PGIMER BSc Nursing Biology

Sample Paper – 12

Duration: 23 Minutes **Maximum Marks: 25**

Instructions

- This paper contains **25** Multiple Choice Questions (Single Correct Answer), modelled on the Biology portion of the **PGIMER BSc Nursing** entrance exam.
- Each correct answer carries **+1 mark**. **0.25 mark** is deducted for every incorrect answer. Unattempted questions carry **0 marks**.
- Only **one** option is correct. Choose carefully.
- Syllabus level: **Class 11 and 12 (NCERT) Biology**.
- The exam is conducted as a computer-based test. Personal calculators, mobile phones, and other electronic gadgets are strictly prohibited.

Q1. In the stomach of a human infant, a gastric enzyme acts on the soluble milk protein casein and curdles (coagulates) the milk so that it stays longer for digestion. This enzyme is:

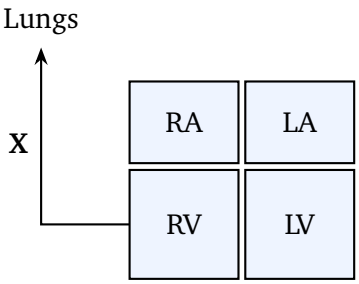
(A) Pepsin

(B) Rennin

(C) Trypsin

(D) Salivary amylase

Q2. The diagram shows the human heart. The vessel labelled **X**, which leaves the right ventricle and carries deoxygenated blood towards the lungs, is the:



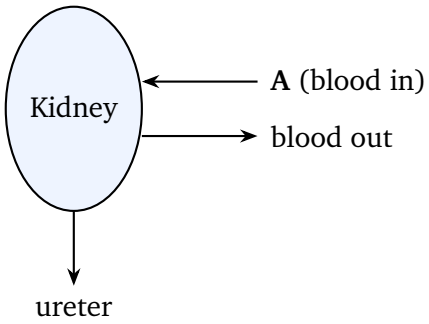
(A) Aorta

(B) Pulmonary vein

(C) Superior vena cava

(D) Pulmonary artery

Q3. The diagram shows a kidney with two blood vessels. The vessel labelled **A** brings blood laden with wastes into the kidney to be filtered. This vessel is the:



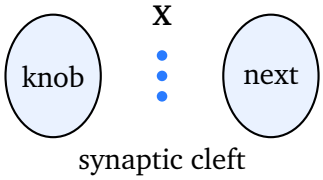
(A) Renal artery

(B) Renal vein

(C) Ureter

(D) Urethra

Q4. The figure shows the junction (synapse) between two neurons. The chemical messenger **X**, released from the synaptic knob into the gap to carry the impulse across to the next neuron, is:



(A) Insulin

(B) Bile salts

(C) Acetylcholine

(D) Sodium chloride crystals

Q5. In aerobic respiration, the Krebs cycle completely oxidises pyruvate and, together with the electron transport chain, produces the major share of the cell's ATP. This cycle takes place in the:

(A) Mitochondrial matrix

(B) Cytoplasm

(C) Nucleus

(D) Chloroplast

Q6. The hormone that stimulates strong contractions of the uterus during childbirth and causes the ejection of milk from the mammary glands during suckling is:

(A) Prolactin

(B) Oxytocin

(C) Estrogen

(D) Thyroxine

Q7. A Punnett square combines the gametes of both parents to predict the offspring. In the cross Tt $\times$ Tt, the probability that a single offspring will be homozygous recessive (tt) is:

(A) $\frac{1}{2}$

(B) $\frac{3}{4}$

(C) $\frac{1}{4}$

(D) 1 (certain)

Q8. Thalassaemia, a disorder in which a person produces abnormal or insufficient haemoglobin and needs repeated blood transfusions, is inherited as a/an:

