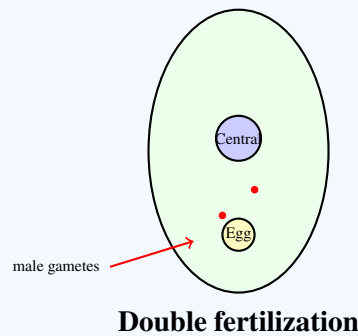
Solution

Concept: In angiosperms, double fertilization occurs. Two male gametes are released into a synergid by the pollen tube.

Solution: Step 1: **Entry of pollen tube:** The pollen tube usually enters the embryo sac through the micropylar end and discharges two male gametes into one of the synergids.

Step 2: **First fusion:** One male gamete fuses with the egg cell to form the diploid zygote. This is called syngamy.

Step 3: **Second fusion:** The other male gamete fuses with the two polar nuclei or secondary nucleus of the central cell to form the triploid primary endosperm nucleus. This is called triple fusion.

**Final Answer:**

One fuses with the egg and other fuses with central cell nuclei.

Answer: (A)



Q48.

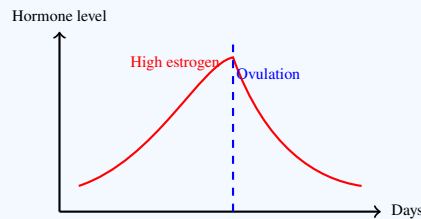
Solution

Concept: Ovulation is controlled by hormonal changes during the menstrual cycle. A high level of estrogen causes a surge in luteinizing hormone, which triggers ovulation.

Solution: Step 1: **Follicular growth:** During the follicular phase, the growing Graafian follicle secretes increasing amounts of estrogen.

Step 2: **Hormonal trigger:** High estrogen level causes positive feedback on the pituitary, leading to a sudden LH surge. This LH surge causes rupture of the Graafian follicle.

Step 3: **Given options:** Although LH surge directly triggers ovulation, the option given that causes ovulation is high concentration of estrogen because it induces the LH surge.



Final Answer:

High concentration of Estrogen

Answer: (D)

Q49.

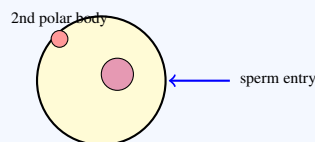
Solution

Concept: In human oogenesis, the secondary oocyte remains arrested in metaphase II. It completes meiosis II only after sperm entry.

Solution: Step 1: **Before fertilization:** At ovulation, the released secondary oocyte has completed meiosis I and contains the first polar body. It is arrested in metaphase II.

Step 2: **After sperm entry:** Entry of sperm stimulates completion of meiosis II. This results in formation of the ovum and extrusion of the second polar body.

Step 3: **Timing:** The second polar body is extruded after entry of sperm but before fusion of male and female pronuclei. Hence, it occurs after sperm entry but before fertilization is completed.



Completion of meiosis II

Final Answer:

After entry of sperm but before fertilization.

Answer: (A)



Q50.

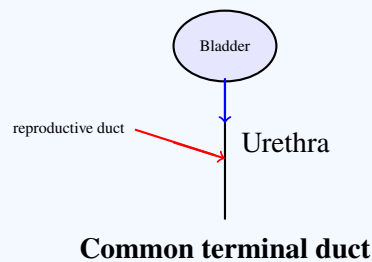
Solution

Concept: In human males, the urinary and reproductive systems share a common terminal passage for the discharge of urine and semen.

Solution: Step 1: **Urinary role:** The urethra carries urine from the urinary bladder to the outside of the body.

Step 2: **Reproductive role:** During ejaculation, semen also passes through the urethra to the exterior.

Step 3: **Eliminating other ducts:** Ureter carries urine from kidney to bladder. Vas deferens transports sperm from epididymis to ejaculatory duct. Vasa efferentia connect rete testis to epididymis. Therefore, the shared terminal duct is urethra.

**Final Answer:**

Urethra

Answer: (A)



Q51.

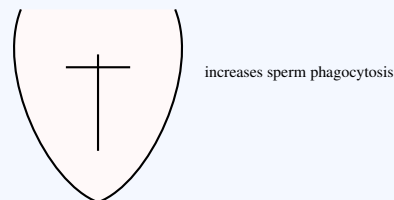
Solution

Concept: Intrauterine devices are contraceptive devices inserted into the uterus by trained medical personnel. They prevent pregnancy mainly by affecting sperm movement, fertilization, and implantation.

