PGIMER BSc Nursing Biology

Sample Paper – 9

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 human small intestine, the enzyme maltase acts on the disaccharide maltose. The final product of this reaction, which is absorbed into the blood, is:

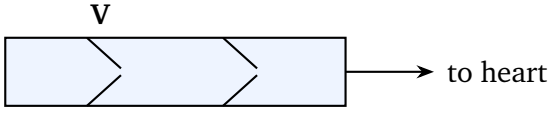
(A) Fructose

(B) Maltose

(C) Glucose

(D) Sucrose

Q2. The diagram shows a blood vessel with internal flap-like valves marked **V** that prevent the backflow of blood and carry blood towards the heart. This vessel is a(n):



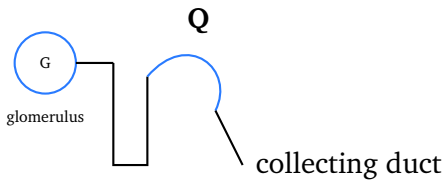
(A) Artery

(B) Vein

(C) Capillary

(D) Aorta

Q3. The diagram shows a nephron. The coiled part labelled **Q**, which lies after the loop of Henle and just before the collecting duct and carries out selective reabsorption and secretion of ions, is the:



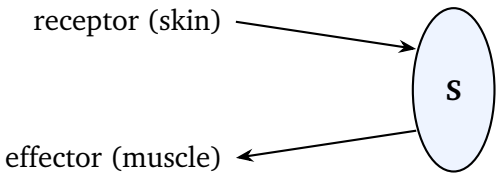
(A) Glomerulus

(B) Proximal convoluted tubule

(C) Loop of Henle

(D) Distal convoluted tubule

Q4. The diagram shows a reflex arc. The central nervous structure labelled **S**, which receives the sensory message and sends back a motor command to produce a quick reflex without waiting for the brain, is the:



(A) Spinal cord

(B) Cerebrum

(C) Cerebellum

(D) Medulla oblongata

Q5. The volume of air that still remains in the lungs even after the most forceful expiration, and which can never be breathed out, is called the:

(A) Tidal volume

(B) Vital capacity

(C) Residual volume

(D) Inspiratory reserve volume

Q6. Severe deficiency of thyroxine in a growing child, leading to stunted body growth and impaired mental development, produces the condition known as:

(A) Simple goitre

(B) Cretinism

(C) Gigantism

(D) Diabetes insipidus

Q7. An organism that carries two different alleles of a gene for a particular trait, for example a tall pea plant with the genotype Tt, is described as:

(A) Homozygous dominant

(B) Homozygous recessive

(C) Pure-breeding

(D) Heterozygous

Q8. Sickle-cell anaemia arises when a single base change replaces glutamic acid by valine in the beta-globin chain of haemoglobin. This alteration of a single base pair is an example of a:

(A) Point (gene) mutation

(B) Chromosomal aberration

(C) Deletion of a whole chromosome

(D) Trisomy

Q9. In the genetic code, the number of consecutive nitrogen bases on mRNA that together specify one amino acid (a codon) is:

(A) Two

(B) Three

(C) One

(D) Four

Q10. The process by which new species are formed when two populations become reproductively isolated so that they can no longer interbreed and produce fertile offspring is called:

(A) Adaptation

(B) Natural selection

(C) Speciation

(D) Mutation

Q11. The rigid, non-living outermost boundary that gives shape and mechanical support to a plant cell and is made mainly of cellulose is the:

(A) Cell wall

(B) Plasma membrane

(C) Tonoplast

(D) Nuclear membrane

Q12. When a plant cell is fully filled with water, the outward pressure exerted by the cell contents against the cell wall, which keeps the cell firm and erect, is called:

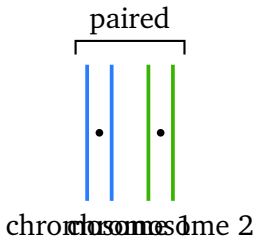
(A) Osmotic pressure

(B) Root pressure

(C) Diffusion pressure

(D) Turgor pressure

Q13. The figure shows a stage of meiosis I in which two homologous chromosomes have come to lie side by side as a pair. This closely paired structure of two homologous chromosomes is called a:



(A) Single chromatid

(B) Bivalent (tetrad)

(C) Centromere

(D) Spindle fibre

Q14. The mode of asexual reproduction in which a parent organism such as *Amoeba* or a bacterium simply divides into two equal daughter cells is called:

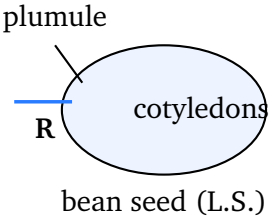
(A) Budding

(B) Fragmentation

(C) Binary fission

(D) Multiple fission

Q15. The figure shows the internal structure of a bean seed. The part labelled **R**, which lies at the pointed end of the embryo and grows into the future root of the seedling, is the:



(A) Radicle

(B) Plumule

(C) Cotyledon

(D) Testa (seed coat)

Q16. In the human male reproductive system, the seminal vesicles and the prostate gland are important chiefly because they:

(A) Produce the sperms

(B) Store the mature sperms

(C) Secrete the hormone testosterone

(D) Add fluid and nutrients to the sperms to form semen

Q17. The normal human gestation period, measured as the time from fertilisation to the birth of the baby, is about:

(A) Six months

(B) Seven months

(C) Nine months

(D) Twelve months

Q18. To prove that starch is formed during photosynthesis, a decolourised leaf is dipped in iodine solution. A positive result, showing the presence of starch, is indicated by a colour of:

(A) Bright red

(B) Blue-black

(C) Green

(D) Brick red

Q19. The upward movement of water and dissolved minerals from the roots to the leaves through the xylem (ascent of sap) is best explained by the transpiration-pull theory, which depends mainly on:

(A) Cohesion of water molecules together with the pull created by transpiration

(B) Active pumping of water by the phloem

(C) Rhythmic muscular contraction of the xylem vessels

(D) The downward force of gravity acting on the sap

Q20. Members of the kingdom Plantae are set apart from all other kingdoms by being multicellular autotrophs whose cells characteristically possess:

(A) Cell walls made of chitin

(B) No cell wall at all

(C) A single large flagellum

(D) Cellulose cell walls and chloroplasts

Q21. The single most characteristic feature that places an animal in the class Mammalia is the presence of:

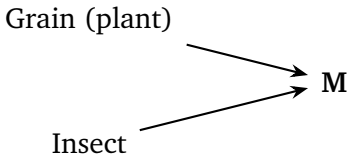
(A) Feathers and a horny beak

(B) Moist scaleless skin used for breathing

(C) Mammary (milk) glands together with body hair

(D) Gills that persist throughout life

Q22. The figure shows the feeding relationships of an animal **M**, which eats both grains (a plant) and insects (an animal) and therefore occupies more than one trophic level. Such an animal is best described as a(n):



(A) Producer

(B) Omnivore

(C) Strict herbivore

(D) Decomposer

Q23. A graphical representation of the total dry weight of all the living organisms present at each successive trophic level of an ecosystem is called the:

(A) Pyramid of numbers

(B) Pyramid of energy

(C) Food web

(D) Pyramid of biomass

Q24. Cholera and typhoid are spread mainly through drinking water contaminated with the faeces of infected persons. The most effective single measure to prevent such water-borne diseases is to:

(A) Drink only boiled or properly purified water

(B) Sleep under a mosquito net every night

(C) Avoid shaking hands with infected persons

(D) Take regular blood transfusions

Q25. The technique that uses the unique pattern of repetitive base sequences in a person's DNA to establish individual identity and to settle disputes of parentage is called:

(A) Polymerase chain reaction (PCR)

(B) Gene cloning

(C) DNA fingerprinting

(D) Tissue culture

Detailed Solutions

Q1.

Solution

Concept — Final steps of carbohydrate digestion: Starch is first broken to maltose, and the last stage of carbohydrate digestion is completed in the small intestine by disaccharidases from the intestinal (succus entericus) juice.

Step 1 — Identify the substrate of maltase: Maltase is an enzyme of the intestinal juice that acts specifically on the disaccharide maltose.

Step 2 — Work out the product: Maltase splits one molecule of maltose into two molecules of the simple sugar glucose, which is then absorbed through the intestinal villi into the blood.