(A) Sex-linked dominant trait

(B) Y-linked trait

(C) Acquired condition that is not inherited

(D) Autosomal recessive trait

Q9. During DNA replication, each new double helix ends up with one old (parental) strand and one newly made strand. Because half of the original molecule is retained in each daughter molecule, this mode of replication is described as:

(A) Semiconservative

(B) Conservative

(C) Dispersive

(D) Non-replicative

Q10. On the Galapagos Islands, Darwin found many species of finches that had evolved from one ancestral seed-eating type, each with a differently shaped beak suited to a different food. The spread of a single ancestral species into many new forms adapted to different habitats is called:

(A) Convergent evolution

(B) Adaptive radiation

(C) Genetic drift

(D) Artificial selection

Q11. The dense, rounded body seen inside the nucleus, which is the site where ribosomal RNA is made and the ribosomal subunits are assembled, is the:

(A) Nuclear pore

(B) Centromere

(C) Nucleolus

(D) Chromatin network

Q12. When a cell is placed in pure water or a dilute (hypotonic) solution, water moves into the cell and it swells and becomes turgid. This inward movement of water into the cell is called:

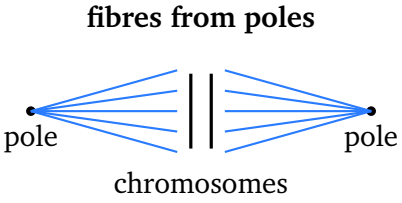
(A) Exosmosis

(B) Plasmolysis

(C) Active transport

(D) Endosmosis

Q13. The figure shows fine microtubule fibres running from the two poles of a dividing cell and attaching to the chromosomes at the centre. This fibre network, which pulls the chromatids apart towards the poles, is the:



(A) Spindle apparatus

(B) Cell plate

(C) Nuclear envelope

(D) Cell wall

Q14. Certain cells, such as mature nerve cells, leave the cell cycle and enter an inactive, non-dividing stage in which they carry out their functions but no longer divide. This stage is called the:

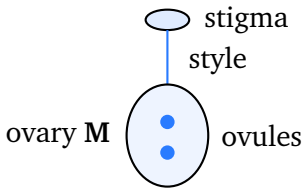
(A) S phase

(B) G_0 (quiescent) stage

(C) M phase

(D) G_2 phase

Q15. The figure shows the female part of a flower after fertilisation. The ovary (labelled **M**) grows into the fruit. The structure present inside the ovary, which develops into the seed, is the:



(A) Stigma

(B) Style

(C) Ovule

(D) Petal

Q16. During the formation of semen, the seminal vesicles and the prostate gland add their secretions to the sperm. The main role of these accessory-gland secretions is to:

(A) Produce the sperm cells themselves

(B) Decide the sex of the future child

(C) Manufacture the male hormone testosterone

(D) Nourish the sperm and provide a fluid medium for their transport

Q17. In the human ovary, the fully mature follicle that ruptures at the ovary surface and releases the ovum during ovulation is the:

(A) Graafian follicle

(B) Corpus luteum

(C) Primary follicle

(D) Corpus albicans

Q18. Leaves look green to our eyes. This is because the pigment chlorophyll absorbs mainly red and blue light for photosynthesis but, for the green part of sunlight, it:

(A) Absorbs green light most strongly

(B) Reflects green light back to our eyes

(C) Turns all the light green in colour

(D) Makes glucose that is green in colour

Q19. The plant growth regulator that closes the stomata during water shortage, promotes dormancy of seeds and buds, and is therefore called the "stress hormone" of plants is:

(A) Auxin

(B) Gibberellin

(C) Abscisic acid

(D) Cytokinin

Q20. Some of the most ancient bacteria live in extreme habitats such as hot springs, very salty lakes and the guts of ruminant animals, and have a distinct cell-wall chemistry. These organisms are the:

(A) Cyanobacteria

(B) Eubacteria

(C) Mycoplasmas

(D) Archaebacteria

Q21. Animals that have dry, scaly skin, are cold-blooded, breathe only through lungs and lay shelled eggs on land (for example lizards and snakes) belong to the class:

(A) Reptilia

(B) Amphibia

(C) Aves

(D) Pisces

Q22. In the food chain shown, the organism at position **X** feeds on the snake and is not eaten by any other animal. Its trophic level is that of the:

Grass → Rabbit → Snake → **X** (Eagle)

(A) Producer

(B) Tertiary consumer (top carnivore)

(C) Primary consumer

(D) Decomposer

Q23. In the nitrogen cycle, the bacteria that convert soil nitrates back into free nitrogen gas and release it into the atmosphere are the:

(A) Nitrifying bacteria

(B) Nitrogen-fixing bacteria

(C) Denitrifying bacteria

(D) Ammonifying bacteria

Q24. After an infection or a vaccination, the body keeps certain long-lived cells so that a second attack by the same germ is met with a quicker and stronger immune response. These cells are the:

(A) Platelets

(B) Red blood cells

(C) Neutrophils

(D) Memory cells

Q25. Dolly, the first mammal produced by transferring the nucleus of an adult body (somatic) cell into an egg whose own nucleus had been removed, was created by the technique of:

(A) Reproductive cloning (nuclear transfer)

(B) Sexual hybridisation

(C) Natural selection

(D) Gene therapy

Detailed Solutions

Q1.

Solution

Concept — Protein digestion in the infant stomach: The gastric juice of a young infant contains a special enzyme that acts on milk before the milk can be digested further.

Step 1 — Identify the milk protein: The main protein of milk is casein, which is present in a soluble form.

Step 2 — Identify the action of rennin: Rennin acts on soluble casein and converts it into a solid, curdled (coagulated) form. This slows the passage of milk out of the stomach and gives pepsin more time to digest the protein.

Why other options are wrong:

- Option A (Pepsin): digests general proteins into peptides but does not curdle milk.
- Option C (Trypsin): a protein-digesting enzyme of the pancreas, active in the small intestine.
- Option D (Salivary amylase): acts on starch in the mouth, not on milk protein.

Final Answer: Milk-curdling in the infant stomach is done by rennin $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q1

Q2.

Solution

Concept — Vessels leaving the heart: Two great arteries leave the ventricles: the aorta from the left ventricle and the pulmonary artery from the right ventricle.

Step 1 — Read the diagram: Vessel **X** leaves the right ventricle (RV) and travels towards the lungs.

Step 2 — Name the vessel and its blood: The vessel that carries deoxygenated blood from the right ventricle to the lungs for oxygenation is the pulmonary artery. It is the only artery in the body that carries deoxygenated blood.

Why other options are wrong:

- Option A (Aorta): leaves the left ventricle and carries oxygenated blood to

the body.
- Option B (Pulmonary vein): brings oxygenated blood from the lungs back to the left atrium.
- Option C (Superior vena cava): brings deoxygenated blood from the upper body into the right atrium, not out of the ventricle.

Final Answer: The vessel from the right ventricle to the lungs is the pulmonary artery $\Rightarrow$ D

Answer: (D) Go Back to Q2

Q3.

Solution

Concept — Blood supply of the kidney: Each kidney receives blood through one vessel and drains it through another; the filtering job needs a fresh supply of blood loaded with wastes.

Step 1 — Read the diagram: Vessel **A** points inward, bringing blood into the kidney to be filtered.

Step 2 — Name the incoming vessel: The renal artery, a branch of the aorta, carries blood containing wastes such as urea into the kidney, where the nephrons filter it.

Why other options are wrong:

- Option B (Renal vein): carries the filtered (cleaned) blood away from the kidney, shown by the outgoing arrow.
- Option C (Ureter): carries urine, not blood, from the kidney to the bladder.
- Option D (Urethra): carries urine out of the body from the bladder, and is not attached to the kidney.

Final Answer: Blood is brought to the kidney by the renal artery $\Rightarrow$ A

Answer: (A) Go Back to Q3

Q4.

