JCECE Biology Sample Paper – 5

Duration: 60 Minutes **Maximum Marks: 50**

Instructions

- This paper contains **50** Multiple Choice Questions (Single Correct Answer), modelled on the Biology portion of **JCECE** entrance.
- Each correct answer carries **+1 mark**. There is -0.25 **mark** for each incorrect answer; unattempted questions get 0.
- Only **one** option is correct. Choose carefully.
- Syllabus level: **Class 11 and Class 12 NCERT Biology (Jharkhand JAC / CBSE aligned) – Botany and Zoology.**
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Q1. A lichen is a classic example of a mutualistic association. The two partners that together build the body of a lichen are:

(A) a fungus and a higher (flowering) plant

(B) two different species of fungi

(C) a fungus (mycobiont) and an alga or cyanobacterium (phycobiont)

(D) a bacterium and a protozoan

Q2. In modern taxonomy a careful distinction is drawn between a 'taxon' and a 'category'. Which statement correctly describes a *taxon*?

(A) it is only the abstract rank such as 'genus' or 'family'

(B) it is the same thing as a taxonomic key

(C) it is the level (tier) in the classification hierarchy

(D) it is an actual group of organisms placed at any rank, e.g. *Mangifera* or Mammalia

Q3. The angiosperms (flowering plants) are divided into two classes on the basis of the number of cotyledons in the seed. A plant with *one* cotyledon, parallel leaf venation and trimerous flowers belongs to the:

(A) monocotyledons (Monocots)

(B) dicotyledons (Dicots)

(C) gymnosperms

(D) pteridophytes

Q4. The phylum Annelida is characterised by a body divided into ring-like segments. This repeated segmentation of the body, seen in earthworms and leeches, is technically called:

(A) a pseudocoelom

(B) metameric segmentation (metamerism)

(C) a water-vascular system

(D) radial symmetry

Q5. The epidermal tissue system forms the outermost protective covering of the plant. The small specialised openings in the leaf epidermis, each bounded by two kidney-shaped guard cells and used for gaseous exchange and transpiration, are the:

(A) lenticels

(B) trichomes

(C) stomata

(D) root hairs

Q6. Areolar tissue, found beneath the skin and between organs, is a type of loose connective tissue. Its chief function is to:

(A) act as a packing/support material that joins skin to muscles and supports internal organs

(B) transmit nerve impulses over long distances

(C) bring about the contraction needed for movement

(D) line the inner surface of body cavities for absorption

Q7. A flower that can be divided into two equal halves by only *one* particular vertical plane (as in pea and *Cassia*) shows:

(A) actinomorphic (radial) symmetry

(B) asymmetry (no plane of symmetry)

(C) radial symmetry like that of *Datura*

(D) zygomorphic (bilateral) symmetry

Q8. The cockroach is a typical insect with biting-and-chewing mouthparts. The pair of hard, jaw-like structures used to bite and grind solid food in the cockroach are the:

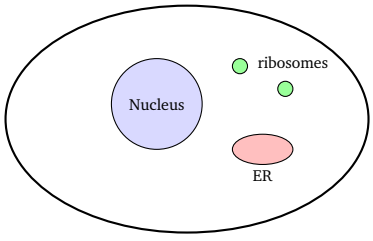
(A) maxillae

(B) mandibles

(C) labrum (upper lip)

(D) labium (lower lip)

Q9. In the animal cell shown below, tiny granular structures (some attached to the endoplasmic reticulum, some free in the cytoplasm) are marked. These granules, which are the actual site of protein synthesis, are the:



(A) lysosomes

(B) centrioles

(C) ribosomes

(D) peroxisomes

Q10. The sodium–potassium pump of the plasma membrane is a carrier protein that, using the energy of ATP, moves:

(A) both Na^+ and K^+ out of the cell together

(B) glucose into the cell down its gradient

(C) 3 K^+ out of and 2 Na^+ into the cell

(D) 3 Na^+ out of the cell and 2 K^+ into the cell, against their gradients

Q11. Some amino acids cannot be synthesised by the human body and must be supplied in the diet. Such amino acids are called *essential* amino acids. Which of the following is an essential amino acid?

(A) glycine

(B) lysine

(C) alanine

(D) serine

Q12. Malonate inhibits the enzyme succinate dehydrogenase because malonate closely resembles the substrate succinate and occupies the active site. This type of enzyme inhibition is:

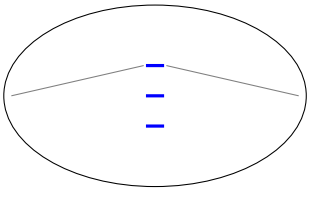
(A) non-competitive inhibition

(B) allosteric inhibition

(C) competitive inhibition

(D) feedback inhibition by the end product

Q13. The figure shows the metaphase plate of mitosis. The stage that comes *after* anaphase, in which the chromosomes reach the poles, two daughter nuclei reform and the nuclear envelope reappears, is:



metaphase plate

(A) prophase

(B) metaphase

(C) anaphase

(D) telophase

Q14. Meiosis is often called a 'reduction division'. The reason it is given this name is that:

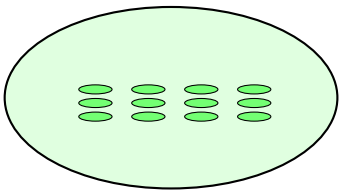
(A) it reduces the chromosome number from diploid (2n) to haploid (n) in the daughter cells

(B) it produces only two daughter cells

(C) it reduces the amount of cytoplasm in each cell

(D) it halves the number of mitochondria in each cell

Q15. The chloroplast shown is the site of photosynthesis. The light-driven synthesis of ATP from ADP and inorganic phosphate, taking place on the thylakoid membranes during the light reaction, is specifically called:



(A) oxidative phosphorylation

(B) photophosphorylation

(C) substrate-level phosphorylation

(D) carboxylation

Q16. In the absence of oxygen, yeast cells break down glucose incompletely, producing ethanol and carbon dioxide. This anaerobic breakdown of sugar by microbes is called:

(A) the Krebs cycle

(B) aerobic respiration

(C) (alcoholic) fermentation

(D) oxidative decarboxylation

Q17. The transport of food (mainly sucrose) made in the leaves to other parts of the plant such as roots, fruits and storage organs takes place through the phloem. This movement of organic solutes is called:

(A) translocation

(B) transpiration

(C) imbibition

(D) guttation

Q18. Nitrogen is a major macronutrient required by plants in the largest amount. Its most important role is that it is a constituent of:

(A) only the cell wall (cellulose)

(B) proteins, nucleic acids, chlorophyll and many vitamins

(C) only the middle lamella (calcium pectate)

(D) starch and other storage carbohydrates

Q19. The only *gaseous* plant growth regulator, which promotes the ripening of fruits, hastens senescence and abscission of leaves, and breaks dormancy in some seeds, is:

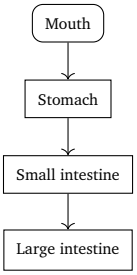
(A) auxin

(B) gibberellin

(C) cytokinin

(D) ethylene

Q20. The flow diagram shows the human alimentary canal. The arrangement of teeth in an adult human is written as the dental formula $2123/2123$, which represents (on one half of each jaw) incisors, canines, premolars and molars numbering:



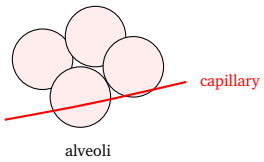
(A) 1 incisor, 2 canines, 1 premolar, 3 molars

(B) 3 incisors, 2 canines, 1 premolar, 2 molars

(C) 2 incisors, 1 canine, 2 premolars, 3 molars

(D) 2 incisors, 1 canine, 3 premolars, 2 molars

Q21. The figure shows the alveoli surrounded by blood capillaries. In the human respiratory system, the actual exchange of O_2 and CO_2 between air and blood (the respiratory surface) takes place at the:



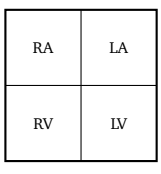
(A) alveoli of the lungs

(B) trachea

(C) bronchi

(D) larynx (voice box)

Q22. The four-chambered human heart pumps blood, which is a fluid connective tissue. When blood is allowed to clot and the clot is removed, the clear straw-coloured fluid that is left, lacking the clotting factors, is called:



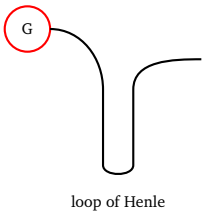
(A) whole blood

(B) plasma (with all factors intact)

(C) lymph

(D) serum

Q23. In the nephron shown, when the body is short of water, a hormone increases the reabsorption of water from the distal tubule and collecting duct, producing a smaller volume of concentrated urine. This hormone is:



(A) ADH (vasopressin)

(B) insulin

(C) adrenaline

(D) thyroxine

Q24. The human skeleton is divided into an axial and an appendicular part. Which set of bones belongs to the *appendicular* skeleton?

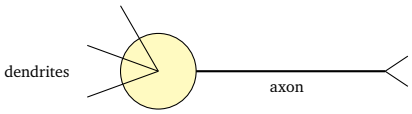
(A) skull, vertebral column and rib cage

(B) limb bones together with the pectoral and pelvic girdles

(C) the cranium and the facial bones only

(D) the sternum and the ribs

Q25. In the neuron diagram, impulses travel along the axon. A reflex action (such as quickly withdrawing the hand from a hot object) is brought about by a simple neural pathway called the reflex arc, whose correct sequence is:



(A) effector → motor neuron → brain → receptor

(B) receptor → motor neuron → sensory neuron → effector

(C) receptor → sensory neuron → spinal cord (interneuron) → motor neuron → effector

(D) motor neuron → receptor → sensory neuron → effector

Q26. The part of the brain that links the nervous and endocrine systems, secreting releasing and inhibiting hormones that control the anterior pituitary, is the:

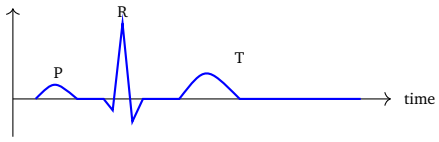
(A) hypothalamus

(B) cerebellum

(C) medulla oblongata

(D) pineal gland

Q27. The ECG trace shown records the electrical activity of the heart. The volume of blood pumped out by one ventricle during a single heartbeat (one contraction) is called the:



(A) cardiac output

(B) stroke volume

(C) heart rate

(D) pulse pressure

Q28. Immediately after a nerve impulse passes a point on the axon, the membrane potential returns from its reversed (positive inside) state back to the resting (negative inside) state. This restoration, brought about mainly by the outflow of K^+ ions, is called:

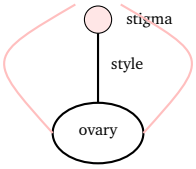
(A) depolarisation

(B) hyperpolarisation that triggers the impulse

(C) repolarisation

(D) the all-or-none threshold

Q29. The longitudinal section of a flower is shown. Within the anther, the diploid microspore mother cells (pollen mother cells) divide to form haploid microspores (pollen). The type of cell division responsible for this microsporogenesis is:



(A) mitosis (equational division)

(B) meiosis (reductional division)

(C) binary fission

(D) amitosis

Q30. The events from the landing of a compatible pollen grain on the stigma up to the entry of the pollen tube into the ovule, which allow the pistil to recognise the right pollen and reject the wrong pollen, are together called:

(A) double fertilization

(B) parthenocarpy

(C) triple fusion

(D) pollen–pistil interaction

Q31. A human sperm has a head, a middle piece and a tail. The numerous mitochondria packed in the *middle piece* of the sperm serve mainly to:

(A) provide the energy (ATP) for the movement of the tail

(B) store the genetic material (DNA)

(C) secrete enzymes that dissolve the egg membrane

(D) produce the acrosome at the tip of the head

Q32. During pregnancy the placenta connects the developing foetus to the wall of the uterus. Apart from supplying nutrients and oxygen and removing wastes, the placenta also acts as:

(A) the site of fertilization of the egg

(B) the organ that produces sperms

(C) an endocrine gland secreting hormones such as hCG, hPL, oestrogen and progesterone

(D) the structure that ruptures during ovulation

Q33. Medical termination of pregnancy (MTP), or induced abortion, is considered relatively safe when it is carried out:

(A) only after the seventh month of pregnancy

(B) during the first trimester (up to 12 weeks) of pregnancy

(C) only at the time of natural childbirth

(D) at any time without any medical limit

Q34. When an F_1 hybrid organism is crossed with one of its homozygous *parents*, the cross is termed a:

(A) dihybrid cross

(B) reciprocal cross

(C) monohybrid self-cross

(D) back cross

Q35. Human ABO blood grouping is controlled by a single gene 'I' that exists in three different forms (I^A, I^B and i) in the population. A gene having more than two alternative forms is an example of:

(A) multiple alleles

(B) polygenic inheritance

(C) pleiotropy

(D) incomplete dominance

Q36. The chromosomal theory of inheritance, which states that Mendelian factors (genes) are located on chromosomes and that chromosomes are the physical carriers of heredity, was proposed by:

(A) Gregor Mendel

(B) T. H. Morgan

(C) Walter Sutton and Theodor Boveri

(D) Watson and Crick

Q37. Haemophilia (the 'bleeder's disease') is a sex-linked recessive disorder in which blood fails to clot normally. Its pattern of inheritance is best described by the fact that it is:

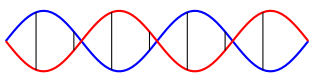
(A) carried on the Y chromosome and passed only from father to son

