phosphorylation of GDP to GTP (or ADP to ATP).

Quick Tip

This step in the Krebs cycle is a substrate-level phosphorylation where energy is conserved directly in the form of GTP or ATP.

ZOOLOGY

SECTION-A

151. Match List I with List II:

List I

A. Down's syndrome

B. $\alpha - Thalassemia$

C. $\beta - Thalassemia$

D. Klinefelter's syndrome

List II

I. 11th chromosome

II. 'X' chromosome

III. 21st chromosome

IV. 16th chromosome

Choose the correct answer from the options given below:

(1) A-IV, B-I, C-II, D-III

(2) A-II, B-III, C-IV, D-I

(3) A-III, B-IV, C-I, D-II

(4) A-III, B-IV, C-I, D-II

Correct Answer: (4) A-III, B-IV, C-I, D-II

Solution:

- A-III: Down's syndrome is associated with an extra copy of chromosome 21.

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- B-IV: -Thalassemia involves mutations in genes on chromosome 16.
- C-I: -Thalassemia involves mutations in genes on chromosome 11.
- D-II: Klinefelter's syndrome is characterized by one or more extra 'X' chromosomes in males.

Quick Tip

Genetic disorders can often be traced to specific chromosomal abnormalities, which help in their diagnosis and understanding of the condition.

---

152. Match List I with List II:

List I

A. Axoneme

B. Cartwheel pattern

C. Crista

D. Satellite

List II

I. Centriole

II. Cilia and flagella

III. Chromosome

IV. Mitochondria

Choose the correct answer from the options given below:

(1) A-I, B-I, C-IV, D-III

(2) A-II, B-III, C-I, D-IV

(3) A-II, B-I, C-IV, D-III

(4) A-II, B-I, C-III, D-IV

Correct Answer: **(1)** A-II, B-I, C-IV, D-III

Solution:

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- A-II: The axoneme is the central shaft of cilia and flagella, consisting of microtubules in a '9+2' arrangement.
- B-I: The cartwheel pattern is characteristic of the centriole structure.
- C-IV: Cristae are the folds of the inner mitochondrial membrane.
- D-III: Satellites are often associated with specific regions on chromosomes.

Quick Tip

Understanding cellular structures is crucial for insights into their functions and roles in various cellular processes.

---

153. Given below are two statements: one is labelled as Assertion and the other as Reason:

Assertion A: FSH acts upon ovarian follicles in female and Leydig cells in male.

Reason R: Growing ovarian follicles secrete estrogen in female while interstitial cells secrete androgen in male human being.

In the light of the above statements, Choose the correct answer from the options given below:

(1) A is false but R is true

(2) Both A and R are true and R is the correct explanation of A

(3) Both A and R are true but R is NOT the correct explanation of A

(4) A is true but R is false

Correct Answer: (1) A is false but R is true

Solution: FSH acts on the Sertoli cells in males, not Leydig cells. It is true that growing ovarian follicles secrete estrogen in females. Therefore, while R is true, A is incorrect as it incorrectly identifies the cell type acted upon by FSH in males.

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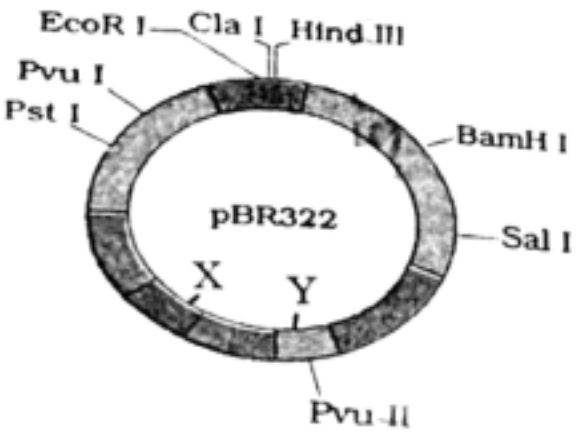
Quick Tip

Correct understanding of hormone interactions with specific cell types is critical for comprehending endocrine system functions.

---

154. The following diagram showing restriction sites in *E. coli* cloning vector pBR322. Find the role of 'X' and 'Y' genes:



(1) Gene 'X' is responsible for recognition sites and 'Y' is responsible for antibiotic resistance.

(2) The gene 'X' is responsible for resistance to antibiotics and 'Y' for protein involved in the replication of the plasmid.

(3) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.

(4) The gene 'X' is for protein involved in replication of Plasmid and 'Y' for resistance to antibiotics.

Correct Answer: (3) The gene 'X' is responsible for controlling the copy number of the linked DNA and 'Y' for protein involved in the replication of Plasmid.

Solution: In the pBR322 plasmid, gene 'X' typically encodes functions that control the plasmid's copy number, ensuring the plasmid is replicated within the host. Gene 'Y' often encodes proteins essential for the replication process of the plasmid itself, facilitating its maintenance in the bacterial cell.

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Quick Tip

Understanding the functional roles of genes in plasmid vectors is crucial for effective genetic engineering and biotechnology applications.

---

155. Given below are two statements: one is labelled as Assertion and the other as Reason:

Assertion A: The presence or absence of hymen is not a reliable indicator of virginity.

Reason R: The hymen is torn during the first coitus only.

In the light of the above statements, Choose the correct answer from the options given below:

(1) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

(4) Statement I is true but Statement II is false

Correct Answer: (4) Statement I is true but Statement II is false

Solution: The presence or absence of the hymen is not a reliable indicator of virginity as it can be torn due to various non-sexual activities as well. The hymen may not necessarily be torn during the first coitus, making Statement II false.

Quick Tip

Medical myths surrounding the hymen are widespread and often contribute to misconceptions about female virginity.