Solution: Step 1: **Nature of IUDs:** IUDs are inserted into the uterus and may be non-medicated, copper-releasing, or hormone-releasing. They are not inserted by the user herself; they require medical insertion.

Step 2: **Action of IUDs:** IUDs increase phagocytosis of sperms within the uterus. Copper-releasing IUDs also suppress sperm motility and fertilizing capacity.

Step 3: **Eliminating wrong options:** IUDs need replacement after a certain period. They do not generally suppress gametogenesis. Therefore, the correct statement is that IUDs increase phagocytosis of sperms in the uterus.

**IUD inside uterus****Final Answer:**

IUDs increase phagocytosis of sperms in the uterus.

Answer: (C)



Q52.

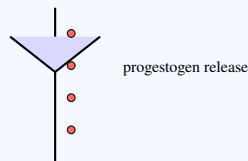
Solution

Concept: IUDs are classified as non-medicated, copper-releasing, and hormone-releasing devices. Hormone-releasing IUDs release progestogens.

Solution: Step 1: **Non-medicated and copper IUDs:** Lippes loop is a non-medicated IUD. Multiload 375 is a copper-releasing IUD.

Step 2: **Hormone-releasing IUDs:** Progestasert and LNG-20 are hormone-releasing intrauterine devices. They release progesterone or levonorgestrel.

Step 3: **Mechanism:** These hormones make the uterus unsuitable for implantation and make cervical mucus hostile to sperms. Therefore, the hormone-releasing IUDs are Progestasert and LNG-20.

**Hormone-releasing IUD****Final Answer:**

Progestasert, LNG-20

Answer: (C)



Q53.

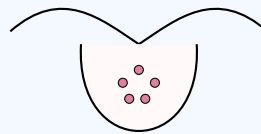
Solution

Concept: In assisted reproductive technology, the site of embryo transfer depends on the developmental stage of the embryo.

Solution: Step 1: **Early embryo transfer:** A zygote or embryo with up to 8 blastomeres is transferred into the fallopian tube. This is called ZIFT.

Step 2: **Later embryo transfer:** An embryo with more than 8 blastomeres, including embryos with more than 16 blastomeres, is transferred into the uterus. This is called IUT.

Step 3: **Conclusion:** Since the question mentions an embryo with more than 16 blastomeres, it should be transferred into the uterus.



Embryo transferred into uterus

Final Answer:

Uterus

Answer: (A)

Q54.

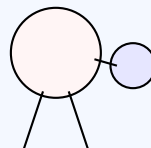
Solution

Concept: Traditional contraceptive methods are natural methods that prevent fertilization without using devices, surgery, or chemical barriers.

Solution: Step 1: **Traditional methods:** Traditional methods include periodic abstinence, withdrawal method, and lactational amenorrhea.

Step 2: **Lactational amenorrhea:** During intense lactation after childbirth, ovulation and menstrual cycle are suppressed for some time. This naturally reduces the chance of conception.

Step 3: **Eliminating other options:** Condoms are barrier methods, IUDs are intrauterine devices, and sterilization is a surgical method. Therefore, lactational amenorrhea is a traditional method.



Lactational amenorrhea

Final Answer:

Lactational amenorrhea

Answer: (C)



Q55.

Solution

Concept: Turner's syndrome is a chromosomal disorder in females caused by monosomy of the X chromosome.

Solution: Step 1: **Normal female chromosome complement:** A normal human female has 46 chromosomes with XX sex chromosomes.

Step 2: **Turner's syndrome:** In Turner's syndrome, one X chromosome is missing. The individual has 45 chromosomes with XO condition.

Step 3: **Symptoms and fertility:** Such females are usually sterile with underdeveloped ovaries and do not produce children normally. Therefore, the correct statement is 45 chromosomes with XO.

XXXXX X

XO condition: one X chromosome missing

Final Answer:

Has 45 chromosomes with XO.

Answer: (A)

Q56.

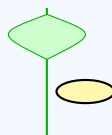
Solution

Concept: Mendel studied seven pairs of contrasting characters in garden pea, including plant height, seed shape, seed color, flower color, pod shape, pod color, and flower position.

Solution: Step 1: **Characters studied by Mendel:** Mendel studied characters like plant height, seed color, and pod shape in pea plants.

Step 2: **Checking the given options:** Plant height, seed color, and pod shape are among the seven characters studied by Mendel.

Step 3: **Not studied by Mendel:** Trichomes, whether glandular or non-glandular, were not one of Mendel's seven selected pea characters.