(B) an autosomal dominant trait

(C) caused by an extra chromosome (trisomy)

(D) carried on the X chromosome, so it appears much more often in males than in females

Q38. The DNA double helix is shown. According to the Watson–Crick model, the two strands form a right-handed helix in which the distance between two consecutive base pairs (the rise) and the length of one complete turn are:



double helix

(A) 3.4 nm between base pairs and 0.34 nm per turn

(B) 0.34 nm between base pairs and 3.4 nm per complete turn (of about 10 base pairs)

(C) 34 nm between base pairs and 3.4 nm per turn

(D) 0.34 nm between base pairs and 0.34 nm per turn

Q39. In the *lac* operon of *E. coli*, the structural genes for lactose metabolism are normally switched off. They are switched ON (transcription begins) when:

(A) glucose is added to the medium

(B) the repressor binds tightly to the operator

(C) lactose (the inducer) is present and inactivates the repressor, freeing the operator

(D) RNA polymerase is removed from the cell

Q40. In their classic experiment on the chemical origin of life, S. L. Miller and H. Urey passed electric sparks through a mixture of gases in a closed flask and obtained simple organic molecules. The gas mixture they used to simulate the primitive atmosphere was:

(A) methane (CH_4), ammonia (NH_3), hydrogen (H_2) and water vapour

(B) pure oxygen alone

(C) carbon dioxide and oxygen only

(D) nitrogen and oxygen as in today's air

Q41. Ringworm, one of the commonest infectious diseases of the human skin, scalp and nails, producing dry scaly lesions, is caused by:

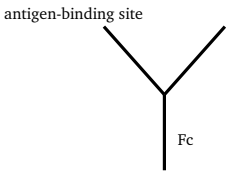
(A) a protozoan (*Entamoeba*)

(B) fungi such as *Microsporum*, *Trichophyton* and *Epidermophyton*

(C) a bacterium (*Salmonella*)

(D) a virus (rhinovirus)

Q42. The Y-shaped antibody molecule is shown. In the human immune system, the cells that mature in the bone marrow and produce antibodies that circulate in the blood, giving *humoral* immunity, are the:



(A) T-lymphocytes (T-cells)

(B) macrophages

(C) mast cells

(D) B-lymphocytes (B-cells)

Q43. Bacteria of the genus *Rhizobium*, which live in the root nodules of leguminous plants and convert atmospheric nitrogen into usable nitrogen compounds, are used as:

(A) biofertilizers that enrich soil nitrogen

(B) chemical pesticides

(C) antibiotics against crop diseases

(D) a source of biogas

Q44. The branch of agriculture concerned with the feeding, breeding, care and management of useful domestic animals such as cattle, buffalo, poultry and fish is called:

(A) apiculture

(B) sericulture

(C) horticulture

(D) animal husbandry

Q45. In recombinant DNA work, fragments of DNA cut by restriction enzymes are separated according to their size by gel electrophoresis. In this technique the negatively charged DNA fragments:

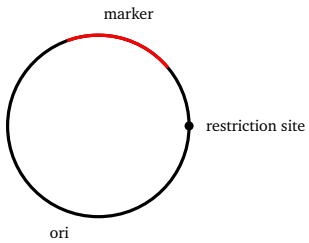
(A) move towards the negative electrode (cathode), large fragments moving fastest

(B) move towards the positive electrode (anode), smaller fragments moving faster and farther

(C) do not move at all in the electric field

(D) separate purely on the basis of their base sequence, not size

Q46. The plasmid cloning vector is used to carry a gene into a host cell. To obtain large quantities of the desired product on an industrial scale, the cultured cells are grown in a vessel that provides optimal conditions of temperature, pH, oxygen and stirring. This vessel is the:



(A) gel-electrophoresis tank

(B) PCR thermal cycler

(C) autoclave

(D) bioreactor (fermenter)

Q47. Transgenic animals are animals whose DNA has been altered by introducing a foreign gene. Which of the following is a well-known example of a useful transgenic animal?

(A) Rosie, the transgenic cow that produced human-protein-enriched milk

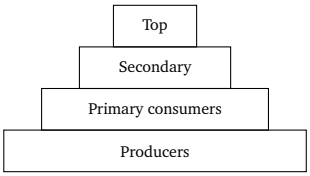
(B) Bt cotton, a transgenic crop plant

(C) Golden rice, enriched with vitamin A

(D) the wild-type fruit fly *Drosophila*

Q48. The ecological pyramid shown places producers at the base. In an ecosystem, the organisms (mainly fungi and bacteria) that break down dead

plant and animal matter (detritus) into simple inorganic substances are the decomposers, and this overall process is called:



(A) photosynthesis

(B) nitrogen fixation

(C) decomposition

(D) primary production

Q49. Gause's competitive exclusion principle, derived from experiments with *Paramecium*, states that:

(A) two species can always coexist indefinitely on exactly the same resource

(B) two closely related species competing for the same limiting resource cannot coexist indefinitely; the inferior competitor is eventually eliminated

(C) competition always benefits both competing species

(D) predation and competition mean the same thing

Q50. Among the major causes of the present-day loss of biodiversity ('The Evil Quartet'), the *most important* cause of species extinctions is:

(A) co-extinction of associated species

(B) the alien (invasive) species invasions

(C) over-exploitation of resources

(D) habitat loss and fragmentation

Detailed Solutions

Q1.

Solution

Concept — Lichens: A lichen is a symbiotic (mutualistic) partnership between a fungus and a photosynthetic partner. The fungus (mycobiont) gives shelter, water and minerals; the alga or cyanobacterium (phycobiont) makes food by photosynthesis.

Step 1 — Recall the two partners: fungus + alga/cyanobacterium.

Step 2 — Note the benefit: both partners gain, so it is mutualism.

Why other options are wrong:

- (A) no flowering plant is involved in a lichen.
- (B) a lichen is not two fungi together.
- (D) it is not a bacterium–protozoan pair.

Final Answer: fungus + alga/cyanobacterium ⇒ C

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Taxon vs category: A *category* is an abstract rank (level) in the hierarchy, such as species, genus or family. A *taxon* is a real group of organisms placed at any one of these ranks, e.g. *Mangifera* (a genus taxon) or Mammalia (a class taxon).

Step 1 — Define a taxon: it is a concrete group of actual organisms.

Step 2 — Match the option: 'an actual group of organisms placed at any rank' describes a taxon.

Why other options are wrong:

- (A) the abstract rank itself is a category, not a taxon.
- (B) a taxonomic key is an identification tool, not a taxon.
- (C) the level/tier in the hierarchy is a category.

Final Answer: an actual group of organisms at any rank ⇒ D

Answer: (D) Go Back to Q2

Q3.