Solution

Concept — Transmission across a synapse: A nerve impulse cannot jump the tiny gap between two neurons directly. It is carried across by a chemical.

Step 1 — Read the figure: When the impulse reaches the synaptic knob, tiny vesicles release a chemical (**X**) into the synaptic cleft.

Step 2 — Name the chemical: This chemical messenger is a neurotransmitter, and the common neurotransmitter released at such synapses is acetylcholine. It diffuses across the gap and starts a new impulse in the next neuron.

Why other options are wrong:

- Option A (Insulin): a hormone that controls blood glucose, not a neurotransmitter.
- Option B (Bile salts): help in the digestion of fats in the intestine.
- Option D (Sodium chloride crystals): ions move during an impulse, but the chemical released across the synapse is a neurotransmitter, not salt crystals.

Final Answer: The neurotransmitter released at the synapse is acetylcholine $\Rightarrow$ C

Answer: (C) Go Back to Q4

Q5.

Solution

Concept — Stages of aerobic respiration: Glucose is broken down in stages, and each stage takes place in a definite part of the cell.

Step 1 — Locate glycolysis and the Krebs cycle: Glycolysis occurs in the cytoplasm and forms pyruvate. The pyruvate then enters the mitochondrion, where the Krebs cycle takes place in the fluid matrix.

Step 2 — Explain the energy yield: Inside the mitochondrion, the Krebs cycle and the electron transport chain that follows it release most of the cell's ATP. So the Krebs cycle takes place in the mitochondrial matrix.

Why other options are wrong:

- Option B (Cytoplasm): is the site of glycolysis, which gives only a small net yield of ATP.
- Option C (Nucleus): controls the cell and stores DNA; it does not run the

Krebs cycle.

- Option D (Chloroplast): is the site of photosynthesis, not respiration.

Final Answer: The Krebs cycle occurs in the mitochondrial matrix $\Rightarrow$ A

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — Hormones of childbirth and lactation: The posterior pituitary releases a hormone that acts on smooth muscle of the uterus and of the mammary glands.

Step 1 — Identify the hormone: Oxytocin is released from the posterior pituitary.

Step 2 — Describe its two actions: Oxytocin causes powerful contractions of the uterus muscles during childbirth, and it also causes the ejection (let-down) of milk from the mammary glands when the baby suckles.

Why other options are wrong:

- Option A (Prolactin): stimulates the production of milk but not its ejection or uterine contraction.
- Option C (Estrogen): develops female secondary sexual characters; it does not eject milk.
- Option D (Thyroxine): controls the rate of metabolism, unrelated to childbirth.

Final Answer: Uterine contraction and milk ejection are caused by oxytocin $\Rightarrow$ B

Answer: (B) Go Back to Q6

Q7.

Solution

Concept — Punnett square and probability: A Punnett square lists the gametes of each parent along the two sides and fills in the offspring genotypes in the boxes.

Step 1 — Write the gametes: Each Tt parent forms two kinds of gametes: T and t.

Step 2 — Fill the square: Combining them gives four boxes: TT, Tt, Tt and tt.

Step 3 — Read off the probability: Out of the four equally likely boxes, only one

is tt. So the probability of an offspring being homozygous recessive is $\frac{1}{4}$.

Why other options are wrong:

- Option A ($\frac{1}{2}$): is the chance of a heterozygous (Tt) offspring, not tt.
- Option B ($\frac{3}{4}$): is the chance of showing the dominant (tall) phenotype.
- Option D (1): would mean every offspring is tt, which is false.

Final Answer: The probability of a tt offspring is $\frac{1}{4} \Rightarrow \boxed{C}$

Answer: (C) Go Back to Q7

Q8.

Solution

Concept — Pattern of inheritance of thalassaemia: Genetic disorders can be dominant or recessive, and may lie on the autosomes or on the sex chromosomes.