---

156. Which one is the correct product of DNA dependent RNA polymerase to the given template?

Given template: 3'TACATGGAAAATTACCTTCA5'

Choose the correct answer from the options given below:

(1) 5'ATGTACCTTTTAATGGAGT3'

(2) 5'AUGUACCUUUUAAUGGAAGU3'

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(3) 5'AUGAAAGUUUAUGGUAGAGU3'

(4) 5'AUGUACCGUUUAUAGGGAGU3'

Correct Answer: (2) 5'AUGUACCUUUUAAUGGAAGU3'

Solution: RNA polymerase synthesizes RNA by reading the DNA template strand in the 3' to 5' direction, creating an RNA strand that is complementary and antiparallel to the template. The RNA sequence provided in option 2 is the correct transcription of the given DNA template.

Quick Tip

Understanding transcription fundamentals is key in genetics, aiding in everything from basic biology to advanced genetic engineering.

---

157. Match List I with List II:

List I

A. *Pterophyllum*

B. *Myxine*

C. *Pristis*

D. *Exocoetus*

List II

I. Hag fish

II. Saw fish

III. Angel fish

IV. Flying fish

Choose the correct answer from the options given below:

(1) A-III, B-I, C-II, D-IV

(2) A-II, B-IV, C-III, D-I

(3) A-III, B-I, C-IV, D-II

(4) A-IV, B-I, C-II, D-III

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Correct Answer: **(1)** A-III, B-I, C-II, D-IV

Solution:

- A-III: *Pterophyllum* is commonly known as the angel fish.
- B-I: *Myxine* is commonly known as the hag fish.
- C-II: *Pristis* is commonly known as the saw fish.
- D-IV: *Exocoetus* is commonly known as the flying fish.

Quick Tip

Matching organisms with their common names enhances understanding of biodiversity and aids in biological studies.

---

158. Which of the following is not a natural/traditional contraceptive method?

Choose the correct answer from the options given below:

(1) Vaults

(2) Coitus interruptus

(3) Periodic abstinence

(4) Lactational amenorrhea

Correct Answer: **(1)** Vaults

Solution: Vaults, typically referred to as cervical caps, are barrier methods of contraception and not considered a traditional or natural method, unlike the other options which involve behavioral approaches without the use of external devices.

Quick Tip

It is important to understand the various types of contraceptive methods to choose the most suitable one based on individual needs and circumstances.

---

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159. In both sexes of cockroach, a pair of jointed filamentous structures called anal cerci are present on which segment?

Choose the correct answer from the options given below:

(1) 11th segment

(2) 5th segment

(3) 10th segment

(4) 8th and 9th segment

Correct Answer: (3) 10th segment

Solution: Anal cerci are located on the 10th segment of a cockroach. They are sensory organs that can detect air movements, helping the cockroach respond to threats.

Quick Tip

Understanding the anatomy of common insects like cockroaches can provide insights into their behavior and ecology.

---

160. Match List I with List II:

List I

A. Pleurobrachia

B. Radula

C. Stomochord

D. Air bladder

List II

I. Mollusca

II. Ctenophora

III. Osteichthyes

IV. Hemichordata

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-III, D-I

(2) A-IV, B-I, C-II, D-III

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(3) A-II, B-I, C-IV, D-III

(4) A-II, B-III, C-IV, D-I

Correct Answer: (3) A-II, B-I, C-IV, D-III

Solution:

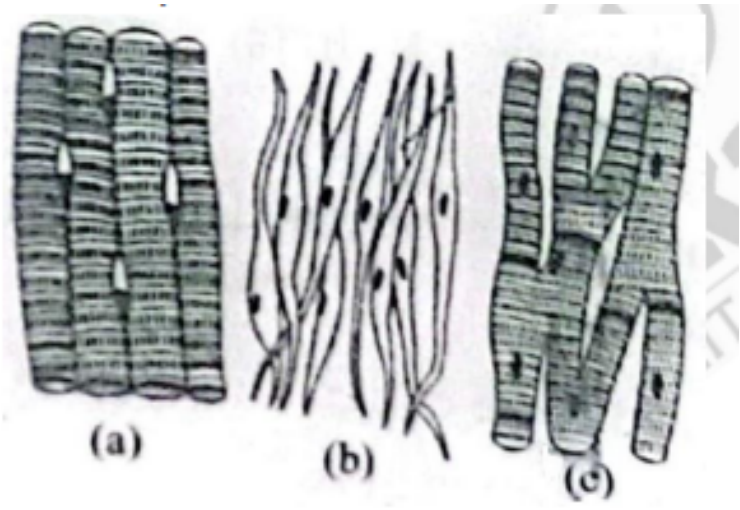
- A-II: Pleurobrachia belongs to the phylum Ctenophora, known for their distinctive comb rows.
- B-I: The radula is a characteristic feeding organ found in mollusks.
- C-IV: Stomochord is a feature of the phylum Hemichordata, reflecting its name.
- D-III: Air bladder, also known as a swim bladder, is an organ in many fish in the class Osteichthyes that helps control buoyancy.

Quick Tip

Matching anatomical features or organs with the correct animal groups helps in understanding biological diversity and phylogenetic relationships.

---

161. Three types of muscles are given as a, b, and c. Identify the correct matching pair along with their location in human body:



Name of muscle/location

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(1) (a) Involuntary – Nose tip

(2) (a) Smooth – Toes

(3) (a) Skeletal – Triceps

(4) (a) Smooth – Heart

Correct Answer: (3) (a) Skeletal – Triceps, (b) Smooth – Stomach, (c) Cardiac – Heart

Solution: Muscle types and their locations are:

- (a) Skeletal – Triceps, primarily involved in arm movements.
- (b) Smooth – Stomach, involved in digestion through involuntary contractions.
- (c) Cardiac – Heart, specialized muscle tissue that makes up the heart and pumps blood.