Mendel studied pea traits, not trichomes

Final Answer:

Trichomes (Glandular or non-glandular)

Answer: (B)



Q59.

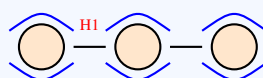
Solution

Concept: Histones help in packaging DNA in eukaryotic chromosomes. Histone H1 is a linker histone associated with higher-order chromatin organization.

Solution: Step 1: **Nucleosome structure:** A nucleosome consists of DNA wrapped around a histone octamer made of *H2A*, *H2B*, *H3*, and *H4*.

Step 2: **Role of histone H1:** Histone H1 binds to the linker DNA near the nucleosome and helps bring nucleosomes closer together.

Step 3: **Chromatin condensation:** The association of H1 with nucleosome indicates that DNA is being condensed into a chromatin fiber.



H1 promotes chromatin condensation

Final Answer:

The DNA is condensed into a chromatin fiber.

Answer: (B)

Q60.

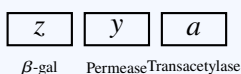
Solution

Concept: The lac operon contains structural genes *z*, *y*, and *a*. These genes code for enzymes involved in lactose metabolism.

Solution: Step 1: **Structural genes of lac operon:** The *z* gene codes for β -galactosidase, the *y* gene codes for permease, and the *a* gene codes for transacetylase.

Step 2: **Function of permease:** Permease helps lactose enter the bacterial cell by increasing the permeability of the cell membrane to lactose.

Step 3: **Conclusion:** Since the gene *y* codes for permease, the correct answer is permease.



Lac operon structural genes

Final Answer:

Permease

Answer: (B)



Q61.

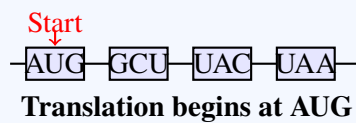
Solution

Concept: A start codon is the codon that initiates translation. It signals the ribosome to begin protein synthesis.

Solution: Step 1: **Understanding codons:** A codon is a sequence of three nucleotides present on mRNA. Each codon specifies an amino acid or a stop signal.

Step 2: **Start codon:** The codon AUG acts as the start codon in most organisms. It codes for methionine in eukaryotes and formyl methionine in prokaryotes.

Step 3: **Eliminating other options:** UAA, UAG, and UGA are stop codons. They terminate translation and do not initiate protein synthesis.



Final Answer:

AUG

Answer: (C)

Q62.

Solution

Concept: Translation is the process by which the genetic message present in mRNA is used to synthesize a polypeptide chain or protein.

Solution: Step 1: **Central dogma:** Genetic information generally flows from DNA to RNA by transcription and from RNA to protein by translation.

Step 2: **Meaning of translation:** During translation, ribosomes read codons present on mRNA and join amino acids in the correct sequence to form a protein.

Step 3: **Eliminating other options:** DNA → RNA is transcription, DNA → DNA is replication, and RNA → DNA is reverse transcription. Therefore, translation is RNA → Protein.



Final Answer:

RNA → Protein

Answer: (B)



Q63.

Solution

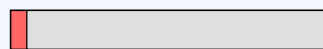
Concept: The Human Genome Project revealed that only a very small portion of the human genome codes for proteins. Most of the genome consists of non-coding DNA and repetitive sequences.

Solution: Step 1: **Gene number:** The human genome was estimated to contain around 30,000 genes in standard NCERT-based descriptions. Hence, option A is considered a feature.

Step 2: **Coding percentage:** Less than 2% of the human genome codes for proteins. Therefore, the statement that more than 98% codes for proteins is incorrect.

Step 3: **Other features:** Repetitive sequences form a large portion of the genome, and chromosome 1 has the maximum number of genes. Thus, the incorrect feature is option B.

Coding < 2% Non-coding / repetitive DNA



Human genome

Final Answer:

More than 98% of the genome codes for proteins.

Answer: (B)



Q64.

Solution

Concept: According to the Hardy-Weinberg principle, if the frequency of allele A is p and allele a is q , then genotype frequencies are p^2 , $2pq$, and q^2 .

Solution: Step 1: **Given value:** The frequency of dominant allele A is $p = 0.4$. Since $p + q = 1$, the frequency of allele a is:

$$q = 1 - 0.4 = 0.6$$

Step 2: **Calculate homozygous dominant frequency:**

$$AA = p^2 = (0.4)^2 = 0.16$$

Step 3: **Calculate heterozygous frequency:**

$$Aa = 2pq = 2(0.4)(0.6) = 0.48$$

Step 4: **Calculate homozygous recessive frequency:**

$$aa = q^2 = (0.6)^2 = 0.36$$

	A	a
A	p^2	pq
a	pq	q^2
	$p^2 : 2pq : q^2$	

Final Answer:

$$0.16 (AA); 0.48 (Aa); 0.36 (aa)$$

Answer: (A)



Q65.