Solution

Concept — Angiosperm classes: Flowering plants are split into monocotyledons (one cotyledon, parallel venation, fibrous roots, trimerous flowers) and dicotyledons (two cotyledons, reticulate venation, tap root, tetra-/pentamerous flowers).

Step 1 — Read the clues: one cotyledon + parallel venation + trimerous flowers.

Step 2 — Match the class: these are all monocot features.

Why other options are wrong:

- (B) dicots have two cotyledons and reticulate venation.
- (C) gymnosperms are non-flowering naked-seeded plants.
- (D) pteridophytes are seedless vascular cryptogams.

Final Answer: monocotyledons $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q3

Q4.

Solution

Concept — Annelida: Annelids have a body made of similar repeating ring-like segments (metameres), both externally and internally. This true segmentation is called metameric segmentation or metamerism.

Step 1 — Read the clue: ring-like repeating segments of the body.

Step 2 — Name it: metameric segmentation (metamerism).

Why other options are wrong:

- (A) a pseudocoelom is a feature of Aschelminthes (roundworms).
- (C) the water-vascular system belongs to Echinodermata.
- (D) annelids are bilaterally, not radially, symmetrical.

Final Answer: metameric segmentation $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept — Epidermal tissue system: The epidermis bears stomata — minute pores each guarded by two bean/kidney-shaped guard cells. Stomata regulate transpiration and the exchange of gases (CO_2 in, O_2 out) during photosynthesis.

Step 1 — Read the clues: pores + two guard cells + gas exchange/transpiration.

Step 2 — Identify the structure: these are stomata.

Why other options are wrong:

- (A) lenticels are openings in woody bark, not bounded by guard cells.
- (B) trichomes are epidermal hairs, not pores.
- (D) root hairs are extensions of root epidermal cells for absorption.

Final Answer: stomata $\Rightarrow$ C

Answer: (C) Go Back to Q5

Q6.

Solution

Concept — Areolar tissue: Areolar tissue is a loose connective tissue with a jelly-like matrix containing fibroblasts, mast cells and collagen/elastin fibres. It fills spaces inside organs, supports them, and joins the skin to the underlying muscles.

Step 1 — Recall its position: found beneath skin and between organs.

Step 2 — State its job: it acts as a packing and support tissue.

Why other options are wrong:

- (B) impulse transmission is the role of nervous tissue.
- (C) contraction for movement is done by muscular tissue.
- (D) lining and absorption is the role of epithelial tissue.

Final Answer: packing/support tissue $\Rightarrow$ A

Answer: (A) Go Back to Q6

Q7.

Solution

Concept — Floral symmetry: A flower is actinomorphic (radial) if any vertical plane through the centre divides it into equal halves (e.g. *Datura*); it is zygomorphic (bilateral) if only one particular plane gives two equal halves (e.g. pea, *Cassia*).

Step 1 — Read the clue: only one vertical plane gives mirror halves.

Step 2 — Name the symmetry: zygomorphic (bilateral).

Why other options are wrong:

- (A) and (C) actinomorphic/radial flowers can be halved by many planes.
- (B) an asymmetrical flower (e.g. canna) has no plane of symmetry at all.

Final Answer: zygomorphic symmetry $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q7

Q8.

Solution

Concept — Cockroach mouthparts: The cockroach has biting-and-chewing mouthparts — labrum (upper lip), a pair of mandibles, a pair of maxillae, labium (lower lip) and a hypopharynx. The hard, toothed mandibles bite and grind the food.

Step 1 — Match the function: biting and grinding of solid food.

Step 2 — Identify the part: the mandibles (jaws).

Why other options are wrong:

- (A) the maxillae hold and push the food, helping in tasting.
- (C) the labrum is the upper lip covering the mouth.
- (D) the labium is the lower lip.

Final Answer: mandibles $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q8

Q9.

Solution

Concept — Ribosomes: Ribosomes are tiny granular organelles (made of rRNA and proteins) that are the site of protein synthesis. They may stay free in the cytoplasm or attach to the endoplasmic reticulum (making it 'rough' ER).

Step 1 — Identify the granules: the small granules on the ER and in the cytoplasm are ribosomes.

Step 2 — State their job: they translate mRNA to build proteins.

Why other options are wrong:

- (A) lysosomes are membrane sacs of digestive enzymes.
- (B) centrioles organise the spindle during cell division.
- (D) peroxisomes carry out oxidation reactions, not protein synthesis.

Final Answer: ribosomes $\Rightarrow$ C

Answer: (C) Go Back to Q9

Q10.

Solution

Concept — Sodium–potassium pump: The Na^+/K^+ ATPase is an active-transport carrier that, for every ATP hydrolysed, pumps 3 Na^+ ions out of the cell and 2 K^+ ions into the cell, both against their concentration gradients. This maintains the resting membrane potential.

Step 1 — Recall the stoichiometry: 3 Na^+ out, 2 K^+ in.

Step 2 — Note the direction: both move against their gradients, using ATP.

Why other options are wrong:

- (A) the two ions move in opposite directions, not both out.
- (B) glucose transport is a separate carrier system.
- (C) the numbers/directions are reversed in this option.

Final Answer: 3 Na^+ out, 2 K^+ in $\Rightarrow$ D

Answer: (D) Go Back to Q10

Q11.

Solution

Concept — Essential amino acids: Of the 20 amino acids, the human body cannot synthesise about nine (e.g. lysine, leucine, valine, methionine, phenylalanine, threonine, tryptophan, histidine, isoleucine); these 'essential' amino acids must come from food.

Step 1 — Test the options: glycine, alanine and serine can be made in the body (non-essential).

Step 2 — Pick the essential one: lysine must be supplied in the diet.

Why other options are wrong:

- (A) glycine is non-essential.
- (C) alanine is non-essential.
- (D) serine is non-essential.

Final Answer: lysine $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q11

Q12.

Solution

Concept — Competitive inhibition: A competitive inhibitor resembles the normal substrate and competes with it for the *same* active site of the enzyme. Malonate mimics succinate and blocks succinate dehydrogenase. Raising the substrate concentration can reverse this inhibition.

Step 1 — Read the clue: the inhibitor resembles the substrate and binds the active site.

Step 2 — Name the inhibition: competitive inhibition.

Why other options are wrong:

- (A) a non-competitive inhibitor binds a site other than the active site.
- (B) allosteric inhibition acts at a regulatory (allosteric) site.
- (D) feedback inhibition is end-product control of a pathway.

Final Answer: competitive inhibition $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q12

Q13.

Solution

Concept — Telophase: Mitosis runs prophase → metaphase → anaphase → telophase. In telophase the chromosomes reach the poles, decondense, the nuclear envelope and nucleolus reappear, and two daughter nuclei form; cytokinesis then divides the cytoplasm.

Step 1 — Place the stage: the figure shows metaphase; the stage after anaphase is telophase.

Step 2 — Match the events: reformation of nuclei and nuclear envelope = telophase.