Quick Tip

Different types of muscle tissues in the human body have specific functions and locations, crucial for their roles in bodily processes.

---

162. Which of the following is not a component of Fallopian tube?

Choose the correct answer from the options given below:

(1) Ampulla

(2) Uterine fundus

(3) Isthmus

(4) Infundibulum

Correct Answer: (2) Uterine fundus

Solution: The uterine fundus is part of the uterus, not the Fallopian tube. The Fallopian tube components include the ampulla, isthmus, and infundibulum.

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Quick Tip

Understanding the anatomical structure of the female reproductive system aids in comprehending its function and related health issues.

---

163. Which of the following factors are favourable for the formation of oxyhaemoglobin in alveoli?

Choose the correct answer from the options given below:

(1) Low pCO2 and High temperature

(2) High pO2 and High pCO2

(3) High pO2 and Lesser H+ concentration

(4) Low pCO2 and High H+ concentration

Correct Answer: **(3)** High pO2 and Lesser H+ concentration

Solution: High partial pressure of oxygen (pO2) and lower hydrogen ion concentration (which indicates lesser acidity) in the alveoli favor the formation of oxyhaemoglobin. This ensures effective oxygen transport from the lungs to the tissues.

Quick Tip

The affinity of hemoglobin for oxygen increases in environments with high oxygen concentration and lower acidity, facilitating oxygen uptake.

---

164. Following are the stages of pathway for conduction of an action potential through the heart:

A. AV bundle

B. Purkinje fibres

C. AV node

D. Bundle branches

E. SA node

Choose the correct sequence of pathway from the options given below: **(1)** E-A-D-B-C

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(2) E-C-A-D-B

(3) A-E-C-B-D

(4) B-D-E-C-A

Correct Answer: (2) E-C-A-D-B

Solution: The pathway of cardiac action potential starts at the SA node (E), then moves to the AV node (C), through the AV bundle (A), continues down the bundle branches (D), and finally spreads through the Purkinje fibers (B).

Quick Tip

The sequential activation of these structures ensures that the heart chambers contract in a coordinated manner, optimizing blood pumping efficiency.

---

165. Match List I with List II:

List I

A. Expiratory capacity

B. Functional residual capacity

C. Vital capacity

D. Inspiratory capacity

List II

I. Expiratory reserve volume + Tidal volume + Inspiratory reserve volume

II. Tidal volume + Expiratory reserve volume

III. Tidal volume + Inspiratory reserve volume

IV. Expiratory reserve volume + Residual volume

Choose the correct answer from the options given below:

(1) A-I, B-III, C-II, D-IV

(2) A-II, B-IV, C-I, D-III

(3) A-III, B-II, C-IV, D-I

(4) A-II, B-IV, C-I, D-III

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Correct Answer: (2) A-II, B-IV, C-I, D-III

Solution:

- A-II: Expiratory capacity is the sum of the tidal volume and the expiratory reserve volume.
- B-IV: Functional residual capacity is the sum of the expiratory reserve volume and the residual volume.
- C-I: Vital capacity is the sum of the tidal volume, expiratory reserve volume, and inspiratory reserve volume.
- D-III: Inspiratory capacity is the sum of the tidal volume and the inspiratory reserve volume.

Quick Tip

Understanding lung capacities and volumes is essential for assessing respiratory health and diagnosing pulmonary disorders.

---

166. Given below are some stages of human evolution. Arrange them in correct sequence. (Past to Recent)

A. *Homo habilis*

B. *Homo sapiens*

C. *Homo neanderthalensis*

D. *Homo erectus*

Choose the correct sequence of human evolution from the options given below: **(1)** A-D-C-B

(2) D-A-C-B

(3) B-A-D-C

(4) C-B-D-A

Correct Answer: (1) A-D-C-B

Solution: The evolutionary timeline of Homo species starts with *Homo habilis* (A), followed

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by *Homo erectus* (D), then *Homo neanderthalensis* (C), and finally *Homo sapiens* (B).

Quick Tip

Studying human evolution helps us understand the biological and cultural developments that define our species today.

---

167. Match List I with List II:

List I

A. Common cold

B. Haemozoin

C. Widal test

D. Allergy

List II

I. Plasmodium

II. Typhoid

III. Rhinoviruses

IV. Dust mites

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-III, D-I

(2) A-II, B-IV, C-III, D-I

(3) A-I, B-III, C-II, D-IV

(4) A-III, B-I, C-II, D-IV

Correct Answer: **(4)** A-III, B-I, C-II, D-IV

Solution:

- A-III: The common cold is caused by Rhinoviruses.
- B-I: Haemozoin is a byproduct of hemoglobin digestion by Plasmodium, the malaria parasite.
- C-II: The Widal test is used to diagnose Typhoid fever.

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- D-IV: Allergies can be triggered by Dust mites among other allergens.

Quick Tip

Understanding the causal relationships between diseases and pathogens or allergens is crucial for diagnosis and treatment.

---

168. The flippers of the Penguins and Dolphins are the example of:

Choose the correct answer from the options given below:

(1) Divergent evolution

(2) Adaptive radiation

(3) Natural selection

(4) Convergent evolution

Correct Answer: **(4)** Convergent evolution

Solution: The flippers of penguins and dolphins are an example of convergent evolution, where unrelated species evolve similar traits independently due to similar environmental pressures.

Quick Tip

Convergent evolution highlights how different organisms can develop analogous adaptations to cope with similar ecological niches or environmental challenges.

---

169. Following are the stages of cell division:

A. Gap 2 phase

B. Cytokinesis

C. Synthesis phase

D. Karyokinesis

E. Gap 1 phase

Choose the correct sequence of stages from the options given below: **(1)** E-C-A-D-B

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(2) C-E-D-A-B

(3) E-B-D-A-C

(4) B-D-E-A-C

Correct Answer: **(1)** E-C-A-D-B

Solution: The correct sequence of cell division stages typically follows this order: Gap 1 phase (E), Synthesis phase (C), where DNA is replicated, followed by Gap 2 phase (A), Karyokinesis (D), where the nucleus divides, and finally Cytokinesis (B), where the cell splits into two.