Why other options are wrong:

- Option A (Fructose): is released by the enzyme sucrase acting on sucrose, not by maltase.
- Option B (Maltose): is the starting substrate, not the final product of the reaction.
- Option D (Sucrose): is itself a disaccharide that must be digested, not a product of maltase.

Final Answer: Maltase digests maltose to glucose, which is absorbed $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Structure of blood vessels: Blood vessels are of three main types: arteries, veins and capillaries, each suited to its function.

Step 1 — Read the clues in the figure: The vessel carries blood towards the heart and has internal flap-like valves that stop blood from flowing backwards.

Step 2 — Match these features: Only veins carry blood towards the heart and contain valves along their length to prevent backflow, because the blood in them flows under low pressure. The vessel shown is therefore a vein.

Why other options are wrong:

- Option A (Artery): carries blood away from the heart, has thick muscular

walls and no valves along its length.
- Option C (Capillary): a microscopic one-cell-thick vessel for exchange, with no valves.
- Option D (Aorta): is the largest artery; it carries blood away from the heart, not towards it.

Final Answer: A vessel with valves carrying blood to the heart is a vein $\Rightarrow$ B

Answer: (B) Go Back to Q2

Q3.

Solution

Concept — Regions of the nephron: Along the nephron the filtrate passes through the glomerulus, proximal convoluted tubule, loop of Henle, distal convoluted tubule and finally the collecting duct.

Step 1 — Locate the labelled part: Part **Q** lies after the loop of Henle and just before the collecting duct.

Step 2 — Name it by position and function: This coiled region after the loop is the distal convoluted tubule (DCT). It carries out selective reabsorption of ions and water and the secretion of substances such as H^+ and K^+ to adjust the composition and pH of urine.

Why other options are wrong:

- Option A (Glomerulus): is the tuft of capillaries where blood is filtered, at the very start of the nephron.
- Option B (Proximal convoluted tubule): lies before the loop of Henle and reabsorbs most of the glucose and salts.
- Option C (Loop of Henle): is the U-shaped part that concentrates the urine; part Q comes after it.

Final Answer: The tubule after the loop that does selective reabsorption and secretion is the DCT $\Rightarrow$ D

Answer: (D) Go Back to Q3

Q4.

Solution

Concept — The reflex arc: A reflex action is a quick, automatic response to a stimulus. Its pathway, the reflex arc, is coordinated by the central nervous system.

Step 1 — Trace the pathway: A receptor in the skin sends a sensory impulse along a sensory neuron to the central structure **S**, which then sends a motor impulse along a motor neuron to the effector muscle.

Step 2 — Identify structure S: Most reflex arcs are completed within the spinal cord, which processes the message and sends back the response directly, without waiting for the brain. So **S** is the spinal cord.

Why other options are wrong:

- Option B (Cerebrum): is the seat of thinking and voluntary action, not the centre of a spinal reflex.
- Option C (Cerebellum): maintains balance and coordinates muscular movements.
- Option D (Medulla oblongata): controls involuntary actions such as heartbeat and breathing, not limb reflexes.

Final Answer: The centre that coordinates a reflex action is the spinal cord $\Rightarrow \boxed{\text{A}}$

Answer: (A) Go Back to Q4

Q5.

Solution

Concept — Pulmonary (lung) volumes: The air breathed in and out is measured as several distinct volumes and capacities.

Step 1 — Focus on the air that cannot be expelled: Even after the deepest possible expiration, some air always stays behind in the lungs and air passages to keep the alveoli inflated.

Step 2 — Name this volume: This left-over air is the residual volume, normally about 1100–1200 mL. It can never be breathed out.

Why other options are wrong:

- Option A (Tidal volume): the small volume of air exchanged in a single normal quiet breath.
- Option B (Vital capacity): the maximum air a person can breathe out after a

maximum breath in; this air *can* be expelled.
- Option D (Inspiratory reserve volume): the extra air that can be inhaled beyond a normal breath.

Final Answer: The air remaining after the most forceful expiration is the residual volume $\Rightarrow$ C

Answer: (C) Go Back to Q5

Q6.

Solution

Concept — Disorders of thyroxine: The thyroid hormone thyroxine controls the rate of body metabolism, growth and mental development, and its deficiency causes distinct disorders.