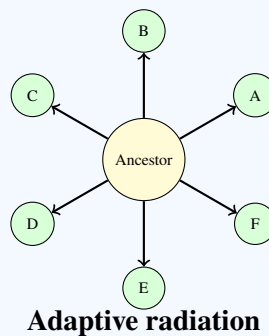
Solution

Concept: Adaptive radiation is the evolutionary process in which organisms diversify from a common ancestral form into different species adapted to different ecological niches.

Solution: Step 1: **Meaning of radiation:** Radiation means spreading out from a common point. In evolution, it refers to the diversification of an ancestral group into many forms.

Step 2: **Adaptive nature:** The new species adapt to different habitats, food sources, and ecological conditions in a geographical area.

Step 3: **Example:** Darwin's finches in the Galapagos Islands are a classic example of adaptive radiation, where different beak types evolved from a common ancestor.



Final Answer:

Adaptive radiation

Answer: (A)



Q66.

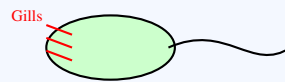
Solution

Concept: Embryological and larval features can provide evidence of evolutionary ancestry. Tadpole larva of frog has gills, showing resemblance with aquatic gilled ancestors.

Solution: Step 1: **Tadpole stage:** Frog has an aquatic tadpole larva. Tadpole respire through gills before metamorphosing into an adult frog.

Step 2: **Evolutionary indication:** The presence of gills in the larval stage indicates that amphibians evolved from ancestors that had gills and lived in water.

Step 3: **Conclusion:** Therefore, the presence of gills in frog tadpole suggests that frogs evolved from gilled ancestors.



Tadpole shows gilled ancestry

Final Answer:

Frogs evolved from gilled ancestors.

Answer: (C)

Q67.

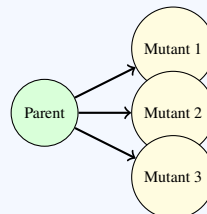
Solution

Concept: Hugo de Vries proposed mutation theory of evolution. According to him, mutations are sudden changes that can produce new forms.

Solution: Step 1: **Mutation theory:** Hugo de Vries studied *Oenothera lamarckiana* and proposed that evolution occurs by sudden mutations rather than only by gradual variations.

Step 2: **Nature of mutations:** Mutations arise randomly. They are not guided towards a particular adaptive direction.

Step 3: **Conclusion:** Therefore, variations caused by mutation, as proposed by Hugo de Vries, are random and directionless.



Random directionless mutations

Final Answer:

Random and directionless

Answer: (C)



Q68.

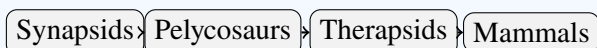
Solution

Concept: Mammals evolved from synapsid reptiles through pelycosaur and therapsid stages. Therapsids show several mammal-like features.

Solution: Step 1: **Synapsids:** Synapsids were early amniotes characterized by a single temporal opening behind the eye. They form the evolutionary line leading to mammals.

Step 2: **Pelycosaurs and therapsids:** Pelycosaurs were early synapsids. Later, therapsids evolved from them and showed more mammal-like characteristics.

Step 3: **Mammalian evolution:** Mammals evolved from therapsid ancestors. Therefore, the correct sequence is Synapsids → Pelycosaurs → Therapsids → Mammals.



Final Answer:

Synapsids → Pelycosaurs → Therapsids → Mammals

Answer: (A)

Q69.

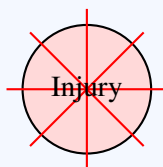
Solution

Concept: Inflammation is an innate immune response against injury or infection. It commonly includes redness, swelling, heat, pain, and sometimes fever.

Solution: Step 1: **Local inflammation:** Swelling and redness occur due to increased blood flow and leakage of fluid into tissues at the affected site.

Step 2: **Systemic response:** Fever may also occur as part of the inflammatory response due to pyrogens released during infection or immune activation.

Step 3: **Eliminating antibody production:** Production of antibodies is a specific adaptive immune response, not the typical inflammatory response listed here. Therefore, both fever and swelling-redness are examples of inflammatory response.