Quick Tip

Understanding the stages of cell division is fundamental in cell biology, aiding in the comprehension of how cells grow, replicate, and maintain their genetic integrity.

---

170. Which one of the following factors will not affect the Hardy-Weinberg equilibrium?

Choose the correct answer from the options given below:

(1) Constant gene pool

(2) Genetic recombination

(3) Genetic drift

(4) Gene migration

Correct Answer: **(1)** Constant gene pool

Solution: A constant gene pool, implying no change in allele frequencies due to absence of evolutionary forces, does not affect the Hardy-Weinberg equilibrium, which assumes such a state for its principle to apply.

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Quick Tip

The Hardy-Weinberg principle is a key concept in population genetics, providing a foundation for understanding how populations evolve over time.

---

171. Match List I with List II:

List I

A. Pons

B. Hypothalamus

C. Medulla

D. Cerebellum

List II

I. Provides additional space for Neurons, regulates posture and balance.

II. Controls respiration and gastric secretions.

III. Connects different regions of the brain.

IV. Neuro secretory cells

Choose the correct answer from the options given below:

(1) A-I, B-II, C-III, D-IV

(2) A-II, B-III, C-I, D-IV

(3) A-III, B-IV, C-II, D-I

(4) A-I, B-III, C-II, D-IV

Correct Answer: **(3)** A-III, B-IV, C-II, D-I

Solution:

- A-III: The pons connects different regions of the brain.
- B-IV: The hypothalamus contains neurosecretory cells that regulate hormonal activities.
- C-II: The medulla controls respiration and gastric secretions.
- D-I: The cerebellum provides additional space for neurons and regulates posture and balance.

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Quick Tip

Understanding the functions of different brain regions is crucial for the study of neurology and helps in diagnosing related disorders.

---

172. Given below are two statements: One is labelled as Assertion and the other is labelled as Reason:

Assertion A: Breast-feeding during initial period of infant growth is recommended by doctors for bringing a healthy baby.

Reason R: Colostrum contains several antibodies absolutely essential to develop resistance for the new born baby.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) A is not correct but R is correct

(2) Both A and R are correct and R is the correct explanation of A

(3) Both A and R are correct but R is NOT the correct explanation of A

(4) A is correct but R is not correct

Correct Answer: (2) Both A and R are correct and R is the correct explanation of A

Solution: Both statements are correct. Colostrum is highly beneficial for newborns as it contains antibodies that help in developing the baby's immune system, directly supporting the assertion that breast-feeding promotes a healthy baby.

Quick Tip

The early days of breastfeeding are crucial for the immune development of the baby, highlighting the importance of colostrum in infant diet.

---

173. Match List I with List II:

List I

A. Typhoid

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B. Leishmaniasis

C. Ringworm

D. Filariasis

List II

I. Fungus

II. Nematode

III. Protozoa

IV. Bacteria

Choose the correct answer from the options given below:

(1) A-I, B-IV, C-II, D-III

(2) A-II, B-III, C-I, D-IV

(3) A-IV, B-III, C-I, D-II

(4) A-II, B-IV, C-III, D-I

Correct Answer: **(3)** A-IV, B-III, C-I, D-II

Solution:

- A-IV: Typhoid is caused by *Salmonella typhi*, which is a bacterium.
- B-III: Leishmaniasis is caused by *Leishmania* species, which are protozoa.
- C-I: Ringworm is a fungal infection, caused by a variety of fungi.
- D-II: Filariasis is caused by nematodes, specifically *Wuchereria bancrofti* and *Brugia malayi*.

Quick Tip

Correct identification of pathogens is crucial for the effective treatment of infectious diseases.

---

174. Match List I with List II:

List I

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A. Cocaine

B. Heroin

C. Morphine

D. Marijuana

List II

I. Effective sedative in surgery

II. Cannabis sativa

III. Erythroxylum

IV. Papaver somniferum

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-I, D-II

(2) A-IV, B-III, C-I, D-II

(3) A-II, B-III, C-IV, D-I

(4) A-III, B-I, C-II, D-IV

Correct Answer: (1) A-III, B-IV, C-I, D-II

Solution:

- A-III: Cocaine is derived from the Erythroxylum plant.
- B-IV: Heroin is derived from Papaver somniferum, the opium poppy.
- C-I: Morphine, an effective sedative in surgery, is also derived from Papaver somniferum.
- D-II: Marijuana comes from Cannabis sativa.

Quick Tip

Knowledge of the origins of these substances helps in understanding their effects and applications in medicine and recreational use.

---

175. Which of the following statements is incorrect?

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Choose the correct answer from the options given below:

(1) Bio-reactors have an agitator system, an oxygen delivery system and foam control system

(2) A bio-reactor provides optimal growth conditions for achieving the desired product

(3) Most commonly used bio-reactors are of stirring type

(4) Bio-reactors are used to produce small scale bacterial cultures

Correct Answer: (4) Bio-reactors are used to produce small scale bacterial cultures

Solution: Bio-reactors are typically used for large-scale production processes, not just small scale. They are designed to support the growth of organisms for the manufacturing of pharmaceuticals, chemicals, and food products among others.

Quick Tip

Understanding the scale and application of bioreactors is crucial for fields like biotechnology and pharmaceutical manufacturing.

