

IISER Biology Sample Paper-6

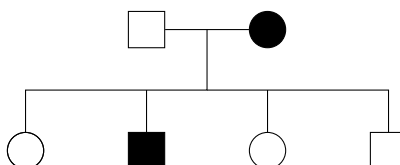
Duration: 45 Minutes

Maximum Marks: 60

Instructions

- This paper contains **15** Multiple Choice Questions (Single Correct).
- Each correct answer carries **+4 marks**.
- Each incorrect answer carries: **-1 marks**.
- Unattempted questions carry **0** marks.
- Only one option is correct for each question.
- Use of mobile phones, smartwatches, calculators, or any electronic gadgets is strictly prohibited.

Q1. Let the pedigree below represent a rare, fully penetrant genetic disorder in a human family. Squares represent males, circles represent females, and filled symbols denote affected individuals.

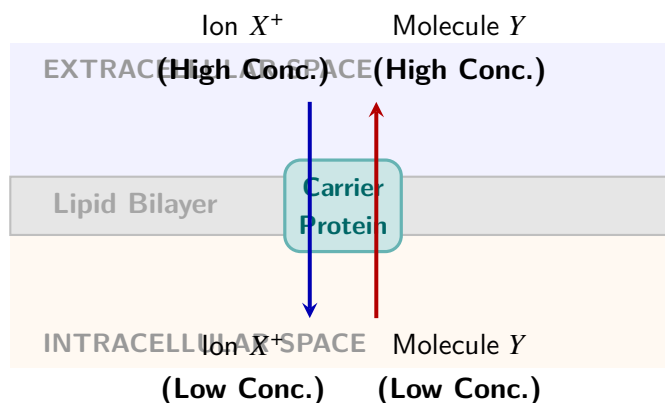


What is the most likely mode of inheritance for this condition?

- (A) Y-linked inheritance
- (B) Autosomal recessive
- (C) X-linked dominant
- (D) Autosomal dominant

Q2. The following schematic diagram illustrates a cellular transport mechanism operating across the plasma membrane of an epithelial cell.

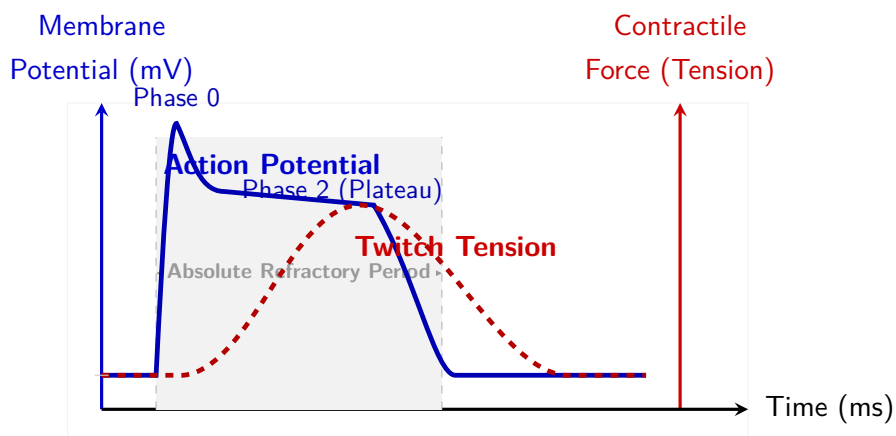




Based on the directional flow and concentration gradients indicated, this transport process is best classified as:

- (A) Primary active antiport
- (B) Secondary active antiport
- (C) Facilitated diffusion symport
- (D) Simple passive dialysis

Q3. During an experiment monitoring the mechanical changes in a mammalian heart muscle fiber, a single action potential waveform is recorded alongside the corresponding myocardial contractile twitch force, as represented schematically below:

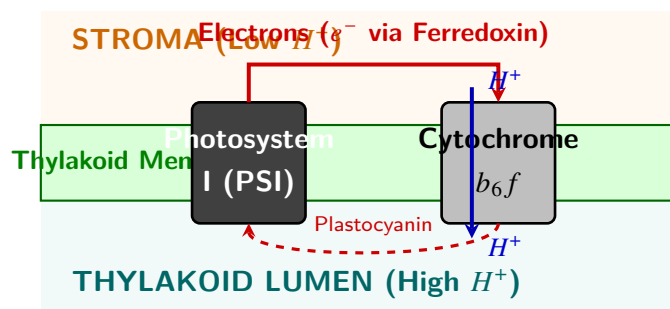


Which physiological feature prevents cardiac muscle cells from

undergoing sustained tetanic contractions when stimulated at high frequencies?