Why other options are wrong:

- (A) prophase is condensation, before the metaphase shown.
- (B) metaphase is the alignment shown in the figure.
- (C) anaphase is the separation of chromatids to the poles.

Final Answer: telophase ⇒ $\boxed{\text{D}}$

Answer: (D) Go Back to Q13

Q14.

Solution

Concept — Reduction division: Meiosis halves the chromosome number: a diploid (2n) cell produces haploid (n) gametes/spores. Because the number is reduced to half, meiosis is called the reduction division.

Step 1 — Recall the outcome: 2n cell → n daughter cells.

Step 2 — Link to the name: halving the chromosome number gives the name 'reduction division'.

Why other options are wrong:

- (B) it actually produces four daughter cells, and cell number is not the reason for the name.
- (C) the cytoplasm amount is not what is reduced.
- (D) the name refers to chromosomes, not mitochondrial number.

Final Answer: it halves 2n to n ⇒ $\boxed{\text{A}}$

Answer: (A) Go Back to Q14

Q15.

Solution

Concept — Photophosphorylation: The synthesis of ATP from ADP and inorganic phosphate using light energy, on the thylakoid membranes, is called photophosphorylation. It may be cyclic (only ATP) or non-cyclic (ATP + NADPH).

Step 1 — Read the clue: ATP made using light energy on thylakoids.

Step 2 — Name it: photophosphorylation.

Why other options are wrong:

- (A) oxidative phosphorylation makes ATP in mitochondria using the respiratory chain.
- (C) substrate-level phosphorylation makes ATP directly in glycolysis/Krebs cycle.
- (D) carboxylation is the fixation of CO_2 in the Calvin cycle.

Final Answer: photophosphorylation $\Rightarrow$ B

Answer: (B) Go Back to Q15

Q16.

Solution

Concept — Fermentation: Fermentation is the incomplete, anaerobic breakdown of sugars by microbes. In yeast, alcoholic fermentation converts glucose into ethanol and CO_2; in muscle/bacteria, lactic acid fermentation gives lactic acid.

Step 1 — Read the products: ethanol + CO_2 from glucose, without oxygen, by yeast.

Step 2 — Name the process: (alcoholic) fermentation.

Why other options are wrong:

- (A) the Krebs cycle is an aerobic, oxygen-requiring pathway.
- (B) aerobic respiration fully oxidises glucose to CO_2 and water.
- (D) oxidative decarboxylation is the link reaction forming acetyl CoA.

Final Answer: (alcoholic) fermentation $\Rightarrow$ C

Answer: (C) Go Back to Q16

Q17.

Solution

Concept — Translocation: The movement of organic food (chiefly sucrose) from sources (leaves) to sinks (roots, fruits, growing and storage organs) through the phloem sieve tubes is called translocation. It is explained by the pressure-flow (mass-flow) hypothesis.

Step 1 — Read the clue: transport of food through phloem.

Step 2 — Name it: translocation.

Why other options are wrong:

- (B) transpiration is loss of water vapour from leaves.
- (C) imbibition is absorption of water by colloids.
- (D) guttation is loss of liquid water through hydathodes.

Final Answer: translocation $\Rightarrow$ A

Answer: (A) Go Back to Q17

Q18.

Solution

Concept — Role of nitrogen: Nitrogen is required by plants in the greatest amount among mineral nutrients. It is a constituent of amino acids (hence proteins), nucleic acids (DNA, RNA), chlorophyll, ATP and several vitamins and hormones.

Step 1 — List where N occurs: proteins, nucleic acids, chlorophyll, vitamins.

Step 2 — Match the option: nitrogen is part of all of these.

Why other options are wrong:

- (A) cellulose of the cell wall is a carbohydrate without nitrogen.
- (C) calcium pectate of the middle lamella does not require nitrogen.
- (D) storage carbohydrates like starch contain no nitrogen.

Final Answer: proteins, nucleic acids, chlorophyll, vitamins $\Rightarrow$ B

Answer: (B) Go Back to Q18

Q19.

Solution

Concept — Ethylene: Ethylene is the only gaseous plant growth regulator. It promotes fruit ripening, hastens senescence and abscission of leaves and flowers, breaks dormancy of buds/seeds, and promotes female flowers in some plants.

Step 1 — Read the clues: gaseous hormone + ripening + senescence/abscission.

Step 2 — Identify it: ethylene.

Why other options are wrong:

- (A) auxin promotes cell elongation and apical dominance.
- (B) gibberellin promotes stem elongation and bolting.
- (C) cytokinin promotes cell division and delays ageing.

Final Answer: ethylene $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q19

Q20.

Solution

Concept — Dental formula: The adult human dental formula is $2123/2123$. Read on one half of each jaw it means 2 incisors, 1 canine, 2 premolars and 3 molars; multiplied over both halves and both jaws this gives the full set of 32 permanent teeth.

Step 1 — Decode the digits: 2 (I), 1 (C), 2 (PM), 3 (M).

Step 2 — Match the option: 2 incisors, 1 canine, 2 premolars, 3 molars.

Why other options are wrong:

- (A) gives wrong numbers of incisors, canines and premolars.
- (B) wrongly puts 3 incisors and 2 molars.
- (D) wrongly gives 3 premolars and 2 molars.

Final Answer: 2 incisors, 1 canine, 2 premolars, 3 molars $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q20

Q21.

Solution

Concept — Site of gas exchange: The trachea, bronchi and bronchioles are only conducting passages. The actual diffusion of O_2 into and CO_2 out of the blood happens across the thin walls of the millions of alveoli, which provide a huge moist respiratory surface.

Step 1 — Separate conduction from exchange: the airways conduct air; the alveoli exchange gases.

Step 2 — Identify the respiratory surface: the alveoli of the lungs.

Why other options are wrong:

- (B) the trachea is a conducting tube only.
- (C) the bronchi conduct air to the lungs.
- (D) the larynx is the voice box, not a gas-exchange surface.

Final Answer: alveoli of the lungs $\Rightarrow$ A

Answer: (A) Go Back to Q21

Q22.

Solution

Concept — Serum: Plasma is the fluid part of blood and contains the clotting factors (including fibrinogen). When blood clots, fibrinogen is used up; the clear yellowish fluid left after the clot is removed is serum (plasma minus the clotting factors).

Step 1 — Recall the definition: serum = plasma without the clotting factors.

Step 2 — Match the description: clear straw-coloured fluid left after clotting = serum.

Why other options are wrong:

- (A) whole blood still contains cells and has not clotted.
- (B) plasma still contains the clotting factors.
- (C) lymph is a separate tissue fluid, not the fluid left after clotting.

Final Answer: serum $\Rightarrow$ D

Answer: (D) Go Back to Q22

Q23.