---

176. Match List I with List II:

List I

A. – antitrypsin

B. Cry IAb

C. Cry IAc

D. Enzyme replacement therapy

List II

I. Cotton bollworm

II. ADA deficiency

III. Emphysema

IV. Corn borer

Choose the correct answer from the options given below:

(1) A-II, B-IV, C-I, D-III

(2) A-I, B-IV, C-II, D-III

(3) A-III, B-I, C-IV, D-II

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(4) A-III, B-IV, C-I, D-II

Correct Answer: (4) A-III, B-IV, C-I, D-II

Solution:

- A-III: – antitrypsin is involved in treating emphysema.
- B-IV: Cry IAb targets the corn borer.
- C-I: Cry IAc targets the cotton bollworm.
- D-II: Enzyme replacement therapy is used for ADA deficiency.

Quick Tip

Biotechnology uses genetic engineering to create crops that produce their own pesticides and therapies that replace missing or defective proteins.

---

177. Match List I with List II:

List I

A. Non-medicated IUD

B. Copper releasing IUD

C. Hormone releasing IUD

D. Implants

List II

I. Multiload 375

II. Progestogens

III. Lippes loop

IV. LNG-20

Choose the correct answer from the options given below:

(1) A-III, B-I, C-IV, D-II

(2) A-II, B-IV, C-III, D-I

(3) A-III, B-I, C-II, D-IV

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(4) A-IV, B-I, C-II, D-III

Correct Answer: (1) A-III, B-I, C-IV, D-II

Solution:

- A-III: Non-medicated IUDs, such as the Lippes loop, do not release hormones or copper.
- B-I: Copper releasing IUDs, like the Multiload 375, release copper to increase contraceptive efficacy.
- C-IV: Hormone releasing IUDs, such as those containing LNG-20, release levonorgestrel to prevent pregnancy.
- D-II: Implants typically release progestogens to provide long-term contraception.

Quick Tip

Understanding different types of contraceptives and their mechanisms is essential for making informed choices about reproductive health.

---

178. Match List I with List II:

List I

A. Lipase

B. Nuclease

C. Protease

D. Amylase

List II

I. Peptide bond

II. Ester bond

III. Glycosidic bond

IV. Phosphodiester bond

Choose the correct answer from the options given below:

(1) A-IV, B-I, C-III, D-II

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(2) A-IV, B-III, C-I, D-II

(3) A-II, B-IV, C-I, D-III

(4) A-II, B-IV, C-I, D-III

Correct Answer: (4) A-II, B-IV, C-I, D-III

Solution:

- A-II: Lipase breaks down fats which involve ester bonds.
- B-IV: Nuclease breaks down nucleic acids which involve phosphodiester bonds.
- C-I: Protease breaks down proteins which involve peptide bonds.
- D-III: Amylase breaks down starch which involves glycosidic bonds.

Quick Tip

Enzymes are specialized proteins that catalyze specific biochemical reactions, crucial for metabolism and other cellular functions.

---

179. Given below are two statements:

Statement I: In the nephron, the descending limb of loop of Henle is impermeable to water and permeable to electrolytes.

Statement II: The proximal convoluted tubule is lined by simple columnar brush border epithelium and increases the surface area for reabsorption.

In the light of the above statements, Choose the correct answer from the options given below:

(1) Statement I is false but Statement II is true

(2) Both Statement I and Statement II are true

(3) Both Statement I and Statement II are false

(4) Statement I is true but Statement II is false

Correct Answer: (3) Both Statement I and Statement II are false

Solution: Statement I is incorrect as the descending limb of the loop of Henle is permeable

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to water but not to electrolytes. Statement II is also incorrect; the proximal convoluted tubule is lined by simple cuboidal epithelium, not columnar.

Quick Tip

Understanding the structure and function of different parts of the nephron is vital for comprehending how the kidneys regulate body fluids and electrolytes.

---

180. Match List I with List II:

List I

A. Diakinesis

B. Pachytene

C. Zygotene

D. Leptotene

List II

I. Synaptonemal complex formation

II. Completion of terminalisation of chiasmata

III. Chromosomes look like thin threads

IV. Appearance of recombination nodules

Choose the correct answer from the options given below:

(1) A-IV, B-III, C-II, D-I

(2) A-IV, B-I, C-III, D-II

(3) A-II, B-IV, C-I, D-III

(4) A-II, B-IV, C-I, D-III

Correct Answer: (4) A-II, B-IV, C-I, D-III

Solution:

- A-II: Diakinesis is the stage where terminalisation of chiasmata is completed.
- B-IV: Pachytene is the stage where recombination nodules appear, indicating crossing over.

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- C-I: Zygotene is marked by the formation of the synaptonemal complex.
- D-III: During Leptotene, chromosomes begin to condense and appear like thin threads.

Quick Tip

Each stage of prophase I of meiosis has distinct characteristics that are crucial for the successful completion of cell division.

---

181. The "Ti plasmid" of *Agrobacterium tumefaciens* stands for:

Choose the correct answer from the options given below:

(1) Temperature independent plasmid

(2) Tumour inhibiting plasmid

(3) Tumor independent plasmid

(4) Tumor inducing plasmid

Correct Answer: **(4)** Tumor inducing plasmid

Solution: The "Ti plasmid" in *Agrobacterium tumefaciens* stands for "tumor inducing" plasmid. This plasmid is responsible for transferring some of its DNA to plant cells, causing them to form tumors (crown galls).

Quick Tip

The ability of *Agrobacterium tumefaciens* to transfer DNA to plant cells has been harnessed in biotechnology to create genetically modified plants.