Inflammation: redness, swelling, fever

Final Answer:

Both A and B

Answer: (D)



Q70.

Solution

Concept: Autoimmune diseases occur when the immune system mistakenly attacks the body's own cells or tissues.

Solution: Step 1: **Autoimmune examples:** Psoriasis, rheumatoid arthritis, and vitiligo are autoimmune conditions in which immune reactions are directed against self tissues.

Step 2: **Alzheimer's disease:** Alzheimer's disease is primarily a neurodegenerative disorder characterized by progressive memory loss and cognitive decline. It is not classically classified as an autoimmune disease.

Step 3: **Conclusion:** Therefore, among the given options, Alzheimer's disease is not an autoimmune disease.



Alzheimer's: neurodegenerative disorder

Final Answer:

Alzheimer's disease

Answer: (C)

Q71.

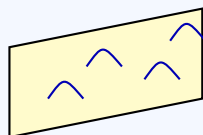
Solution

Concept: Roquefort cheese is a blue cheese produced with the help of fungi. Certain fungi give cheese its characteristic flavour, aroma, and texture.

Solution: Step 1: **Microbes in cheese production:** Different microbes are used in different varieties of cheese. They help in fermentation and ripening.

Step 2: **Roquefort cheese:** Roquefort cheese is ripened by the fungus *Penicillium roqueforti*. This fungus produces the blue-green veins and specific flavour of the cheese.

Step 3: **Conclusion:** Since Roquefort cheese is produced using a fungus, the correct option is fungi.



Roquefort cheese: fungal ripening

Final Answer:

Fungi

Answer: (C)



Q72.

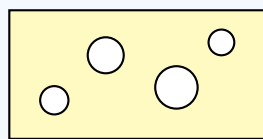
Solution

Concept: Swiss cheese contains large holes because of gas production during microbial fermentation.

Solution: Step 1: **Microbial action:** Swiss cheese is produced with the help of bacteria such as *Propionibacterium shermanii*.

Step 2: **Gas formation:** This bacterium produces a large amount of carbon dioxide during fermentation. The trapped CO_2 gas forms large holes in the cheese.

Step 3: **Conclusion:** Therefore, the large holes in Swiss cheese are due to a bacterium producing a large amount of CO_2 .



CO_2 bubbles form holes

Final Answer:

A bacterium producing a large amount of CO_2 .

Answer: (A)

Q73.

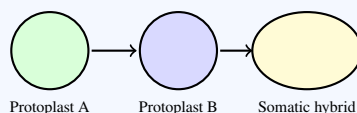
Solution

Concept: Protoplast fusion is a technique in which cell walls are removed and naked plant cells are fused to produce hybrid cells. It is mainly used in plant tissue culture and somatic hybridization.

Solution: Step 1: **Meaning of protoplast:** A protoplast is a plant cell without its cell wall. The cell wall is removed enzymatically using cellulase and pectinase.

Step 2: **Fusion process:** Two protoplasts from different varieties or species can be fused to form a somatic hybrid cell.

Step 3: **Field of use:** This technique is tested and performed under tissue culture conditions because isolated cells are grown and regenerated in artificial nutrient media.



Final Answer:

Tissue culture

Answer: (A)



Q74.

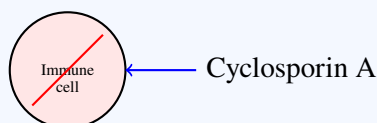
Solution

Concept: Bioactive molecules are biologically active compounds produced by microbes. Some are used as medicines, including immunosuppressants.

Solution: Step 1: **Understanding immunosuppressants:** Immunosuppressants reduce immune response. They are important after organ transplantation to prevent graft rejection.

Step 2: **Cyclosporin A:** Cyclosporin A is produced by the fungus *Trichoderma polysporum*. It is used as an immunosuppressive agent.

Step 3: **Eliminating other options:** Statins lower blood cholesterol. Streptokinase dissolves blood clots. Citric acid is an organic acid. Hence, the immunosuppressant is Cyclosporin A.



Immune response suppressed

Final Answer:

Cyclosporin A

Answer: (C)

Q75.

Solution

Concept: Restriction endonucleases are enzymes that cut DNA at specific recognition sequences. Hence, they are called biological scissors.

Solution: Step 1: **Role in genetic engineering:** Genetic engineering requires cutting DNA at desired sites so that a gene of interest can be inserted into a vector.

Step 2: **Restriction endonuclease action:** Restriction endonucleases recognize specific palindromic DNA sequences and cut both strands of DNA.