Solution

Concept — ADH regulation: When the body is dehydrated, the posterior pituitary releases antidiuretic hormone (ADH/vasopressin). ADH makes the distal tubule and collecting duct more permeable to water, so more water is reabsorbed and a small volume of concentrated urine is formed.

Step 1 — Match the function: more water reabsorption, less urine $\rightarrow$ ADH.

Step 2 — Confirm the source: ADH is released from the posterior pituitary.

Why other options are wrong:

- (B) insulin lowers blood glucose.
- (C) adrenaline prepares the body for emergencies (fight or flight).
- (D) thyroxine controls the basal metabolic rate.

Final Answer: ADH (vasopressin) $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q23

Q24.

Solution

Concept — Appendicular skeleton: The skeleton has an axial part (skull, vertebral column, ribs, sternum) and an appendicular part (the bones of the fore- and hind-limbs together with the pectoral and pelvic girdles that attach them to the axis).

Step 1 — Recall the appendicular bones: limb bones + girdles.

Step 2 — Match the option: limb bones with pectoral and pelvic girdles.

Why other options are wrong:

- (A) skull, vertebral column and rib cage are axial.
- (C) cranium and facial bones are part of the axial skull.
- (D) the sternum and ribs are axial.

Final Answer: limb bones + pectoral and pelvic girdles $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q24

Q25.

Solution

Concept — Reflex arc: A reflex is a quick, automatic response. The reflex arc runs: receptor → sensory (afferent) neuron → spinal cord (interneuron) → motor (efferent) neuron → effector (muscle/gland). The response is produced even before the brain perceives it.

Step 1 — Trace the signal: stimulus is picked up by the receptor and carried in by the sensory neuron.

Step 2 — Complete the path: spinal cord relays via interneuron to the motor neuron, which acts on the effector.

Why other options are wrong:

- (A) it starts wrongly with the effector and routes through the brain.
- (B) it places the motor neuron before the sensory neuron.
- (D) it begins with the motor neuron, which is incorrect.

Final Answer: receptor → sensory → spinal cord → motor → effector ⇒ $\boxed{C}$

Answer: (C) Go Back to Q25

Q26.

Solution

Concept — Hypothalamus: The hypothalamus, at the base of the forebrain, links the nervous and endocrine systems. It secretes releasing and inhibiting hormones that travel to the anterior pituitary and control its secretions; it also makes ADH and oxytocin released by the posterior pituitary.

Step 1 — Match the role: controls the anterior pituitary through releasing/inhibiting hormones.

Step 2 — Identify the structure: the hypothalamus.

Why other options are wrong:

- (B) the cerebellum controls balance and coordination of movement.
- (C) the medulla oblongata controls respiration, heartbeat and blood pressure.
- (D) the pineal gland secretes melatonin and is not the pituitary controller.

Final Answer: hypothalamus ⇒ $\boxed{A}$

Answer: (A) Go Back to Q26

Q27.

Solution

Concept — Stroke volume: Stroke volume is the volume of blood pumped out by one ventricle in a single heartbeat (about 70 mL at rest). Cardiac output = stroke volume × heart rate.

Step 1 — Read the clue: blood ejected per beat by one ventricle.

Step 2 — Name it: stroke volume.

Why other options are wrong:

- (A) cardiac output is the blood pumped per minute, not per beat.
- (C) heart rate is the number of beats per minute.
- (D) pulse pressure is the difference between systolic and diastolic blood pressure.

Final Answer: stroke volume ⇒ B

Answer: (B) Go Back to Q27

Q28.

Solution

Concept — Repolarisation: During an impulse the membrane first depolarises (Na^+ rushes in, inside becomes positive). Repolarisation then restores the resting state as K^+ flows out, making the inside negative again; the Na^+/K^+ pump later resets the ion balance.

Step 1 — Read the clue: return from reversed to resting potential, K^+ moving out.

Step 2 — Name it: repolarisation.

Why other options are wrong:

- (A) depolarisation is the reversal of potential, not its restoration.
- (B) hyperpolarisation is an overshoot below the resting level, not the trigger.
- (D) the all-or-none threshold is the level needed to fire an impulse, not the recovery phase.

Final Answer: repolarisation ⇒ C

Answer: (C) Go Back to Q28

Q29.

Solution

Concept — Microsporogenesis: The diploid microspore mother cells (pollen mother cells) in the anther undergo *meiosis* to form haploid microspores arranged in tetrads. This process of microspore formation is microsporogenesis.

Step 1 — Note the ploidy change: diploid mother cell $\rightarrow$ haploid microspores.

Step 2 — Identify the division: halving the chromosome number requires meiosis.

Why other options are wrong:

- (A) mitosis keeps the chromosome number the same (diploid).
- (C) binary fission occurs in prokaryotes, not in pollen formation.
- (D) amitosis is direct nuclear division without spindle formation.

Final Answer: meiosis $\Rightarrow$ B

Answer: (B) Go Back to Q29

Q30.

Solution

Concept — Pollen–pistil interaction: All the events from pollen landing on the stigma, its recognition (compatible or incompatible), germination, and growth of the pollen tube through the style into the ovule are together called the pollen–pistil interaction. It lets the pistil accept the right pollen and reject the wrong pollen.

Step 1 — Read the description: recognition and rejection events from stigma to ovule.

Step 2 — Name it: pollen–pistil interaction.

Why other options are wrong:

- (A) double fertilization is the fusion event inside the embryo sac.
- (B) parthenocarpy is fruit formation without fertilization.
- (C) triple fusion is fusion of a male gamete with the two polar nuclei.

Final Answer: pollen–pistil interaction $\Rightarrow$ D

Answer: (D) Go Back to Q30

Q31.

Solution

Concept — Sperm middle piece: A sperm has a head (nucleus + acrosome), a middle piece and a tail. The middle piece is packed with mitochondria that produce the ATP needed to power the lashing of the tail, propelling the sperm towards the egg.

Step 1 — Locate the mitochondria: in the middle piece.

Step 2 — State their role: they supply ATP for tail movement (motility).

Why other options are wrong:

- (B) the genetic material (DNA) is stored in the head (nucleus).
- (C) the egg-membrane-dissolving enzymes are in the acrosome of the head.
- (D) the acrosome forms from the Golgi over the nucleus, not from the middle piece.

Final Answer: provide ATP for tail movement $\Rightarrow$ A

Answer: (A) Go Back to Q31

Q32.

Solution

Concept — Placenta as an endocrine gland: Besides exchanging nutrients, gases and wastes between mother and foetus, the placenta secretes hormones — human chorionic gonadotropin (hCG), human placental lactogen (hPL), oestrogen, progesterone and relaxin — that maintain pregnancy.

Step 1 — Recall its extra function: it acts as a temporary endocrine gland.

Step 2 — List the hormones: hCG, hPL, oestrogen, progesterone.