Step 1 — Note the age and symptoms: The question describes a growing child suffering severe thyroxine deficiency, with stunted growth and impaired mental development.

Step 2 — Name the condition: Hypothyroidism in a growing child produces cretinism, marked by dwarfed body, retarded mental growth and other defects.

Why other options are wrong:

- Option A (Simple goitre): the swelling of the thyroid gland due to iodine deficiency, not the growth-and-mental disorder of a child.
- Option C (Gigantism): caused by excess growth hormone, not thyroxine deficiency.
- Option D (Diabetes insipidus): caused by lack of ADH, producing large volumes of dilute urine.

Final Answer: Severe hypothyroidism in a child causes cretinism $\Rightarrow$ B

Answer: (B) Go Back to Q6

Q7.

Solution

Concept — Homozygous and heterozygous: The two alleles an organism carries for a gene may be the same or different, and this decides the term used.

Step 1 — Look at the genotype: The plant has the genotype Tt, so it carries one dominant allele (T) and one recessive allele (t): the two alleles are different.

Step 2 — Apply the definition: An organism with two different alleles for a trait is heterozygous (also called a hybrid) for that trait.

Why other options are wrong:

- Option A (Homozygous dominant): would be TT, with two identical dominant alleles.
- Option B (Homozygous recessive): would be tt, with two identical recessive alleles.
- Option C (Pure-breeding): means homozygous (TT or tt); a Tt plant is not pure-breeding.

Final Answer: An organism (Tt) with two different alleles is heterozygous $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q7

Q8.

Solution

Concept — Types of mutation: A change in the genetic material may involve a single base pair (gene mutation) or larger changes in whole chromosomes (chromosomal mutation).

Step 1 — Examine the change: In sickle-cell anaemia a single base in the gene is altered, replacing one amino acid (glutamic acid) by another (valine) in the beta-globin chain.

Step 2 — Classify it: A change involving a single base pair within a gene is called a point (gene) mutation. This tiny change is enough to make the haemoglobin abnormal and the red cells sickle-shaped.

Why other options are wrong:

- Option B (Chromosomal aberration): involves change in the structure of a whole chromosome, not a single base.
- Option C (Deletion of a whole chromosome): is a large-scale numerical

change, not a single-base substitution.
- Option D (Trisomy): means an extra whole chromosome (as in Down syndrome), not a base change.

Final Answer: A single-base change causing sickle-cell anaemia is a point mutation $\Rightarrow$ A

Answer: (A) Go Back to Q8

Q9.

Solution

Concept — The triplet genetic code: The genetic code is the rule by which the sequence of bases in mRNA is read to build a protein.

Step 1 — Recall the codon: A codon is the group of consecutive bases on mRNA that codes for one amino acid.

Step 2 — Count the bases per codon: The code is a triplet code, so three consecutive bases together specify one amino acid (for example, AUG codes for methionine).

Why other options are wrong:

- Option A (Two): a doublet code of two bases gives only $4^2 = 16$ combinations, too few for the 20 amino acids.
- Option C (One): a single base gives only 4 combinations, far too few.
- Option D (Four): the code is never read four bases at a time; three is sufficient and correct.

Final Answer: A codon is a triplet of three bases $\Rightarrow$ B

Answer: (B) Go Back to Q9

Q10.

Solution

Concept — Formation of new species: Evolution can give rise to entirely new species, a process closely tied to reproductive isolation.

Step 1 — Define the key event: When two populations become reproductively isolated, they can no longer interbreed to produce fertile offspring, so their gene pools stop mixing.

Step 2 — Name the process: Over time such isolated populations accumulate differences and become separate species. This formation of new species is called speciation.

Why other options are wrong:

- Option A (Adaptation): a feature that helps an organism survive in its environment, not the making of a new species.
- Option B (Natural selection): the mechanism that favours useful variations; it drives evolution but is not itself the naming of new-species formation.
- Option D (Mutation): a source of variation, the raw material of evolution, not the process of species formation.

Final Answer: Formation of new species by reproductive isolation is speciation $\Rightarrow$ C

Answer: (C) Go Back to Q10

Q11.

Solution

Concept — The plant cell wall: Plant cells differ from animal cells in having an extra rigid layer outside the plasma membrane.