Step 1 — Recall the nature of thalassaemia: Thalassaemia is a blood disorder in which the globin chains of haemoglobin are made in reduced amounts, so the person has anaemia.

Step 2 — Identify the inheritance: The defect is carried on an autosome (not a sex chromosome), and the disease appears only when both copies of the gene are faulty. So it is an autosomal recessive disorder, passed on when a child inherits a defective gene from each parent.

Why other options are wrong:

- Option A (Sex-linked dominant): thalassaemia is not carried on the sex chromosomes.
- Option B (Y-linked): a Y-linked trait would pass only from father to son, which is not the case.
- Option C (Acquired, not inherited): thalassaemia is inherited through genes, not acquired during life.

Final Answer: Thalassaemia is inherited as an autosomal recessive trait $\Rightarrow \boxed{D}$

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Mode of DNA replication: When DNA copies itself, the two parental strands separate and each acts as a template for a new strand.

Step 1 — Trace the strands: Each old strand pairs with a freshly built strand. So every new DNA molecule has one old strand and one new strand.

Step 2 — Name the pattern: Because each daughter molecule conserves one half (one strand) of the original, the process is called semiconservative replication. This was proved by the Meselson and Stahl experiment.

Why other options are wrong:

- Option B (Conservative): would keep both old strands together and make a fully new molecule separately, which does not happen.
- Option C (Dispersive): would scatter old and new pieces along both strands, which is not observed.
- Option D (Non-replicative): is not a real term; DNA clearly does replicate.

Final Answer: DNA replication is semiconservative $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q9

Q10.

Solution

Concept — Diversification from a common ancestor: When one species spreads into different habitats, natural selection can shape it into several new species.

Step 1 — Recall Darwin's finches: On the Galapagos Islands, one ancestral finch gave rise to many species, each with a beak suited to a particular food (seeds, insects, cactus).

Step 2 — Name the process: The evolution of many different species from a single ancestral type, each adapted to a different environment, is called adaptive radiation.

Why other options are wrong:

- Option A (Convergent evolution): is when unrelated species come to look alike, the opposite situation.
- Option C (Genetic drift): is a random change in gene frequency, not adaptation to different foods.

- Option D (Artificial selection): is breeding carried out by humans, not natural evolution on islands.

Final Answer: One ancestor branching into many adapted forms is adaptive radiation $\Rightarrow$ B

Answer: (B) Go Back to Q10

Q11.

Solution

Concept — Structures inside the nucleus: The nucleus contains chromatin and one or more dense bodies with a special job.

Step 1 — Identify the dense body: The rounded, darkly staining body inside the nucleus is the nucleolus.

Step 2 — State its function: The nucleolus is the site where ribosomal RNA (rRNA) is synthesised and where the ribosomal subunits are put together before moving out into the cytoplasm.

Why other options are wrong:

- Option A (Nuclear pore): is a channel in the nuclear membrane for transport, not a site of ribosome assembly.
- Option B (Centromere): is the region of a chromosome where sister chromatids are joined.
- Option D (Chromatin network): is the thread-like DNA-protein material that condenses into chromosomes.

Final Answer: Ribosomal subunits are assembled in the nucleolus $\Rightarrow$ C

Answer: (C) Go Back to Q11

Q12.

Solution

Concept — Direction of osmosis: Osmosis can move water into a cell or out of it, and the two directions have different names.

Step 1 — Note the surrounding solution: The cell is in pure water or a hypotonic (more dilute) solution, so water potential is higher outside than inside.

Step 2 — Name the inward movement: Water therefore moves into the cell,

making it swell and become turgid. This inward osmotic movement of water into a cell is called endosmosis.

Why other options are wrong:

- Option A (Exosmosis): is the outward movement of water when a cell is in a concentrated solution.
- Option B (Plasmolysis): is the shrinking of a cell when water leaves it in a hypertonic solution.
- Option C (Active transport): moves solutes against a gradient using ATP; it is not the passive entry of water.