Why other options are wrong:

- (A) fertilization occurs in the fallopian tube (ampulla), not the placenta.
- (B) sperms are produced in the testes, not the placenta.
- (D) the structure rupturing at ovulation is the Graafian follicle.

Final Answer: an endocrine gland secreting hCG, hPL, oestrogen, progesterone $\Rightarrow$ C

Answer: (C) Go Back to Q32

Q33.

Solution

Concept — MTP timing: Induced abortions (MTP) are comparatively safe during the first trimester, i.e. up to 12 weeks of pregnancy. After the first trimester abortions become much riskier, as the foetus is intimately associated with the mother.

Step 1 — Recall the safe window: the first trimester (up to 12 weeks).

Step 2 — Match the option: during the first trimester.

Why other options are wrong:

- (A) after the seventh month it is highly unsafe.
- (C) MTP is not done at natural childbirth.
- (D) there is a clear medical/legal limit; it is not done at any time.

Final Answer: during the first trimester $\Rightarrow$ B

Answer: (B) Go Back to Q33

Q34.

Solution

Concept — Back cross: A back cross is a cross of the F_1 (hybrid) with either of its parents. When the parent used is the homozygous *recessive* one, the back cross is also a test cross, used to find out the genotype of the hybrid.

Step 1 — Read the clue: F_1 crossed with a parent.

Step 2 — Name it: back cross.

Why other options are wrong:

- (A) a dihybrid cross involves two pairs of contrasting traits.
- (B) a reciprocal cross swaps the sexes of the parental types.
- (C) a monohybrid self-cross is selfing of the F_1, not crossing with a parent.

Final Answer: back cross $\Rightarrow$ D

Answer: (D) Go Back to Q34

Q35.

Solution

Concept — Multiple alleles: When a single gene has more than two allelic forms in a population, they are called multiple alleles. The ABO blood group gene 'I' has three alleles — I^A, I^B and i — though any one diploid person carries only two of them.

Step 1 — Read the clue: one gene with three forms in the population.

Step 2 — Name it: multiple alleles.

Why other options are wrong:

- (B) polygenic inheritance involves many genes affecting one trait.
- (C) pleiotropy is one gene affecting many traits.
- (D) incomplete dominance is a blended phenotype of two alleles.

Final Answer: multiple alleles $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q35

Q36.

Solution

Concept — Chromosomal theory of inheritance: In 1902–1903 Walter Sutton and Theodor Boveri independently noted that the behaviour of chromosomes during meiosis parallels Mendel's factors, and proposed that genes are carried on chromosomes.

Step 1 — Recall the proposers: Sutton and Boveri.

Step 2 — Link the idea: chromosome segregation explains Mendel's laws.

Why other options are wrong:

- (A) Mendel proposed the laws of inheritance but did not know about chromosomes.
- (B) Morgan later proved linkage using Drosophila, but did not first propose the theory.
- (D) Watson and Crick gave the DNA double-helix structure.

Final Answer: Walter Sutton and Theodor Boveri $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q36

Q37.

Solution

Concept — Haemophilia: Haemophilia is an X-linked recessive disorder; the defective gene lies on the X chromosome. A male (XY) needs only one defective X to be affected, whereas a female (XX) must inherit two defective X's, so the disease is far commoner in males.

Step 1 — Locate the gene: on the X chromosome (sex-linked recessive).

Step 2 — Explain the male bias: one defective X is enough to affect a male.

Why other options are wrong:

- (A) the gene is on the X, not the Y chromosome.
- (B) it is recessive and X-linked, not autosomal dominant.
- (C) it is a gene defect, not an extra chromosome (trisomy).

Final Answer: X-linked, commoner in males $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q37

Q38.

Solution

Concept — DNA dimensions (Watson–Crick): In B-DNA the two antiparallel strands form a right-handed helix. The distance between two adjacent base pairs (rise) is 0.34 nm, and one complete turn of the helix (about 10 base pairs) measures 3.4 nm; the helix diameter is 2 nm.

Step 1 — Recall the two figures: 0.34 nm per base-pair step; 3.4 nm per turn.

Step 2 — Match the option: 0.34 nm between base pairs and 3.4 nm per turn.

Why other options are wrong:

- (A) swaps the two values.
- (C) 34 nm is far too large for a base-pair spacing.
- (D) makes the turn length equal to the base-pair spacing, which is wrong.

Final Answer: 0.34 nm per base pair, 3.4 nm per turn $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q38

Q39.

Solution

Concept — lac operon: In the absence of lactose the repressor protein binds the operator and blocks transcription. When lactose is present, it acts as an inducer: it binds and inactivates the repressor, which leaves the operator, so RNA polymerase transcribes the structural genes (z, y, a).

Step 1 — Identify the trigger: lactose (the inducer) must be present.

Step 2 — State the mechanism: lactose inactivates the repressor and frees the operator, switching the operon ON.

Why other options are wrong:

- (A) added glucose actually keeps the operon largely off (catabolite repression).
- (B) a repressor bound to the operator keeps the operon OFF.
- (D) removing RNA polymerase would stop transcription, not start it.

Final Answer: lactose inactivates the repressor and frees the operator $\Rightarrow$ C

Answer: (C) Go Back to Q39

Q40.

Solution

Concept — Miller–Urey experiment: To test the chemical origin of life, Miller and Urey (1953) created a closed apparatus with a 'primitive atmosphere' of methane (CH_4), ammonia (NH_3), hydrogen (H_2) and water vapour, and passed electric sparks (simulating lightning). They obtained amino acids and other simple organic molecules.

Step 1 — Recall the gas mixture: CH_4, NH_3, H_2 and water vapour — a reducing atmosphere.

Step 2 — Match the option: methane, ammonia, hydrogen and water vapour.

Why other options are wrong:

- (B) pure oxygen would be an oxidising, not a primitive reducing, atmosphere.
- (C) the primitive atmosphere had little free oxygen.
- (D) the present nitrogen–oxygen air is not the simulated early atmosphere.

Final Answer: methane, ammonia, hydrogen and water vapour $\Rightarrow$ A

Answer: (A) Go Back to Q40

Q41.

Solution

Concept — Ringworm: Ringworm is a fungal disease of the skin, scalp and nails caused by dermatophytic fungi — *Microsporum*, *Trichophyton* and *Epidermophyton*. It spreads through contaminated soil, towels, combs and clothing, producing dry, scaly, ring-shaped lesions.

Step 1 — Identify the pathogen type: fungi.

Step 2 — Name the genera: *Microsporum*, *Trichophyton*, *Epidermophyton*.

Why other options are wrong:

- (A) *Entamoeba* (a protozoan) causes amoebic dysentery.
- (C) *Salmonella* (a bacterium) causes typhoid.
- (D) rhinoviruses cause the common cold.

Final Answer: fungi (*Microsporum* etc.) $\Rightarrow$ B

Answer: (B) Go Back to Q41

Q42.