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182. Match List I with List II:

List I

A. Fibrous joints

B. Cartilaginous joints

C. Hinge joints

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D. Ball and socket joints

List II

I. Adjacent vertebrae, limited movement

II. Humerus and Pectoral girdle, rotational movement

III. Skull, don't allow any movement

IV. Knee, help in locomotion

Choose the correct answer from the options given below:

(1) A-III, B-I, C-IV, D-II

(2) A-IV, B-III, C-II, D-I

(3) A-II, B-III, C-I, D-IV

(4) A-II, B-IV, C-I, D-III

Correct Answer: (1) A-III, B-I, C-IV, D-II

Solution:

- A-III: Fibrous joints are found in the skull where they don't allow any movement.
- B-I: Cartilaginous joints in adjacent vertebrae allow limited movement.
- C-IV: Hinge joints like those in the knee help in locomotion.
- D-II: Ball and socket joints such as those between the humerus and pectoral girdle allow rotational movement.

Quick Tip

Understanding the types of joints and their locations helps in studying human anatomy and movements.

---

183. Which of the following are Autoimmune disorders?

A. Myasthenia gravis

B. Rheumatoid arthritis

C. Gout

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D. Muscular dystrophy

E. Systemic Lupus Erythematosus (SLE)

choose the most appropriate answer from the options given below:

(1) C, D E only

(2) A, B D only

(3) A, B E only

(4) B, C E only

Correct Answer: (3) A, B E only

Solution:

- A, Myasthenia gravis; B, Rheumatoid arthritis; and E, Systemic Lupus Erythematosus are all autoimmune disorders where the body's immune system mistakenly attacks its own tissues.
- C, Gout, and D, Muscular dystrophy, are not autoimmune diseases.

Quick Tip

Recognizing autoimmune disorders is important for diagnosis and treatment, as these conditions often require immune system modulation.

---

184. Consider the following statements:

A. Annelids are true coelomates

B. Poriferans are pseudocoelomates

C. Aschelminthes are acoelomates

D. Platyhelminthes are pseudocoelomates

Choose the correct answer from the options given below:

(1) D only

(2) B only

(3) A only

(4) C only

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Correct Answer: **(3)** A only

Solution: Statement A is correct as annelids, like earthworms, are indeed true coelomates with a body cavity completely lined by mesoderm. Statements B, C, and D are incorrect as poriferans lack a body cavity, aschelminthes are pseudocoelomates, and platyhelminthes are acoelomates.

Quick Tip

Understanding the classifications of organisms based on their body cavity development is crucial in zoology and helps in comprehending their evolutionary relationships.

---

185. Which of the following is not a steroid hormone?

Choose the correct answer from the options given below:

(1) Glucagon

(2) Cortisol

(3) Testosterone

(4) Progesterone

Correct Answer: **(1)** Glucagon

Solution: Glucagon is a peptide hormone, not a steroid hormone. It is produced by the pancreas and raises blood glucose levels. Cortisol, testosterone, and progesterone are all steroid hormones.

Quick Tip

Understanding different types of hormones and their chemical structures is important for studying their functions and effects in the body.

SECTION-B

186. Match List I with List II:

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List I

A. RNA polymerase III

B. Termination of transcription

C. Splicing of Exons

D. TATA box

List II

I. snRNPs

II. Promoter

III. Rho factor

IV. SnRNAs, tRNA

Choose the correct answer from the options given below:

(1) A-IV, B-III, C-I, D-II

(2) A-II, B-IV, C-I, D-III

(3) A-IV, B-III, C-IV, D-I

(4) A-III, B-IV, C-I, D-II

Correct Answer: **(1)** A-IV, B-III, C-I, D-II

Solution:

- A-IV: RNA polymerase III synthesizes snRNAs and tRNA.
- B-III: Termination of transcription in prokaryotes often involves the Rho factor.
- C-I: Splicing of exons is facilitated by snRNPs.
- D-II: The TATA box is a promoter element.

Quick Tip

Matching molecular biology concepts with their functions provides a foundational understanding of gene expression and regulation.

---

187. Choose the correct statement given below regarding juxta medullary nephron.

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Choose the correct answer from the options given below:

(1) Juxta medullary nephrons outnumber the cortical nephrons. **(2)** Juxta medullary nephrons are located in the columns of Bertini. **(3)** Renal corpuscle of juxta medullary nephron lies in the outer portion of the renal medulla. **(4)** Loop of Henle of juxta medullary nephron runs deep into medulla.

Correct Answer: **(4)** Loop of Henle of juxta medullary nephron runs deep into medulla.

Solution: The statement is correct because the juxta medullary nephrons have long loops of Henle that extend deeply into the medulla, which is essential for the process of urine concentration.

Quick Tip

Understanding the structure and function of different types of nephrons is crucial for comprehending how kidneys concentrate urine and regulate water and salt balance.

---

188. The following are the statements about non-chordates:

A. Pharynx is perforated by gill slits.

B. Notochord is absent.

C. Central nervous system is dorsal.

D. Heart is dorsal if present.

E. Post anal tail is absent.

choose the most appropriate answer from the options given below:

(1) C, B D only **(2)** A C only **(3)** A, B D only **(4)** B, D E only

Correct Answer: **(4)** B, D E only

Solution:

- B, D, and E are correct as non-chordates typically lack a notochord, have a dorsal heart if present, and do not have a post-anal tail.
- A is incorrect as non-chordates do not have pharynx perforated by gill slits.

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- C is incorrect because non-chordates generally have a ventral nervous system.

Quick Tip

Understanding the basic anatomical and physiological traits of chordates and non-chordates helps in distinguishing between these two groups in the animal kingdom.

---

189. As per ABO blood grouping system, the blood group of father is B+, mother is A+ and child is O-. Their respective genotype can be:

choose the most appropriate answer from the options given below:

(1) D E only **(2)** A only **(3)** B only **(4)** C B only

Correct Answer: (2) A only

Solution:

- The possible genotypes for the father (B+) could be IBi or IBIB, and for the mother (A+) could be IAi or IAIA. The child being O- must have the genotype ii, which indicates both parents must carry an i allele, hence father IBi and mother IAi.

Quick Tip

Understanding genetics and inheritance patterns such as those in the ABO blood group system is essential for fields like genetics, medicine, and forensic science.