Final Answer: Water entering a cell in a hypotonic solution is endosmosis $\Rightarrow$ D

Answer: (D) Go Back to Q12

Q13.

Solution

Concept — Apparatus that moves chromosomes: During cell division a special structure made of protein fibres separates the chromosomes.

Step 1 — Read the figure: Fine fibres run from the two poles of the cell and attach to the chromosomes lying at the centre.

Step 2 — Name the structure: These fibres are microtubules that together form the spindle apparatus. The spindle fibres shorten and pull the sister chromatids towards opposite poles.

Why other options are wrong:

- Option B (Cell plate): forms later at the centre to divide the cytoplasm in a plant cell; it does not pull chromosomes.
- Option C (Nuclear envelope): is the membrane around the nucleus, which actually breaks down during division.
- Option D (Cell wall): is the rigid outer covering of a plant cell and has no role in moving chromosomes.

Final Answer: The microtubule fibres that pull chromatids form the spindle apparatus $\Rightarrow$ A

Answer: (A) Go Back to Q13

Q14.

Solution

Concept — The resting stage of the cell cycle: Not all cells keep dividing; some step out of the cycle and stop dividing.

Step 1 — Recall the cell cycle: The cell cycle runs through G_1, S, G_2 and M phases. From G_1, some cells can leave the cycle.

Step 2 — Name the resting stage: Cells that stop dividing, such as mature nerve cells, enter a quiet, non-dividing stage called the G_0 (quiescent) stage. They stay metabolically active but do not divide.

Why other options are wrong:

- Option A (S phase): is when DNA is copied; it is part of active division.
- Option C (M phase): is the actual division phase (mitosis), the opposite of resting.
- Option D (G_2 phase): is the stage of preparation just before mitosis, not a resting stage.

Final Answer: The non-dividing resting stage is the G_0 stage $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q14

Q15.

Solution

Concept — Fate of flower parts after fertilisation: After fertilisation, different parts of the pistil grow into different structures of the fruit.

Step 1 — Read the figure: The ovary **M** is the swollen base of the pistil, and inside it lie small bodies called ovules.

Step 2 — Match each part to its product: The ovary wall grows into the fruit, while each ovule inside the ovary develops into a seed. So the structure that becomes the seed is the ovule.

Why other options are wrong:

- Option A (Stigma): the sticky tip that receives pollen; it withers after fertilisation.
- Option B (Style): the stalk connecting stigma to ovary; it does not become a seed.
- Option D (Petal): a coloured whorl that attracts pollinators and later falls

off.

Final Answer: The ovule develops into the seed $\Rightarrow$ C

Answer: (C) Go Back to Q15

Q16.

Solution

Concept — Accessory glands of the male reproductive system: Semen is more than just sperm; it also contains fluids added by accessory glands.

Step 1 — Identify the secretions: The seminal vesicles and the prostate gland pour their secretions onto the sperm as they pass along the reproductive tract.

Step 2 — State their role: These secretions contain sugars (such as fructose) and other substances that nourish the sperm and provide a fluid medium in which the sperm can swim and be transported.

Why other options are wrong:

- Option A (Produce sperm): sperm are made in the seminiferous tubules of the testis, not by these glands.
- Option B (Decide the sex): the sex of the child is decided by the sex chromosome in the sperm, not by gland secretions.
- Option C (Make testosterone): testosterone is made by the interstitial (Leydig) cells of the testis, not by these accessory glands.

Final Answer: Accessory-gland secretions nourish the sperm and provide their fluid medium $\Rightarrow$ D

Answer: (D) Go Back to Q16

Q17.

Solution

Concept — Follicles in the ovary: An egg matures inside a fluid-filled sac in the ovary, which changes name as it develops.

Step 1 — Trace follicle growth: A primary follicle grows and fills with fluid, becoming a large mature follicle called the Graafian follicle.