- (A) Rapid inactivation of voltage-gated sodium channels during the resting phase.
- (B) The prolonged absolute refractory period overlapping significantly with the mechanical contraction phase.
- (C) Rapid efflux of calcium ions into the extracellular fluid during repolarization.
- (D) Complete absence of T-tubules in cardiac ventricular muscle cells.

Q4. A critical phase of cyclic photophosphorylation in chloroplasts involves the establishment of a proton gradient. Consider the simplified diagram of the thylakoid membrane below:



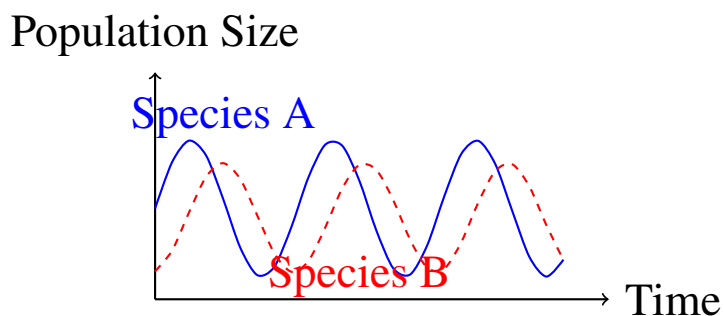
During purely cyclic electron flow, which of the following events directly occurs to drive ATP production without producing NADPH?

- (A) Photolysis of water at the oxygen-evolving complex of PSI.
- (B) Transfer of electrons from ferredoxin back to the cytochrome b_6f complex, pumping protons into the lumen.
- (C) Direct reduction of $NADP^+$ reductase by plastoquinone within the lipid bilayer.



(D) Excitation of electrons from PSII followed by down-gradient capture by plastocyanin.

Q5. The diagram below displays a classic ecological model tracking the population dynamics of two interacting species over an extended period within an isolated nature reserve.

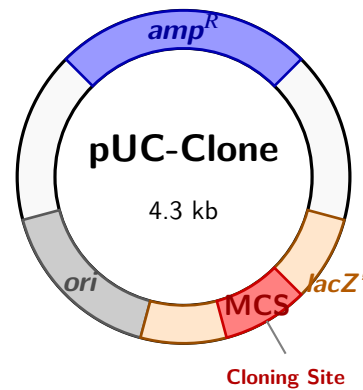


Based on the phase lag and structural oscillations between the two populations, what biological relationship is modeled here, and which species represents the primary consumer?

- (A) Mutualism; Species A is the primary consumer.
- (B) Amensalism; Species B is the primary consumer.
- (C) Predator-Prey interaction; Species A is the primary consumer.
- (D) Interspecific competition; Species B is the primary consumer.

Q6. The following vector diagram displays a plasmid construct modified for molecular cloning, containing a specific antibiotic resistance gene and a Multiple Cloning Site (MCS).





If a foreign target DNA fragment is successfully ligated into the unique restriction enzyme site located precisely within the MCS region, what phenotypic change allows the identification of recombinant transformants if the MCS is nested inside the functional coding sequence of the *lacZ'* gene?

- (A) Cells acquire resistance to ampicillin and form red colonies.
- (B) Insertional inactivation occurs, leading to a loss of β -galactosidase activity (white colonies on X-gal media).
- (C) The plasmid fails to replicate due to structural disruptions near the *ori* region.
- (D) Transformants show rapid, unrestricted cell lysis due to toxigenic gene expression.

Q7. A population of *Drosophila melanogaster* is in Hardy-Weinberg equilibrium for a specific locus with two alleles, *B* and *b*. If the frequency of the homozygous recessive phenotype (*bb*) is measured to be 0.09, what is the calculated frequency of the heterozygous genotype (*Bb*) within this population?

- (A) 0.21
- (B) 0.42

(C) 0.70

(D) 0.49

Q8. The process of transition during macroevolution involves major modifications of anatomical body parts. Which of the following structural pairs represents an accurate example of homologous structures, indicating shared ancestry?

(A) Flippers of a penguin and flippers of a dolphin.

(B) Wings of a honeybee and wings of a modern predatory bird.