---

190. Match List I with List II:

List I

A. P wave

B. QRS complex

C. T wave

D. T-P gap

List II

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I. Heart muscles are electrically silent.

II. Depolarisation of ventricles.

III. Depolarisation of atria.

IV. Repolarisation of ventricles.

Choose the correct answer from the options given below:

(1) A-IV, B-II, C-I, D-III

(2) A-II, B-III, C-IV, D-I

(3) A-III, B-II, C-IV, D-I

(4) A-III, B-II, C-I, D-IV

Correct Answer: (3) A-III, B-II, C-IV, D-I

Solution:

- A-III: The P wave represents depolarisation of the atria.
- B-II: The QRS complex represents depolarisation of the ventricles.
- C-IV: The T wave represents repolarisation of the ventricles.
- D-I: The T-P gap is a period when the heart muscles are electrically silent.

Quick Tip

Understanding the electrical activity of the heart as represented in an ECG is crucial for diagnosing heart conditions and monitoring cardiac health.

---

191. Given below are two statements:

Statement I: Bone marrow is the main lymphoid organ where all blood cells including lymphocytes are produced.

Statement II: Both bone marrow and thymus provide micro environments for the development and maturation of T-lymphocytes.

In the light of the above statements, choose the most appropriate answer from the options given below:

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(1) Statement I is incorrect but Statement II is correct. **(2)** Both Statement I and Statement II are correct. **(3)** Both Statement I and Statement II are incorrect. **(4)** Statement I is correct but Statement II is incorrect.

Correct Answer: **(2)** Both Statement I and Statement II are correct.

Solution:

- Statement I is correct as bone marrow is indeed the primary site for the production of all types of blood cells, including lymphocytes.
- Statement II is also correct because the bone marrow provides the environment for B-lymphocyte development, and the thymus is crucial for T-lymphocyte maturation.

Quick Tip

The bone marrow and thymus are essential components of the immune system, each playing specialized roles in cellular immunity.

---

192. Identify the correct option (A), (B), (C), (D) with respect to spermatogenesis.

GnRH $\rightarrow$ LH $\downarrow$

(A) $\rightarrow$ (B) $\rightarrow$ Androgens $\rightarrow$ (C) $\rightarrow$ Formation of spermatids $\rightarrow$ (D)

choose the most appropriate answer from the options given below:

(1) ICSH, Leydig cells, Sertoli cells, spermatogenesis. **(2)** FSH, Leydig cells, Sertoli cells, spermatogenesis. **(3)** ICSH, Interstitial cells, Leydig cells, spermiogenesis. **(4)** FSH, Sertoli cells, Leydig cells, spermatogenesis.

Correct Answer: **(2)** FSH, Leydig cells, Sertoli cells, spermatogenesis.

Solution:

- GnRH stimulates the release of LH.
- (A) FSH stimulates the Sertoli cells.
- (B) Leydig cells produce androgens under the influence of LH.

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- (C) Androgens act on Sertoli cells to promote spermatogenesis.
- (D) The final result is the formation of spermatids.

Quick Tip

Understanding the hormonal control of spermatogenesis is vital for comprehending reproductive biology and the interplay between different hormones and cells in the testes.

---

193. Match List I with List II:

List I

A. Exophthalmic goiter

B. Acromegaly

C. Cushing's syndrome

D. Cretinism

List II

I. Excess secretion of cortisol, moon face & hyperglycemia.

II. Hypo-secretion of thyroid hormone and stunted growth.

III. Hyper secretion of thyroid hormone & protruding eye balls.

IV. Excessive secretion of growth hormone.

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-I, D-II

(2) A-II, B-IV, C-I, D-III

(3) A-IV, B-II, C-III, D-I

(4) A-III, B-IV, C-II, D-I

Correct Answer: **(1)** A-III, B-IV, C-I, D-II

Solution:

- A-III: Exophthalmic goiter is characterized by hypersecretion of thyroid hormone leading to protruding eyeballs.
- B-IV: Acromegaly results from excessive secretion of growth hormone.

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- C-I: Cushing's syndrome involves excessive cortisol secretion, causing moon face and hyperglycemia.
- D-II: Cretinism results from hypo-secretion of thyroid hormone, leading to stunted growth.

Quick Tip

Understanding hormonal disorders and their effects on the body provides insights into how hormonal imbalances impact overall health.

---

194. Given below are two statements:

Statement I: The cerebral hemispheres are connected by nerve tract known as corpus callosum.

Statement II: The brain stem consists of the medulla oblongata, pons and cerebrum.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement I is incorrect but Statement II is correct. **(2)** Both Statement I and Statement II are correct. **(3)** Both Statement I and Statement II are incorrect. **(4)** Statement I is correct but Statement II is incorrect.

Correct Answer: (4) Statement I is correct but Statement II is incorrect.

Solution: Statement I is correct as the corpus callosum indeed connects the cerebral hemispheres. Statement II is incorrect because the brain stem does not include the cerebrum; it comprises the medulla oblongata, pons, and midbrain.

Quick Tip

Knowledge of brain anatomy is crucial for understanding its function and diagnosing neurological conditions accurately.

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195. Given below are two statements:

Statement I: Gause's competitive exclusion principle states that two closely related species competing for different resources cannot exist indefinitely.

Statement II: According to Gause's principle, during competition, the inferior will be eliminated. This may be true if resources are limiting.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement I is false but Statement II is true.

(2) Both Statement I and Statement II are true.

(3) Both Statement I and Statement II are incorrect.

(4) Statement I is true but Statement II is false.

Correct Answer: **(1)** Statement I is false but Statement II is true.

Solution: Statement I is incorrect because Gause's principle states that two closely related species competing for the same resources cannot coexist indefinitely, not different resources. Statement II correctly interprets the principle in that competition where resources are limited typically results in the elimination of the inferior competitor.