Step 2 — Link it to ovulation: At ovulation, the Graafian follicle ruptures at the surface of the ovary and releases the ovum. So the follicle that releases the egg is

the Graafian follicle.

Why other options are wrong:

- Option B (Corpus luteum): is the yellow body formed from the ruptured follicle after the egg is released; it secretes progesterone.
- Option C (Primary follicle): is an early, immature stage that has not yet released an egg.
- Option D (Corpus albicans): is the scar tissue left when the corpus luteum degenerates.

Final Answer: The ovum is released at ovulation from the Graafian follicle $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — Why leaves look green: The colour we see from an object is the light it reflects, not the light it absorbs.

Step 1 — Recall chlorophyll absorption: Chlorophyll absorbs mainly the red and blue parts of sunlight and uses that energy for photosynthesis.

Step 2 — Explain the green colour: Chlorophyll does not absorb green light well; instead it reflects (and transmits) green light. This reflected green light reaches our eyes, so leaves appear green.

Why other options are wrong:

- Option A (Absorbs green strongly): if it absorbed green, the leaf would not look green.
- Option C (Turns light green): pigments do not colour the light itself; they absorb some colours and reflect others.
- Option D (Green glucose): glucose is colourless; the green colour is due to chlorophyll, not sugar.

Final Answer: Leaves are green because chlorophyll reflects green light $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Growth-inhibiting plant hormone: Most plant hormones promote growth, but one important hormone slows growth and helps the plant survive stress.

Step 1 — Recall the stress hormone: Abscisic acid (ABA) is the hormone that acts against growth-promoting hormones.

Step 2 — List its actions: ABA closes the stomata when water is short (reducing water loss), promotes dormancy in seeds and buds, and helps the plant tolerate stress. That is why it is called the stress hormone.

Why other options are wrong:

- Option A (Auxin): promotes cell elongation and controls tropic movements.
- Option B (Gibberellin): promotes stem elongation and breaks seed dormancy, the opposite of ABA.
- Option D (Cytokinin): promotes cell division and delays ageing of leaves.

Final Answer: The stress hormone that closes stomata and causes dormancy is abscisic acid $\Rightarrow$ C

Answer: (C) Go Back to Q19

Q20.

Solution

Concept — The most ancient bacteria: Kingdom Monera is split into two great groups: the ancient archaebacteria and the true bacteria (eubacteria).

Step 1 — Note the extreme habitats: Organisms living in hot springs, very salty lakes and the guts of ruminants survive conditions that would kill most life.

Step 2 — Name the group: These extremophiles are the archaebacteria. They include halophiles (salt-loving), thermophiles (heat-loving) and methanogens (in the gut of ruminants), and they have a distinct cell-wall chemistry.

Why other options are wrong:

- Option A (Cyanobacteria): are photosynthetic blue-green bacteria of ordinary waters, not extreme habitats.
- Option B (Eubacteria): are the "true bacteria" of common environments.
- Option C (Mycoplasmas): are the smallest bacteria that lack a cell wall; they

are not defined by extreme habitats.

Final Answer: Extremophiles of hot springs and salty waters are archaebacteria $\Rightarrow$ D

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Characters of the class Reptilia: Vertebrates are grouped into classes by their skin, body temperature, breathing and mode of reproduction.

Step 1 — Match the features: Dry scaly skin, a cold-blooded (poikilothermic) body, lung breathing and shelled eggs laid on land are the hallmark features of reptiles.

Step 2 — Name the class: Animals such as lizards and snakes with these features belong to the class Reptilia.

Why other options are wrong:

- Option B (Amphibia): have moist skin, lay eggs in water and often breathe partly through the skin.
- Option C (Aves): are warm-blooded birds with feathers, not dry scales.
- Option D (Pisces): are fishes that live in water and breathe through gills.

Final Answer: Dry-scaled, cold-blooded, shelled-egg layers are class Reptilia $\Rightarrow$ A

Answer: (A) Go Back to Q21

Q22.