(C) Tendrils of *Passiflora* and tendrils of *Pisum sativum*.

(D) Forelimbs of a subterranean mole and forelimbs of a cursorial horse.

Q9. Analysis of a purified eukaryotic subcellular fraction reveals a high concentration of acid hydrolases, including proteases, nucleases, and lipases, which exhibit optimal catalytic efficiency at a pH value near 5.0. Which organelle constitutes the bulk of this isolated fraction?

(A) Peroxisome

(B) Lysosome

(C) Smooth Endoplasmic Reticulum

(D) Glyoxysome

Q10. During the synthesis of secretory proteins in a pancreatic acinar cell, which pathway outlines the correct sequential trajectory of a newly translated polypeptide chain before it is discharged into the extracellular space?



- (A) Rough Endoplasmic Reticulum → Cis-Golgi → Trans-Golgi → Secretory Vesicles → Plasma Membrane
- (B) Smooth Endoplasmic Reticulum → Lysosome → Trans-Golgi → Plasma Membrane
- (C) Nucleolus → Cytoplasm → Trans-Golgi → Cis-Golgi → Secretory Vesicles
- (D) Rough Endoplasmic Reticulum → Endosome → Peroxisome → Plasma Membrane

Q11. A human clinical subject presents with abnormally low blood pressure, decreased blood volume, and structural sodium depletion. Physiological evaluation shows an elevated rate of renin secretion from the juxtaglomerular cells. Which hormonal response sequence is directly triggered by this mechanism to restore homeostasis?

- (A) Decreased Angiotensin II production leading to systemic vasodilation.
- (B) Stimulation of the adrenal cortex to secrete aldosterone, enhancing renal sodium reabsorption.
- (C) Inhibition of Antidiuretic Hormone (ADH) release from the posterior pituitary gland.
- (D) Secretion of Atrial Natriuretic Peptide (ANP) to promote rapid glomerular filtration.

Q12. During the process of systemic carbon dioxide transport in human blood, a significant portion of CO_2 enters erythrocytes and undergoes conversion. Which of the following options correctly details this phenomenon within systemic capillaries?



- (A) CO_2 combines directly with water via carbonic anhydrase to form H^+ and HCO_3^- , followed by efflux of HCO_3^- matched by influx of Cl^- .
- (B) CO_2 binds competitively to the oxygen binding sites of oxyhemoglobin, converting it to carboxyhemoglobin.
- (C) Carbaminohemoglobin complexes dissociate rapidly in response to a drop in hydrogen ion concentrations.
- (D) Bicarbonate ions accumulate inside the erythrocyte, drawing sodium ions inward via active symport mechanisms.

Q13. In C4 plants, the spatial separation of initial carbon fixation and the Calvin cycle serves to minimize photorespiration. Which of the following statements correctly identifies the enzyme and cellular location responsible for the initial fixation of atmospheric carbon dioxide in a C4 leaf?

- (A) Rubisco operating inside the chloroplast stroma of bundle sheath cells.
- (B) PEP carboxylase operating in the cytoplasm of mesophyll cells.
- (C) PEP carboxylase operating within the matrix of bundle sheath mitochondria.
- (D) Rubisco operating inside the cytoplasm of specialized epidermal trichomes.

Q14. A plant physiologist places a healthy flaccid plant cell with an internal osmotic potential (Ψ_s) of -0.8 MPa into an open beaker containing a 0.2 M sucrose solution that possesses a total water potential (Ψ_w) of -0.5 MPa. Assuming equilibrium is reached



without changes in cell volume, what will be the final turgor pressure (Ψ_p) of this cell?

- (A) -0.3 MPa
- (B) $+0.3$ MPa
- (C) $+1.3$ MPa
- (D) 0.0 MPa

Q15. Which of the following options summarizes the exact mechanism by which a human primary oocyte progresses through its development cycle up to the point of fertilization?

- (A) Completes Meiosis I during embryonic development and remains arrested in Metaphase II until puberty.
- (B) Arrests in Prophase I (Diplotene) during fetal development, completes Meiosis I just prior to ovulation, and arrests in Metaphase II until fertilization occurs.
- (C) Completes both Meiosis I and Meiosis II uniformly prior to the LH surge within the Graafian follicle.
- (D) Undergoes symmetrical mitotic divisions within the fallopian tubes immediately following secondary ovulation.