Quick Tip

Understanding ecological principles such as competitive exclusion is vital for studying biodiversity, conservation, and the dynamics of ecosystems.

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196. Match List I with List II:

List I

A. Mesozoic Era

B. Proterozoic Era

C. Cenozoic Era

D. Paleozoic Era

List II

I. Lower invertebrates

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II. Fish & Amphibia

III. Birds & Reptiles

IV. Mammals

Choose the correct answer from the options given below:

(1) A-III, B-I, C-IV, D-II

(2) A-II, B-I, C-III, D-IV

(3) A-III, B-II, C-I, D-IV

(4) A-I, B-II, C-IV, D-III

Correct Answer: **(1)** A-III, B-I, C-IV, D-II

Solution:

- A-III: The Mesozoic Era is known for the dominance of dinosaurs and the early evolution of birds and reptiles.
- B-I: The Proterozoic Era is known for the early development of life, including lower invertebrates.
- C-IV: The Cenozoic Era is known as the age of mammals.
- D-II: The Paleozoic Era is famous for the development of fish and amphibians.

Quick Tip

Understanding geological time scales and the dominant life forms of each era helps in studying the evolutionary biology and history of life on Earth.

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197. Match List I with List II:

List I

A. Unicellular glandular epithelium

B. Compound epithelium

C. Multicellular glandular epithelium

D. Endocrine glandular epithelium

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List II

I. Salivary glands

II. Pancreas

III. Goblet cells of alimentary canal

IV. Moist surface of buccal cavity

Choose the correct answer from the options given below:

(1) A-I, B-I, C-IV, D-IV

(2) A-II, B-I, C-III, D-IV

(3) A-IV, B-III, C-II, D-I

(4) A-III, B-IV, C-I, D-II

Correct Answer: (4) A-III, B-IV, C-I, D-II

Solution:

- A-III: Unicellular glandular epithelium like goblet cells are found in the alimentary canal.
- B-IV: Compound epithelium does not relate directly to glandular structures; however, it's involved in protective surfaces.
- C-I: Multicellular glandular epithelium, such as in the salivary glands, produces various secretions.
- D-II: Endocrine glandular epithelium, like that in the pancreas, secretes hormones directly into the blood.

Quick Tip

Recognizing different types of epithelial tissues and their functions is crucial for understanding human anatomy and physiology, especially in the context of glandular secretion.

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198. Regarding catalytic cycle of an enzyme action, select the correct sequential steps:

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A. Substrate enzyme complex formation.

B. Freeze enzyme ready to bind with another substrate.

C. Release of products.

D. Chemical bonds of the substrate broken.

E. Substrate binding to active site.

Choose the correct answer from the options given below:

(1) E, D, C, B, A

(2) E, A, D, C, B

(3) A, E, B, D, C

(4) B, A, C, D, E

Correct Answer: **(2)** E, A, D, C, B

Solution: The correct sequence of enzyme action is:

- E: The substrate first binds to the enzyme's active site.
- A: This binding leads to the formation of a substrate-enzyme complex.
- D: Chemical bonds within the substrate are then broken down.
- C: The products of the reaction are released.
- B: The enzyme is now free and ready to bind with another substrate, restarting the cycle.

Quick Tip

Understanding the steps involved in enzyme catalysis is fundamental to biochemistry and molecular biology, providing insights into how biological reactions are facilitated.

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199. Match List I with List II related to digestive system of cockroach:

List I

A. The structures used for storing of food

B. Ring of 6-8 blind tubules at junction of foregut and midgut.

C. Ring of 100-150 yellow coloured thin filaments at junction of midgut and hindgut.

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D. The structures used for grinding the food.

List II

I. Gizzard

II. Gastric Caeca

III. Malpighian tubules

IV. Crop

Choose the correct answer from the options given below:

(1) A-III, B-IV, C-I, D-II

(2) A-IV, B-II, C-III, D-I

(3) A-I, B-II, C-IV, D-III

(4) A-IV, B-III, C-II, D-I

Correct Answer: **(2)** A-IV, B-II, C-III, D-I

Solution:

- A-IV: The crop is used for storing food in the cockroach.
- B-II: Gastric caeca are found at the junction of the foregut and midgut, aiding in secretion and digestion.
- C-III: Malpighian tubules, located at the junction of the midgut and hindgut, help in excretion.
- D-I: The gizzard is used for grinding the food.

Quick Tip

Understanding the anatomical features and functions of the cockroach's digestive system can provide insights into the broader category of insect physiology.

---

200. Given below are two statements:

Statement I: Mitochondria and chloroplasts both have double membranes bound organelles.

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Statement II: Inner membrane of mitochondria is relatively less permeable, as compared to chloroplast.

In the light of the above statements, choose the most appropriate answer from the options given below:

(1) Statement I is incorrect but Statement II is correct. **(2)** Both Statement I and Statement II are correct. **(3)** Both Statement I and Statement II are incorrect. **(4)** Statement I is correct but Statement II is incorrect.

Correct Answer: (4) Statement I is correct but Statement II is incorrect.

Solution:

- Statement I is correct as both mitochondria and chloroplasts are double-membraned organelles, which is fundamental to their functions in cellular respiration and photosynthesis, respectively.
- Statement II is incorrect because the inner membrane of mitochondria is actually highly impermeable, which is essential for establishing the proton gradient necessary for ATP synthesis, while the inner membranes of chloroplasts, involved in the light reactions of photosynthesis, must allow for more permeability to facilitate the movement of ions and molecules necessary for the light-dependent reactions.

Quick Tip

Understanding the structural and functional aspects of cell organelles like mitochondria and chloroplasts is crucial for grasping key concepts in cell biology and bioenergetics.

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