Solution

Concept — Trophic levels and the top carnivore: Energy passes along a food chain from producers through several levels of consumers.

Step 1 — Count the levels: Grass is the producer. Rabbit is the primary consumer, snake is the secondary consumer, and **X** (the eagle) feeds on the snake.

Step 2 — Place organism X: An organism that eats the secondary consumer stands at the next level, the tertiary consumer. Because nothing eats the eagle, it is also the top carnivore (apex predator) of this chain.

Why other options are wrong:

- Option A (Producer): only grass, which makes its own food, is the producer.
- Option C (Primary consumer): that position is held by the rabbit, which eats grass.
- Option D (Decomposer): decomposers break down dead matter and are not shown feeding on the snake.

Final Answer: The eagle that eats the snake is the tertiary consumer (top carnivore) $\Rightarrow$ B

Answer: (B) Go Back to Q22

Q23.

Solution

Concept — Steps of the nitrogen cycle: Nitrogen moves between the air and the soil through the work of different bacteria.

Step 1 — Recall the return step: Nitrates in the soil must be turned back into free nitrogen gas to complete the cycle and refill the atmosphere.

Step 2 — Name the bacteria: Denitrifying bacteria carry out this step, converting soil nitrates into free nitrogen (N_2) that escapes into the air.

Why other options are wrong:

- Option A (Nitrifying bacteria): change ammonia into nitrites and then nitrates, the opposite direction.
- Option B (Nitrogen-fixing bacteria): change atmospheric nitrogen into usable compounds in the soil.
- Option D (Ammonifying bacteria): break down proteins of dead matter into ammonia.

Final Answer: Nitrates are returned to the air as N_2 by denitrifying bacteria $\Rightarrow$ C

Answer: (C) Go Back to Q23

Q24.

Solution

Concept — Immune memory: After the body fights off an infection, it keeps a record so that it can respond faster the next time.

Step 1 — Recall what happens after the first exposure: During the first (primary) response, some lymphocytes are set aside as long-lived cells instead of fighting immediately.

Step 2 — Name the cells and their role: These are the memory cells. On a second exposure to the same germ, they recognise it at once and mount a quicker, stronger (secondary) response. This is the basis of vaccination.

Why other options are wrong:

- Option A (Platelets): help in blood clotting, not in immune memory.
- Option B (Red blood cells): carry oxygen and have no role in immunity.
- Option C (Neutrophils): are short-lived cells that engulf germs during the general response; they do not store memory.

Final Answer: A faster secondary response is due to memory cells $\Rightarrow \boxed{\text{D}}$

Answer: (D) Go Back to Q24

Q25.

Solution

Concept — Cloning by nuclear transfer: A clone is an organism genetically identical to another, made without normal fertilisation.

Step 1 — Recall how Dolly was made: The nucleus from an adult body (somatic) cell of one sheep was placed into an egg cell whose own nucleus had been removed. This egg was then allowed to develop.

Step 2 — Name the technique: This method of making a genetically identical copy of an animal by somatic-cell nuclear transfer is called reproductive cloning. Dolly the sheep was the first mammal produced this way.

Why other options are wrong:

- Option B (Sexual hybridisation): involves the fusion of male and female gametes, which was not used for Dolly.
- Option C (Natural selection): is an evolutionary process, not a laboratory technique.

- Option D (Gene therapy): is the correction of a faulty gene to treat a disorder, not the making of a whole clone.

Final Answer: Dolly the sheep was produced by reproductive cloning (nuclear transfer) $\Rightarrow$ A

Answer: (A) Go Back to Q25

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	B	2	D	3	A	4	C	5	A
6	B	7	C	8	D	9	A	10	B
11	C	12	D	13	A	14	B	15	C
16	D	17	A	18	B	19	C	20	D
21	A	22	B	23	C	24	D	25	A