Detailed Solutions**Q1.****Solution****Concept:**

Pedigree analysis tracks phenotypes across generations to determine familial inheritance patterns. Analyzing rare conditions involves determining whether the trait skips generations (recessive) or appears in every generation (dominant), and evaluating sex biases among affected individuals.

Solution:

- (a) The pedigree shows an affected mother (I2) in the first generation passing the trait down to her offspring.
- (b) In generation II, we observe that the trait appears in an affected son (II2) while other offspring are unaffected. This direct transmission from an affected parent to an offspring is a hallmark of dominant inheritance, as recessive traits typically require both parents to carry an allele and often skip generations.
- (c) Because the trait is noted as rare and fully penetrant, an autosomal dominant allele from the mother perfectly accounts for the affected son (II2) receiving the dominant allele and the unaffected children receiving the normal allele.
- (d) It cannot be Y-linked because the trait is expressed in a female (I2). It is highly unlikely to be X-linked dominant because an affected mother has an equal chance of passing it to sons and daughters, but an autosomal dominant model easily explains the pedigree.
- (e) Thus, the clear presence of the trait in the maternal parent and its direct phenotypic expression in her son indicates an autosomal dominant mode of inheritance.

Final Answer: Autosomal dominant

Answer: (D)

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Q2.

Solution**Concept:**

Cellular membranes utilize transmembrane proteins to move solutes across lipid bilayers. Active transport mechanisms move substances against their respective electrochemical gradients, which requires an input of metabolic energy.

Solution:

- (a) In the provided diagram, Ion X^+ moves from an area of high concentration above the lipid bilayer to an area of low concentration below it. This represents downhill movement down its concentration gradient, which releases free energy.
- (b) Simultaneously, Molecule Y moves from an area of low concentration to an area of high concentration. This represents uphill movement against its concentration gradient, requiring energy.
- (c) The transport protein couples the energetically favorable downhill movement of Ion X^+ to drive the energetically unfavorable uphill movement of Molecule Y . Because the two species move in opposite directions across the membrane, the mechanism is an antiport system.
- (d) Since the energy driving the transport of Molecule Y comes indirectly from an existing electrochemical gradient rather than direct ATP hydrolysis, this process is classified as secondary active transport.
- (e) Therefore, the diagram illustrates a classic secondary active antiport system, which is commonly found in epithelial tissues like renal tubules and intestinal mucosa.

Final Answer: Secondary active antiport

Answer: (B)

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Q3.

Solution**Concept:**

Sustained skeletal muscle contraction, known as tetanus, occurs when rapid consecutive stimuli fuse mechanical twitches. Cardiac muscle must relax between beats to allow the heart chambers to fill with blood adequately.

Solution:

- (a) The diagram shows a mammalian cardiac action potential plotted with its mechanical contractile twitch tension. Notice that the action potential features a prolonged plateau phase that lasts nearly as long as the entire contraction.
- (b) This extended action potential duration is driven by the opening of L-type voltage-gated calcium channels, which balances the repolarizing potassium current.
- (c) Because voltage-gated sodium channels remain inactivated during this plateau, the cell experiences a very long absolute refractory period.
- (d) This absolute refractory period spans the entire contraction phase and a significant part of the relaxation phase of the myocardial twitch.
- (e) Consequently, a second electrical stimulus cannot trigger another action potential until the muscle fiber has mostly relaxed, preventing wave summation or tetanic contractions.

Final Answer: The prolonged absolute refractory period overlapping significantly with the mechanical contraction phase.

Answer: (B)

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Q4.

Solution**Concept:**

Photophosphorylation in chloroplast thylakoid membranes converts solar energy into chemical energy. While non-cyclic electron flow generates both ATP and NADPH, cyclic electron flow functions solely to produce ATP.

Solution:

- (a) Cyclic photophosphorylation involves only Photosystem I (PSI). When light excites the reaction center P700, electrons are expelled and transferred to a primary electron acceptor.
- (b) Instead of passing to $NADP^+$ reductase, these energized electrons travel down a regulatory loop to ferredoxin and are then routed back to the cytochrome b_6f complex.
- (c) As the cytochrome b_6f complex processes these returned electrons, it uses their energy to pump protons from the stroma into the thylakoid lumen, increasing the proton motive force.
- (d) The electrons return to oxidized P700 via plastocyanin, completing the cycle. This proton accumulation drives ATP synthase to synthesize ATP.
- (e) Because Photosystem II is bypassed entirely, there is no photolysis of water, no oxygen evolution, and no reduction of $NADP^+$ into NADPH, satisfying the cell's energetic demand for extra ATP.