Step 1 — Identify the outermost layer: Outside the plasma membrane of a plant cell lies a rigid, non-living covering.

Step 2 — Name it and its material: This is the cell wall, made mainly of cellulose. It gives the cell a definite shape and provides mechanical support and protection.

Why other options are wrong:

- Option B (Plasma membrane): lies just inside the cell wall; it is thin, living and selectively permeable, not rigid.
- Option C (Tonoplast): the membrane that surrounds the vacuole, deep inside the cell.
- Option D (Nuclear membrane): encloses the nucleus, not the whole cell.

Final Answer: The rigid cellulose covering of a plant cell is the cell wall $\Rightarrow$ A

Answer: (A) Go Back to Q11

Q12.

Solution

Concept — Turgidity in plant cells: When a plant cell absorbs water by osmosis, the water collects in the vacuole and pushes outward.

Step 1 — Describe what happens: As water enters, the swollen cell contents press against the cell wall.

Step 2 — Name the pressure: This outward pressure of the cell contents on the wall is called turgor pressure. It keeps the cell firm (turgid) and helps soft plant parts stay erect.

Why other options are wrong:

- Option A (Osmotic pressure): the pressure that draws water into a solution; it is not the outward push on the wall.
- Option B (Root pressure): the pressure developed in root cells that pushes water up the xylem, a different phenomenon.
- Option C (Diffusion pressure): a general term for the tendency of molecules to diffuse, not the firmness of a cell.

Final Answer: The pressure that keeps a water-filled plant cell firm is turgor pressure $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q12

Q13.

Solution

Concept — Pairing of homologous chromosomes: During meiosis I, homologous chromosomes (one from each parent) come together in a process called synapsis.

Step 1 — Read the figure: Two homologous chromosomes are shown lying side by side as a close pair.

Step 2 — Name the paired structure: A pair of synapsed homologous chromosomes is called a bivalent. Since each chromosome has two chromatids, the pair contains four chromatids and is also called a tetrad.

Why other options are wrong:

- Option A (Single chromatid): is just one half of a single chromosome, not a pair of chromosomes.

- Option C (Centromere): the point on a chromosome where the two sister chromatids are joined, not the whole pair.
- Option D (Spindle fibre): the protein thread that moves chromosomes, not a pair of chromosomes.

Final Answer: A pair of synapsed homologous chromosomes is a bivalent (tetrad) $\Rightarrow$ B

Answer: (B) Go Back to Q13

Q14.

Solution

Concept — Modes of asexual reproduction: Simple organisms reproduce asexually by several methods such as fission, budding and fragmentation.

Step 1 — Read the description: A single parent, such as *Amoeba* or a bacterium, splits into two equal daughter cells.

Step 2 — Name the method: Division of a parent into two equal halves is called binary fission. The nucleus divides first, followed by the cytoplasm, giving two identical daughters.

Why other options are wrong:

- Option A (Budding): a small outgrowth (bud) forms on the parent and detaches, as in *Hydra* and yeast.
- Option B (Fragmentation): the body breaks into pieces, each growing into a new individual, as in *Spirogyra*.
- Option D (Multiple fission): the parent divides into many daughter cells at once, as in *Plasmodium*, not just two.

Final Answer: Division of *Amoeba* into two equal cells is binary fission $\Rightarrow$ C

Answer: (C) Go Back to Q14

Q15.

Solution

Concept — Parts of a seed: A seed contains an embryo (radicle and plumule), one or more cotyledons, and a protective seed coat.

Step 1 — Recall the embryo parts: The embryo has two ends: the radicle, which forms the future root, and the plumule, which forms the future shoot.

Step 2 — Match the label: Part **R** is shown at the pointed end and grows into the root, so it is the radicle.

Why other options are wrong:

- Option B (Plumule): forms the future shoot (stem and leaves), the opposite end of the embryo.
- Option C (Cotyledon): the food-storing seed leaf; in a bean it forms the bulky halves of the seed.
- Option D (Testa): the outer protective seed coat, not the part that grows into the root.

Final Answer: The embryo part that grows into the root is the radicle $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q15

Q16.

Solution

Concept — Accessory glands of the male system: Besides the testes, the male reproductive system has accessory glands that contribute to semen.