Solution

Concept — B-cells (humoral immunity): B-lymphocytes mature in the bone marrow and, on activation, become plasma cells that secrete antibodies into the blood and lymph. This antibody-mediated defence is called humoral (antibody-mediated) immunity. T-cells mediate cell-mediated immunity.

Step 1 — Read the clues: mature in bone marrow + produce circulating antibodies $\rightarrow$ humoral immunity.

Step 2 — Identify the cell: B-lymphocytes (B-cells).

Why other options are wrong:

- (A) T-cells provide cell-mediated immunity and mature in the thymus.
- (B) macrophages engulf pathogens but do not secrete antibodies.
- (C) mast cells release histamine in allergic/inflammatory responses.

Final Answer: B-lymphocytes (B-cells) $\Rightarrow$ D

Answer: (D) Go Back to Q42

Q43.

Solution

Concept — Biofertilizers: Biofertilizers are living organisms that enrich soil nutrients. *Rhizobium* lives in legume root nodules and fixes atmospheric nitrogen into nitrogenous compounds, so it is used as a nitrogen biofertilizer (others include *Azospirillum*, *Azotobacter*, cyanobacteria and mycorrhiza).

Step 1 — Recall the role: nitrogen-fixing symbiont in root nodules.

Step 2 — Classify the use: as a biofertilizer.

Why other options are wrong:

- (B) it is not a chemical pesticide.
- (C) it does not act as an antibiotic.
- (D) biogas is produced by methanogens, not *Rhizobium*.

Final Answer: biofertilizer $\Rightarrow$ A

Answer: (A) Go Back to Q43

Q44.

Solution

Concept — Animal husbandry: Animal husbandry is the scientific management of livestock — their feeding, breeding, housing, health care and improvement. It covers cattle, buffalo, sheep, goat, poultry, and aquaculture (fisheries).

Step 1 — Read the description: care, breeding and management of domestic animals.

Step 2 — Name the branch: animal husbandry.

Why other options are wrong:

- (A) apiculture is the rearing of honeybees.
- (B) sericulture is the rearing of silkworms.
- (C) horticulture is the cultivation of fruits, vegetables and ornamental plants.

Final Answer: animal husbandry $\Rightarrow$ D

Answer: (D) Go Back to Q44

Q45.

Solution

Concept — Gel electrophoresis: DNA carries a net negative charge (due to its phosphate groups), so in an electric field it migrates towards the positive electrode (anode). The agarose gel acts as a sieve: smaller fragments move faster and travel farther, separating DNA by size.

Step 1 — Note the charge and direction: negatively charged DNA moves to the anode (+).

Step 2 — Note the sieving: smaller fragments move faster/farther than larger ones.

Why other options are wrong:

- (A) DNA moves to the anode, not the cathode, and small fragments are fastest.
- (C) DNA does migrate; it does not stay put.
- (D) separation is by size, not by base sequence.

Final Answer: towards the anode, smaller fragments farther $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q45

Q46.

Solution

Concept — Bioreactor: A bioreactor (fermenter) is a large vessel in which raw materials are biologically converted into products by microbes, plant or animal cells. It maintains optimum temperature, pH, dissolved oxygen, substrate and agitation for large-scale production.

Step 1 — Read the clue: vessel giving optimal temperature/pH/O_2/stirring for large-scale culture.

Step 2 — Name it: bioreactor (fermenter).

Why other options are wrong:

- (A) the electrophoresis tank separates DNA fragments.
- (B) the PCR thermal cycler amplifies DNA, not whole cultures.
- (C) the autoclave is used for sterilisation.

Final Answer: bioreactor (fermenter) $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q46

Q47.

Solution

Concept — Transgenic animals: A transgenic animal carries a foreign gene introduced deliberately into its genome. Rosie, a transgenic cow, produced milk enriched with the human protein alpha-lactalbumin, making her milk more nutritionally balanced for human babies.

Step 1 — Pick a transgenic *animal*: Rosie the cow.

Step 2 — Confirm: she expressed a human gene in her milk.

Why other options are wrong:

- (B) Bt cotton is a transgenic *plant*, not an animal.
- (C) Golden rice is a transgenic *plant*.
- (D) the wild-type *Drosophila* is not transgenic.

Final Answer: Rosie, the transgenic cow $\Rightarrow$ A

Answer: (A) Go Back to Q47

Q48.

Solution

Concept — Decomposition: Decomposers (mainly fungi and bacteria, the saprotrophs) break down dead organic matter (detritus) into simple inorganic nutrients, returning them to the soil. This breakdown process is called decomposition; it includes fragmentation, leaching, catabolism, humification and mineralisation.

Step 1 — Identify the agents: fungi and bacteria acting on dead matter.

Step 2 — Name the process: decomposition.

Why other options are wrong:

- (A) photosynthesis is food-making by producers.
- (B) nitrogen fixation converts N_2 gas to usable nitrogen.
- (D) primary production is the synthesis of biomass by producers.

Final Answer: decomposition $\Rightarrow$ C

Answer: (C) Go Back to Q48

Q49.

Solution

Concept — Competitive exclusion (Gause): Gause's principle states that two species competing for the same limiting resources cannot coexist indefinitely; the competitively superior species drives the inferior one to local extinction. He showed this using two *Paramecium* species.

Step 1 — Read the principle: two species on one limiting resource cannot coexist for long.

Step 2 — State the outcome: the weaker competitor is eliminated.

Why other options are wrong:

- (A) indefinite coexistence on the same resource contradicts the principle.
- (C) competition harms at least the weaker competitor; it does not benefit both.
- (D) predation and competition are different interactions.

Final Answer: inferior competitor is eventually eliminated $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q49

Q50.

Solution

Concept — Causes of biodiversity loss: The four major causes ('The Evil Quartet') are habitat loss and fragmentation, over-exploitation, alien species invasions, and co-extinctions. Of these, habitat loss and fragmentation is the single most important cause of extinctions.

Step 1 — Recall the Evil Quartet: habitat loss, over-exploitation, invasions, co-extinction.

Step 2 — Pick the most important: habitat loss and fragmentation.

Why other options are wrong:

- (A) co-extinction is a cause but not the leading one.
- (B) alien-species invasion is important but secondary to habitat loss.
- (C) over-exploitation contributes but is not the foremost cause.

Final Answer: habitat loss and fragmentation $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q50

Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	C	2	D	3	A	4	B	5	C
6	A	7	D	8	B	9	C	10	D
11	B	12	C	13	D	14	A	15	B
16	C	17	A	18	B	19	D	20	C
21	A	22	D	23	A	24	B	25	C
26	A	27	B	28	C	29	B	30	D
31	A	32	C	33	B	34	D	35	A
36	C	37	D	38	B	39	C	40	A
41	B	42	D	43	A	44	D	45	B
46	D	47	A	48	C	49	B	50	D