Final Answer: Transfer of electrons from ferredoxin back to the cytochrome b_6f complex, pumping protons into the lumen.

Answer: (B)

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Q5.

Solution**Concept:**

Ecosystem populations fluctuate based on interspecific interactions. In predator-prey dynamics, the populations of both organisms oscillate out of phase with one another due to density-dependent feedback loops.

Solution:

- (a) The provided graph shows regular, coupled oscillations between the population sizes of Species A and Species B over time.
- (b) Species A reaches its peak population size slightly before Species B reaches its peak. This time delay, or phase lag, is characteristic of predator-prey mathematical models.
- (c) When the prey population expands, it provides more food, causing the predator population to grow after a brief delay. As predators increase, they overconsume the prey, causing the prey population to drop.
- (d) Because the population of Species A rises first and acts as the foundation for the subsequent rise of Species B, Species A serves as the prey, which corresponds to the primary consumer.
- (e) Species B represents the predator that lags behind its food source, showing that the graph depicts a standard predator-prey relationship where Species A is the primary consumer.

Final Answer: Predator-Prey interaction; Species A is the primary consumer.

Answer: (C)

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Q6.

Solution**Concept:**

Recombinant DNA technology uses plasmid vectors containing selectable markers and reporter genes to confirm successful cloning. Blue-white screening utilizes alpha-complementation to visually identify bacterial colonies containing recombinant plasmids.

Solution:

- (a) The pUC-Clone plasmid diagram shows an ampicillin resistance gene (amp^R) and a Multiple Cloning Site (MCS) where restriction enzymes cut open the circular DNA.
- (b) This MCS is located within the coding region of the $lacZ'$ gene, which expresses the alpha-peptide of the enzyme beta-galactosidase.
- (c) When non-recombinant plasmids enter host cells, the functional beta-galactosidase enzyme hydrolyzes the substrate X-gal, turning the bacterial colonies blue.
- (d) If a foreign DNA fragment is successfully ligated into the MCS, it disrupts the reading frame of the $lacZ'$ gene. This disruption is known as insertional inactivation.
- (e) Host cells carrying this recombinant plasmid cannot produce functional beta-galactosidase and cannot cleave X-gal, forming white colonies. This color difference simplifies identification.

Final Answer: Insertional inactivation occurs, leading to a loss of β -galactosidase activity (white colonies on X-gal media).

Answer: (B)

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Q7.

Solution**Concept:**

The Hardy-Weinberg principle states that allele and genotype frequencies in an ideal population remain constant across generations. It uses mathematical equations to calculate carrier and homozygous frequencies.

Solution:

- (a) Let p represent the frequency of the dominant allele B and q represent the frequency of the recessive allele b . The principle states that $p + q = 1$ and $p^2 + 2pq + q^2 = 1$.
- (b) The prompt gives the frequency of the homozygous recessive phenotype (bb), which corresponds to $q^2 = 0.09$.
- (c) Taking the square root of q^2 gives the allele frequency of b , so $q = \sqrt{0.09} = 0.30$.
- (d) Using the allele frequency relationship $p = 1 - q$, we find the frequency of the dominant allele B is $p = 1 - 0.30 = 0.70$.
- (e) The frequency of the heterozygous genotype (Bb) is calculated as $2pq$. Substituting our values gives $2 \times 0.70 \times 0.30 = 0.42$. Thus, 42% of the population are heterozygous carriers.

Final Answer: 0.42**Answer:** (B)[Go Back to Question 7](#)

Q8.

Solution**Concept:**

Homology refers to anatomical features across different species that share a common evolutionary origin despite serving entirely different biological functions. Conversely, analogous structures share similar functional adaptations without a common ancestral blueprint.

Solution:

- (a) Homologous structures are identified by looking for underlying anatomical similarities in embryonic development, skeletal architecture, and tissue morphology, which reveal a shared ancestry between the organisms.
- (b) The forelimbs of a subterranean mole, which are adapted for digging tunnels, and the forelimbs of a cursorial horse, which are adapted for rapid running, contain the exact same pentadactyl structural plan.
- (c) Both configurations consist of a proximal humerus, a medial radius and ulna, a cluster of carpals and metacarpals, and a distal sequence of phalanges modified over generations.
- (d) This conserved anatomical blueprint provides definitive structural evidence that mammals branched out from a common ancestral tetrapod population via divergent evolution.
- (e) The other choices, such as the flippers of penguins and dolphins or the wings of insects and birds, represent convergent evolution because they share common functional pressures rather than structural lineages.