Step 3: **Eliminating other enzymes:** Ligase joins DNA fragments, polymerase synthesizes DNA, and helicase unwinds DNA. Therefore, restriction endonuclease is the biological scissor.



Restriction endonuclease cuts DNA

Final Answer:

Restriction endonuclease

Answer: (C)



Q76.

Solution

Concept: DNA carries negative charge because of phosphate groups present in its sugar-phosphate backbone.

Solution: Step 1: **DNA backbone:** DNA is made up of nucleotides. Each nucleotide has a sugar, nitrogenous base, and phosphate group.

Step 2: **Charge on DNA:** Phosphate groups are negatively charged. Since many phosphate groups are present along the DNA backbone, DNA fragments are negatively charged.

Step 3: **Importance in electrophoresis:** Due to this negative charge, DNA fragments move towards the positive electrode during gel electrophoresis.

- - - - -
————— → Positive electrode
DNA is negatively charged

Final Answer:

Negatively charged

Answer: (B)



Q77.

Solution

Concept: A palindromic DNA sequence is a sequence that reads the same on both strands when read in the same direction, usually from 5' to 3'.

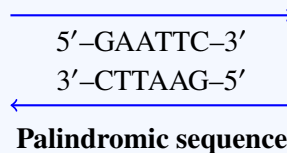
Solution: Step 1: **Meaning of palindrome:** In DNA, a palindrome is not read exactly like a word palindrome on the same strand. It is read the same on complementary strands in the 5' → 3' direction.

Step 2: **Example:** A common example is:

$$5'-GAATTC-3'$$
$$3'-CTTAAG-5'$$

Both strands show the same sequence when read from 5' to 3'.

Step 3: **Importance:** Restriction endonucleases recognize such palindromic sequences and cut DNA at specific sites.



Final Answer:

Palindromic sequence

Answer: (A)



Q78.

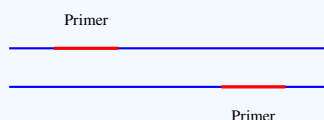
Solution

Concept: PCR, or Polymerase Chain Reaction, is a technique used to amplify DNA. It requires template DNA, primers, nucleotides, and thermostable DNA polymerase.

Solution: Step 1: **DNA template:** The DNA template provides the sequence that has to be amplified.

Step 2: **Primers and Taq polymerase:** Primers initiate DNA synthesis, and Taq polymerase extends the primers at high temperature.

Step 3: **DNA ligase is not required:** DNA ligase joins DNA fragments, but PCR does not require joining separate DNA fragments. Hence, DNA ligase is not a requirement for PCR.



PCR needs template, primers, Taq polymerase

Final Answer:

DNA Ligase

Answer: (D)

Q79.

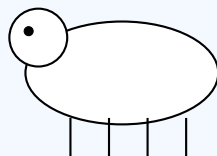
Solution

Concept: Transgenic animals are animals whose genome has been altered by introducing a foreign gene. Rosie was the first transgenic cow.

Solution: Step 1: **About Rosie:** Rosie was the first transgenic cow produced in 1997.

Step 2: **Milk produced by Rosie:** Rosie produced milk enriched with human alpha-lactalbumin. This made the milk nutritionally more balanced for human babies.

Step 3: **Conclusion:** Therefore, the first transgenic cow Rosie produced milk enriched with human alpha-lactalbumin.



Rosie: human alpha-lactalbumin milk

Final Answer:

Human alpha-lactalbumin

Answer: (A)



Q80.

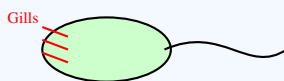
Solution

Concept: The tadpole stage of frog is aquatic and shows features that indicate evolutionary relationship with gilled ancestors.

Solution: Step 1: **Tadpole respiration:** Tadpoles live in water and respire through gills in their early developmental stage.

Step 2: **Evolutionary significance:** Presence of gills in a larval amphibian indicates that frogs evolved from ancestors that had gills and were aquatic.

Step 3: **Conclusion:** Hence, the presence of gills in the tadpole of frog indicates that frogs evolved from gilled ancestors.



Tadpole shows gilled ancestry

Final Answer:

Frogs evolved from gilled ancestors.

Answer: (C)

Q81.

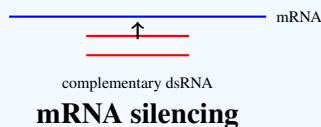
Solution

Concept: RNA interference is a gene-silencing mechanism in which double-stranded RNA prevents expression of a specific gene by targeting its complementary mRNA.