Step 1 — Identify the glands: The seminal vesicles, the prostate gland and the bulbourethral glands are the accessory glands.

Step 2 — State their function: These glands secrete fluids rich in nutrients (such as fructose) and other substances. Their secretions mix with the sperms to form semen, which nourishes the sperms and helps them move.

Why other options are wrong:

- Option A (Produce the sperms): sperms are made in the seminiferous tubules of the testes, not in these glands.
- Option B (Store the mature sperms): storage and maturation of sperms occur in the epididymis.
- Option C (Secrete testosterone): the male hormone testosterone is secreted

by the Leydig (interstitial) cells of the testis.

Final Answer: The seminal vesicles and prostate add fluid to sperms to form semen $\Rightarrow$ D

Answer: (D) Go Back to Q16

Q17.

Solution

Concept — Human gestation period: Gestation is the period of development of the baby inside the mother's uterus, from fertilisation to birth.

Step 1 — Recall the duration: In humans the developing foetus takes about 40 weeks, roughly nine calendar months (about 280 days), to reach full term.

Step 2 — Confirm the choice: The normal human gestation period is therefore about nine months, after which the baby is born.

Why other options are wrong:

- Option A (Six months): a baby born this early is severely premature and rarely survives without intensive care.
- Option B (Seven months): still premature; this is not the normal full-term period.
- Option D (Twelve months): far longer than the actual human gestation period.

Final Answer: The normal human gestation period is about nine months $\Rightarrow$ C

Answer: (C) Go Back to Q17

Q18.

Solution

Concept — Starch test for photosynthesis: The sugar made in photosynthesis is quickly stored as starch, which can be detected with iodine.

Step 1 — Recall the iodine test: Iodine solution is a specific test for starch: in the presence of starch it changes from brown to a blue-black colour.

Step 2 — Apply it to the leaf: A decolourised leaf that has been photosynthesising contains starch, so when iodine is added it turns blue-black, proving that starch (and hence photosynthesis) has occurred.

Why other options are wrong:

- Option A (Bright red): is not the colour given by starch with iodine.
- Option C (Green): is the natural colour of chlorophyll; it is removed before the test and is not the result of the iodine test.
- Option D (Brick red): is the colour of the Benedict's test for reducing sugars, not the iodine test for starch.

Final Answer: Starch with iodine gives a blue-black colour $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Ascent of sap: Water absorbed by the roots must rise to great heights in the plant through the xylem, a movement called the ascent of sap.

Step 1 — State the main driving force: As water evaporates from the leaves during transpiration, it creates a suction or pull at the top of the water column in the xylem.

Step 2 — Add the role of cohesion: Water molecules cling to one another by cohesion (and to the xylem walls by adhesion), forming an unbroken column. The transpiration pull acting on this cohesive column drags water upward. This is the transpiration-pull cohesion theory.

Why other options are wrong:

- Option B (Active pumping by the phloem): the phloem transports food, not water; it does not pump water upward.
- Option C (Muscular contraction of xylem): xylem vessels are dead, hollow tubes with no muscles.
- Option D (Downward force of gravity): gravity pulls water down and opposes, rather than causes, the ascent of sap.

Final Answer: Ascent of sap is driven by cohesion and transpiration pull $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q19

Q20.

Solution

Concept — Features of kingdom Plantae: Whittaker's classification places multicellular photosynthetic organisms in the kingdom Plantae.

Step 1 — Recall their nutrition and cells: Plants are autotrophs, making their own food by photosynthesis, for which they need the green organelles called chloroplasts.

Step 2 — Recall their cell wall: Plant cells are also bounded by a rigid cell wall made of cellulose. So the defining cell features are cellulose cell walls together with chloroplasts.

Why other options are wrong:

- Option A (Chitin cell walls): chitin walls are found in fungi, not in plants.
- Option B (No cell wall at all): animal cells, not plant cells, lack a cell wall.
- Option C (A single large flagellum): is a feature of certain protists, not a defining feature of plant cells.

Final Answer: Plant cells have cellulose walls and chloroplasts $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Characters of class Mammalia: Mammals are the most advanced vertebrates, with several unique features.