Final Answer: Forelimbs of a subterranean mole and forelimbs of a cursorial horse.

Answer: (D)

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Q9.

Solution**Concept:**

Eukaryotic cells segregate specialized metabolic and hydrolytic activities into membrane-bound compartments. Isolating specific biochemical properties from a crushed cellular solution relies on differential centrifugation and pH-dependent enzyme assays.

Solution:

- (a) Lysosomes function as the primary degradation centers of animal cells, containing a diverse battery of roughly fifty different hydrolytic enzymes capable of breaking down biological polymers.
- (b) These specialized enzymes, including proteases, nucleases, glycosidases, and lipases, are chemically synthesized as proenzymes in the endoplasmic reticulum and travel through the Golgi apparatus.
- (c) To prevent self-digestion of the rest of the cell, these enzymes are strictly optimized to exhibit peak catalytic activity within an acidic environment.
- (d) The internal lumen of a lysosome maintains an approximate pH of 5.0, driven by the continuous action of vacuolar-type proton pumps embedded in its membrane.
- (e) Isolating an intracellular fraction rich in acid hydrolases with optimal activity at pH 5.0 confirms that the sample is composed of purified lysosomes.

Final Answer: Lysosome

Answer: (B)

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Q10.

Solution**Concept:**

Secretory proteins must be synthesized, folded, and physically transported through a highly organized sequence of cellular compartments before being discharged into the extracellular matrix via exocytosis.

Solution:

- (a) The endomembrane system acts as a highly structured molecular conveyor belt, coordinating protein processing, structural modifications, and vesicular transport across distinct membrane domains.
- (b) Synthesis initiates on membrane-bound ribosomes, which insert the growing polypeptide chain directly into the lumen of the rough endoplasmic reticulum for folding and initial core glycosylation.
- (c) Transport vesicles bud from the endoplasmic reticulum and travel along microtubule tracks to fuse with the cis-Golgi network, where modification of oligosaccharide chains begins.
- (d) The protein moves through the medial cisternae to the trans-Golgi network, where it is sorted and packaged into specialized secretory vesicles.
- (e) These secretory vesicles migrate to the cell boundary, fusing with the plasma membrane to release their contents into the extracellular space during regulated exocytosis.

Final Answer: Rough Endoplasmic Reticulum → Cis-Golgi → Trans-Golgi → Secretory Vesicles → Plasma Membrane

Answer: (A)

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Q11.

Solution**Concept:**

The renin-angiotensin-aldosterone system acts as a multi-organ endocrine cascade designed to regulate systemic blood pressure, intravascular volume, and extracellular sodium concentrations.

Solution:

- (a) When renal perfusion decreases or sodium levels drop, the juxtaglomerular cells in the afferent arteriole of the kidney sense the change and release the proteolytic enzyme renin.
- (b) Renin cleaves circulating angiotensinogen into angiotensin I, which is quickly converted into the active octapeptide angiotensin II by endothelial enzymes in the lungs.
- (c) Angiotensin II binds to specific receptors on the cells of the zona glomerulosa within the adrenal cortex, stimulating the synthesis and secretion of aldosterone.
- (d) Aldosterone travels through the bloodstream to the distal convoluted tubules and collecting ducts of the nephron, upgrading the expression of basolateral sodium-potassium pumps.
- (e) This physiological adaptation increases sodium reabsorption from the tubular fluid, pulling water back along with it to increase total blood volume and restore pressure.

Final Answer: Stimulation of the adrenal cortex to secrete aldosterone, enhancing renal sodium reabsorption.

Answer: (B)

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Q12.

Solution**Concept:**

Carbon dioxide transport in human blood relies on specialized biochemical adaptations within red blood cells to maximize transport efficiency while maintaining a constant systemic blood pH.