Solution: Step 1: **Meaning of RNAi:** RNA interference occurs when a complementary double-stranded RNA molecule binds to a specific mRNA molecule.

Step 2: **Silencing mechanism:** The mRNA is degraded or prevented from being translated, so the corresponding protein is not formed.

Step 3: **Conclusion:** RNAi does not directly interfere with DNA replication, nor does it synthesize cDNA. It specifically silences mRNA due to complementary dsRNA.



Final Answer:

Silencing of specific mRNA due to a complementary dsRNA.

Answer: (A)



Q82.

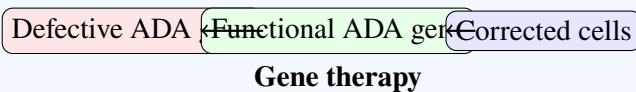
Solution

Concept: Gene therapy is a technique in which a functional gene is introduced into a patient to correct a genetic disorder.

Solution: Step 1: **First clinical gene therapy:** The first clinical gene therapy was given in 1990 to a four-year-old girl suffering from Adenosine deaminase deficiency.

Step 2: **ADA deficiency:** ADA deficiency affects the immune system and causes severe combined immunodeficiency. The patient lacks functional ADA enzyme due to a defective gene.

Step 3: **Therapeutic approach:** Functional ADA gene was introduced into the patient's lymphocytes so that ADA enzyme could be produced. Therefore, the first clinical gene therapy was given for ADA deficiency.



Final Answer:

Adenosine deaminase (ADA) deficiency

Answer: (B)

Q83.

Solution

Concept: Biopiracy refers to unauthorized use of biological resources or traditional knowledge by individuals, companies, or organizations without proper permission or compensation.

Solution: Step 1: **Meaning of bioresources:** Bioresources include plants, animals, microorganisms, genes, and traditional knowledge related to their use.

Step 2: **Unauthorized use:** When these resources are used commercially without permission from the country or local communities concerned, it is called biopiracy.

Step 3: **Conclusion:** Therefore, biopiracy is the use of bioresources without authorization.



Final Answer:

Use of bioresources without authorization.

Answer: (A)



Q84.

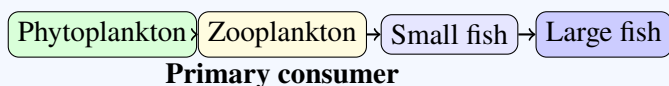
Solution

Concept: Primary consumers are organisms that directly feed on producers. In a pond ecosystem, phytoplankton are producers and zooplankton are primary consumers.

Solution: Step 1: **Producer level:** Phytoplankton are photosynthetic microscopic organisms. They produce food and form the first trophic level.

Step 2: **Primary consumer level:** Zooplankton feed directly on phytoplankton. Therefore, they occupy the second trophic level and act as primary consumers.

Step 3: **Higher consumers:** Small fish feed on zooplankton and large fish feed on small fish. Thus, the primary consumer in a pond ecosystem is zooplankton.

**Final Answer:**

Zooplankton

Answer: (B)

Q85.

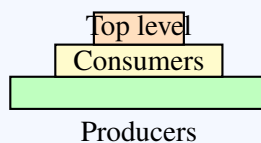
Solution

Concept: Standing crop refers to the mass of living material present at a trophic level at a particular time.

Solution: Step 1: **Meaning of biomass:** Biomass is the total dry weight or mass of living organisms present in an ecosystem or trophic level.

Step 2: **Standing crop:** The amount of living matter present at a trophic level at a given time is known as standing crop. It may be expressed as biomass or number of organisms.

Step 3: **Eliminating other options:** Standing state refers to the amount of inorganic nutrients. Primary productivity is the rate of biomass production by producers. Net productivity is biomass remaining after respiratory losses.

Biomass at a given time = Standing crop**Final Answer:**

Standing crop

Answer: (A)



Q86.

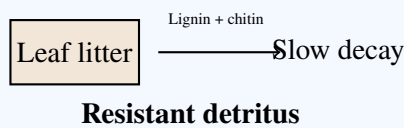
Solution

Concept: Decomposition is affected by the chemical composition of detritus. Organic matter rich in lignin and chitin decomposes slowly.

Solution: Step 1: **Fast decomposition:** Detritus rich in nitrogen and water-soluble substances such as sugars decomposes faster because microbes can easily digest them.

Step 2: **Slow decomposition:** Lignin and chitin are complex and resistant compounds. They are difficult for decomposers to break down.