Step 1 — Recall the defining feature: The name Mammalia comes from the mammary glands, which produce milk to feed the young.

Step 2 — Add the supporting features: Mammals also have body hair (fur), are warm-blooded (homeothermic), and most give birth to live young. The presence of mammary glands together with body hair is the diagnostic feature.

Why other options are wrong:

- Option A (Feathers and a horny beak): are features of birds (class Aves), not mammals.
- Option B (Moist scaleless skin for breathing): is a feature of amphibians such as frogs.
- Option D (Gills throughout life): is a feature of fishes, which breathe through

gills.

Final Answer: Mammary glands with body hair place an animal in Mammalia ⇒ C

Answer: (C) Go Back to Q21

Q22.

Solution

Concept — Feeding categories in a food web: Organisms are grouped by what they eat: producers, herbivores, carnivores and omnivores.

Step 1 — Read the feeding links: Animal **M** feeds on grain, which is a plant (producer), and also on insects, which are animals.

Step 2 — Classify M: Because it eats both plant and animal food, **M** takes in energy at more than one trophic level and is therefore an omnivore.

Why other options are wrong:

- Option A (Producer): a producer makes its own food by photosynthesis; **M** eats other organisms.
- Option C (Strict herbivore): a herbivore eats only plants, but **M** also eats insects.
- Option D (Decomposer): a decomposer feeds on dead remains and breaks them down; **M** eats living grain and insects.

Final Answer: An animal eating both plants and animals is an omnivore ⇒ B

Answer: (B) Go Back to Q22

Q23.

Solution

Concept — Ecological pyramids: An ecological pyramid shows the relationship between successive trophic levels in terms of number, energy or biomass.

Step 1 — Focus on the quantity measured: Here the quantity represented is the total dry weight (mass) of the living organisms at each trophic level.

Step 2 — Name the pyramid: A pyramid based on the total dry weight of organisms at each level is called the pyramid of biomass.

Why other options are wrong:

- Option A (Pyramid of numbers): represents the number of individuals at each level, not their weight.
- Option B (Pyramid of energy): represents the amount of energy at each level; it is always upright but is not based on dry weight.
- Option C (Food web): a network of interconnected food chains, not a pyramid of any single quantity.

Final Answer: A pyramid based on dry weight at each level is the pyramid of biomass $\Rightarrow$ D

Answer: (D) Go Back to Q23

Q24.

Solution

Concept — Water-borne diseases: Diseases such as cholera and typhoid are spread by pathogens carried in water contaminated with the faeces of infected people.

Step 1 — Identify the route of spread: The germs enter the body when a person drinks contaminated water, so the water supply is the point to control.

Step 2 — Choose the best prevention: Drinking only boiled or properly purified (filtered/chlorinated) water kills or removes these germs and directly breaks the route of transmission. This is the most effective single measure.

Why other options are wrong:

- Option B (Sleep under a mosquito net): prevents mosquito-borne diseases such as malaria and dengue, not water-borne ones.
- Option C (Avoid shaking hands): cholera and typhoid spread mainly through water, not by casual touch, so this gives little protection.
- Option D (Regular blood transfusions): has no role in preventing water-borne infections and can carry its own risks.

Final Answer: Drinking boiled or purified water best prevents cholera and typhoid $\Rightarrow$ A

Answer: (A) Go Back to Q24

Q25.

Solution

Concept — DNA fingerprinting: Every individual (except identical twins) has a unique pattern of repetitive base sequences in the DNA.

Step 1 — Recall the technique: DNA fingerprinting analyses these unique repetitive sequences to produce a banding pattern that is specific to each person.

Step 2 — State its uses: Because the pattern is unique, it is used to establish individual identity in forensic (crime) investigations and to settle disputes of parentage.

Why other options are wrong:

- Option A (PCR): a method to make many copies of a DNA segment; it amplifies DNA but does not itself establish identity.
- Option B (Gene cloning): produces many copies of a particular gene, used in research and industry, not for identification.
- Option D (Tissue culture): grows cells or whole plants from small tissue pieces; it has nothing to do with identity from DNA patterns.

Final Answer: Identity from a unique DNA pattern is established by DNA fingerprinting $\Rightarrow$ C

Answer: (C) Go Back to Q25

Answer Key

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