Solution:

- (a) Metabolic waste carbon dioxide continuously diffuses out of tissue cells, traversing the interstitial fluid to enter the plasma and pass into circulating erythrocytes.
- (b) Within the erythrocyte, the abundance of the enzyme carbonic anhydrase accelerates the hydration of carbon dioxide into unstable carbonic acid, which spontaneously dissociates into protons and bicarbonate ions.
- (c) To prevent the internal accumulation of bicarbonate from stalling the forward reaction, a transport protein called band 3 shifts bicarbonate out into the plasma.
- (d) This outward movement is electroneutrally balanced by the simultaneous influx of a chloride ion from the plasma, a process known as the chloride shift.
- (e) The remaining intracellular protons bind to deoxygenated hemoglobin molecules, which stabilizes the red blood cell interior and shifts the oxygen-hemoglobin dissociation curve to promote oxygen unloading.

Final Answer: CO_2 combines directly with water via carbonic anhydrase to form H^+ and HCO_3^- , followed by efflux of HCO_3^- matched by influx of Cl^- .

Answer: (A)

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Q13.

Solution**Concept:**

C4 plants minimize the waste of photorespiration by using a spatial separation mechanism to physically isolate atmospheric carbon capture from the primary Calvin cycle.

Solution:

- (a) The leaf anatomy of C4 plants exhibits a distinct arrangement where outer mesophyll cells encircle a highly specialized inner layer of bundle sheath cells.
- (b) Initial carbon capture occurs exclusively within the cytoplasm of the mesophyll cells, driven by the enzyme phosphoenolpyruvate carboxylase.
- (c) Unlike ribulose-1,5-bisphosphate carboxylase-oxygenase, phosphoenolpyruvate carboxylase has an exceptionally high affinity for bicarbonate ions and displays zero competitive binding with oxygen.
- (d) This carboxylase fastens the carbon to a three-carbon molecule, producing the four-carbon organic acid oxaloacetate, which is quickly converted into malate.
- (e) Malate is then transported through connecting plasmodesmata channels into the bundle sheath cells, where it is decarboxylated to release a concentrated stream of carbon dioxide directly to Rubisco.

Final Answer: PEP carboxylase operating in the cytoplasm of mesophyll cells.

Answer: (B)

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Q14.

Solution**Concept:**

The total water potential of a plant cell is determined by the mathematical sum of its internal solute potential and its physical turgor pressure, governed by the formula $\Psi_w = \Psi_s + \Psi_p$.

Solution:

- (a) A healthy, flaccid plant cell starts with a turgor pressure of zero, meaning its initial total water potential matches its solute potential exactly at -0.8 MPa.
- (b) When this cell is submerged in an open beaker containing a sucrose solution with a higher water potential of -0.5 MPa, a water potential gradient is established.
- (c) Water molecules spontaneously move down this gradient, crossing the semipermeable plasma membrane and entering the intracellular space via osmosis.
- (d) As net water influx expands the vacuole, the plasma membrane pushes outward against the rigid cellulose cell wall, generating an increasing physical turgor pressure.
- (e) Net osmosis continues until the internal water potential rises to match the external solution water potential. Rearranging the formula gives $\Psi_p = \Psi_w - \Psi_s = -0.5 \text{ MPa} - (-0.8 \text{ MPa}) = +0.3 \text{ MPa}$.

Final Answer: $+0.3$ MPa

Answer: (B)

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Q15.

Solution**Concept:**

Human oogenesis is a discontinuous developmental process that begins during embryonic development and is regulated by hormonal signals at puberty and fertilization.

Solution:

- (a) During female fetal development, primordial germ cells differentiate into oogonia and undergo intensive mitotic divisions before transforming into primary oocytes.
- (b) These primary oocytes initiate the first meiotic division but halt during the diplotene stage of prophase I, remaining suspended within developing follicles for years.
- (c) Beginning at puberty, cyclic surges of luteinizing hormone rescue a small cohort of follicles each month, signaling the chosen primary oocyte to complete meiosis I.
- (d) This asymmetrical division produces a large secondary oocyte and a small first polar body. The secondary oocyte enters meiosis II and immediately arrests at metaphase II.
- (e) The secondary oocyte is ovulated in this arrested state, and will only complete the remainder of meiosis II if a sperm cell successfully penetrates the plasma membrane.

Final Answer: Arrests in Prophase I (Diplotene) during fetal development, completes Meiosis I just prior to ovulation, and arrests in Metaphase II until fertilization occurs.

Answer: (B)

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Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	D	2	B	3	B	4	B	5	C
6	B	7	B	8	D	9	B	10	A
11	B	12	A	13	B	14	B	15	B