Step 3: **Conclusion:** Therefore, decomposition of organic matter is slower if it is rich in lignin and chitin.



Final Answer:

Lignin and chitin

Answer: (B)

Q87.

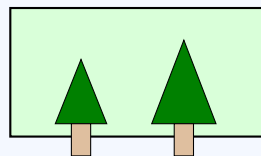
Solution

Concept: Biodiversity conservation may be in situ or ex situ. In situ conservation protects organisms in their natural habitats and is considered the most effective method.

Solution: Step 1: **In situ conservation:** In situ conservation means protecting species in their natural ecosystems. Examples include biosphere reserves, national parks, wildlife sanctuaries, and sacred groves.

Step 2: **Why it is effective:** It conserves not only individual species but also their habitats, interactions, gene pools, and evolutionary processes.

Step 3: **Ex situ comparison:** Ex situ conservation, such as zoos and botanical gardens, protects organisms outside their natural habitat. It is useful but not as comprehensive as in situ conservation.



Natural habitat conservation

Final Answer:

In situ conservation

Answer: (A)



Q88.

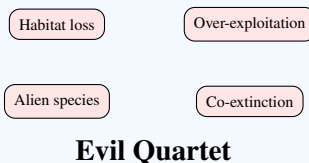
Solution

Concept: The Evil Quartet is a term used for the four major causes of biodiversity loss.

Solution: Step 1: **Meaning of Evil Quartet:** The term refers to four major threats responsible for decline and extinction of biodiversity.

Step 2: **Four causes:** These include habitat loss and fragmentation, over-exploitation, alien species invasion, and co-extinctions.

Step 3: **Conclusion:** Therefore, the Evil Quartet describes the four major causes of biodiversity loss.



Final Answer:

Four major causes of biodiversity loss.

Answer: (A)

Q89.

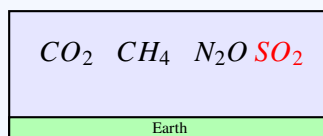
Solution

Concept: Greenhouse gases trap heat in the atmosphere and contribute to global warming. Major greenhouse gases include CO_2 , CH_4 , N_2O , water vapour, and CFCs.

Solution: Step 1: **Checking greenhouse gases:** Carbon dioxide, methane, and nitrous oxide are well-known greenhouse gases. They absorb infrared radiation and trap heat.

Step 2: **Checking sulphur dioxide:** SO_2 is an air pollutant mainly associated with acid rain. It is not generally classified as a major greenhouse gas.

Step 3: **Conclusion:** Therefore, among the given options, SO_2 is not a greenhouse gas.



SO_2 : air pollutant, not major greenhouse gas

Final Answer:

SO_2

Answer: (D)



Q90.

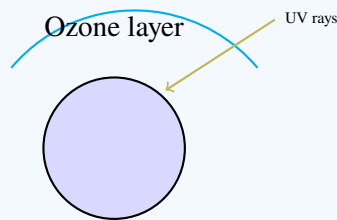
Solution

Concept: World Ozone Day is observed to create awareness about the protection of the ozone layer and the importance of controlling ozone-depleting substances.

Solution: Step 1: **Ozone layer importance:** The ozone layer absorbs harmful ultraviolet radiation from the Sun and protects living organisms on Earth.

Step 2: **Date of observance:** World Ozone Day is celebrated every year on 16th September. This date marks the signing of the Montreal Protocol.

Step 3: **Conclusion:** Therefore, World Ozone Day is celebrated on 16th September.



World Ozone Day: 16th September

Final Answer:

16th September

Answer: (A)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	B	3	C	4	A	5	C
6	D	7	B	8	D	9	B	10	B
11	B	12	A	13	A	14	B	15	B
16	D	17	C	18	B	19	B	20	B
21	B	22	B	23	A	24	C	25	C
26	C	27	B	28	C	29	B	30	C
31	A	32	B	33	B	34	B	35	B
36	C	37	C	38	A	39	B	40	B
41	B	42	B	43	C	44	B	45	C
46	D	47	A	48	D	49	A	50	A
51	C	52	C	53	A	54	C	55	A
56	B	57	C	58	C	59	B	60	B
61	C	62	B	63	B	64	A	65	A
66	C	67	C	68	A	69	D	70	C
71	C	72	A	73	A	74	C	75	C
76	B	77	A	78	D	79	A	80	C
81	A	82	B	83	A	84	B	85	A
86	B	87	A	88	A	89	D	90	A

