

PGIMER BSc Nursing Biology

Sample Paper – 15

Duration: 23 Minutes

Maximum Marks: 25

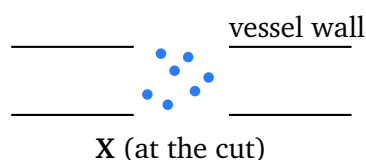
Instructions

- 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. Which of the following is the main function carried out by the large intestine (colon) in the human digestive system?

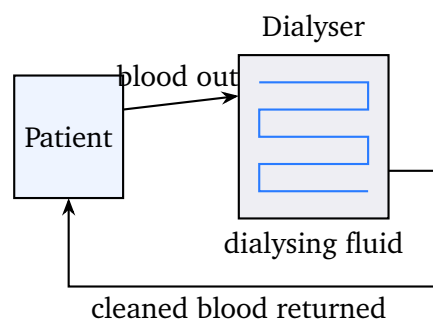
- (A) Chemical digestion of proteins by pepsin
- (B) Complete digestion of fats into fatty acids and glycerol
- (C) Absorption of water and salts from the undigested food, and formation and egestion of faeces
- (D) Absorption of most of the digested nutrients into the blood

Q2. The diagram shows a cut in the wall of a blood vessel. The tiny cell fragments labelled **X** are collecting at the cut, sticking together to plug it and to start the clotting process. The blood cells **X** are:



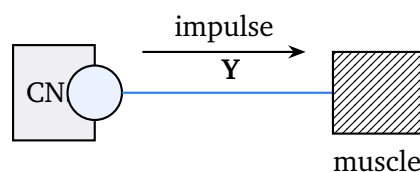
- (A) Platelets (thrombocytes)
- (B) Red blood cells (erythrocytes)
- (C) White blood cells (lymphocytes)
- (D) Mast cells of the plasma

Q3. The diagram shows a machine in which a patient's blood is passed through a set of tubes surrounded by a special fluid, so that wastes such as urea diffuse out of the blood across a membrane. This clinical process, used when the kidneys fail, is called:



- (A) Filtration in the glomerulus
- (B) Osmoregulation
- (C) Deamination
- (D) Haemodialysis

Q4. In the diagram the neuron labelled Y carries a nerve impulse away from the central nervous system (CNS) to a muscle, making the muscle contract. This type of neuron is a:



- (A) Sensory (afferent) neuron
- (B) Motor (efferent) neuron
- (C) Relay neuron (interneuron)



(D) Receptor cell

Q5. The exchange of gases between the blood in the capillaries and the body tissues, in which oxygen passes from the blood into the cells and carbon dioxide passes from the cells into the blood, is called:

(A) Internal (tissue) respiration

(B) External respiration

(C) Breathing (ventilation)

(D) Cellular respiration

Q6. Which hormone, secreted by the pineal gland, regulates the sleep–wake cycle (the biological clock) of the human body?

(A) Thyroxine

(B) Insulin

(C) Adrenaline

(D) Melatonin

Q7. Mendel selected the garden pea (*Pisum sativum*) for his breeding experiments mainly because it:

(A) Takes several years to complete one generation

(B) Has a number of clearly contrasting, easily observable characters

(C) Can reproduce only by vegetative means

(D) Produces very few seeds after each cross

Q8. The tendency of two or more genes located close together on the same chromosome to be inherited together, first studied by Morgan, is called:

(A) Crossing over

(B) Independent assortment

(C) Linkage



(D) Segregation

Q9. In molecular terms, a gene is best defined as:

- (A) A segment of DNA that codes for a particular polypeptide (protein)
- (B) One complete chromosome of the cell
- (C) A single nucleotide of DNA
- (D) A molecule of transfer RNA

Q10. Miller and Urey passed electric sparks through a mixture of methane, ammonia, hydrogen and water vapour in a closed apparatus. Their experiment demonstrated that:

- (A) A living cell can appear fully formed from non-living matter overnight
- (B) Simple organic molecules such as amino acids could form under early-earth conditions
- (C) Oxygen was abundant in the primitive atmosphere
- (D) DNA was the very first molecule to appear on the earth

Q11. The fine hair-like or whip-like projections from the surface of a cell that help the cell to move or move fluids over its surface are:

- (A) Microvilli
- (B) Pseudopodia
- (C) Cilia and flagella
- (D) Centrioles

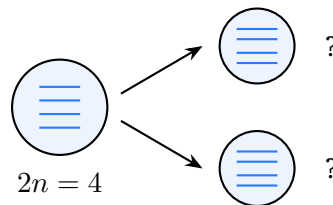
Q12. A cell placed in a certain solution neither gains nor loses water and retains its normal shape and size. A solution having the same solute concentration (water potential) as the cell is described as:

- (A) Hypotonic
- (B) Hypertonic



- (C) A strongly concentrated salt solution
- (D) Isotonic

Q13. The figure shows a somatic (body) cell with $2n = 4$ chromosomes dividing by mitosis into two daughter cells. The number of chromosomes present in each daughter cell is:

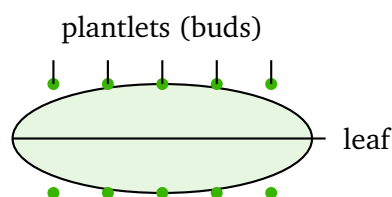


- (A) 4 (the diploid number, $2n$)
- (B) 2 (the haploid number, n)
- (C) 8 ($4n$)
- (D) 16

Q14. A single cell undergoes three successive mitotic divisions. The total number of cells produced at the end is:

- (A) 3
- (B) 6
- (C) 8
- (D) 16

Q15. The figure shows a *Bryophyllum* leaf bearing several tiny plantlets (buds) along its margin. When these buds fall on moist soil they grow into new plants. This illustrates vegetative propagation by:



- (A) Roots



- (B) Underground stems
- (C) Seeds
- (D) Leaves (buds on the leaf margin)

Q16. In the human male, the tube that acts as a common passage for both urine and semen to leave the body through the penis is the:

- (A) Ureter
- (B) Urethra
- (C) Vas deferens
- (D) Epididymis

Q17. Soon after childbirth the mother's mammary glands secrete a yellowish first milk (colostrum) rich in antibodies. The hormone that stimulates the mammary glands to produce milk is:

- (A) Prolactin
- (B) Oxytocin
- (C) Progesterone
- (D) Relaxin

Q18. The opening and closing of a stoma, which controls the entry of carbon dioxide and the escape of water vapour from a leaf, is brought about by the:

- (A) Ordinary epidermal cells
- (B) Mesophyll cells
- (C) Guard cells
- (D) Root hair cells

Q19. When the leaves of *Mimosa pudica* (touch-me-not) are touched, they suddenly fold up and droop. This quick, non-directional movement in response to touch is called:



- (A) Phototropism
- (B) Geotropism
- (C) Hydrotropism
- (D) Thigmonasty

Q20. Members of the kingdom Fungi obtain their food by absorbing nutrients either from dead and decaying matter or from living hosts. Their mode of nutrition is therefore:

- (A) Autotrophic (photosynthetic)
- (B) Heterotrophic — saprophytic or parasitic
- (C) Chemosynthetic
- (D) Holozoic, like most animals

Q21. Aquatic, cold-blooded vertebrates that breathe through gills, swim with the help of fins, and have a body covered with scales are grouped in the class:

- (A) Pisces
- (B) Amphibia
- (C) Reptilia
- (D) Aves

Q22. The figure shows a food chain that begins with dead organic matter and passes through animals that feed on this dead material. A food chain of this kind is called a:

Dead leaves ➤ Earthworm → Frog → Snake

- (A) Grazing food chain
- (B) Parasitic food chain
- (C) Predator food chain
- (D) Detritus (decomposer) food chain



- Q23.** Non-degradable pesticides such as DDT, once they enter a food chain, become more and more concentrated in the bodies of organisms at each higher trophic level. This progressive increase in concentration along the food chain is called:
- (A) Eutrophication
 - (B) Bioremediation
 - (C) Biomagnification (biological magnification)
 - (D) Biodegradation
- Q24.** Filariasis (elephantiasis), caused by the worm *Wuchereria bancrofti*, is transmitted from an infected person to a healthy person through the bite of the:
- (A) Culex mosquito
 - (B) Aedes mosquito
 - (C) Anopheles mosquito
 - (D) Common housefly
- Q25.** In DNA fingerprinting, the technique in which DNA fragments are made to move through a gel under an electric field so that they separate according to their size is called:
- (A) Centrifugation
 - (B) Gel electrophoresis
 - (C) Paper chromatography
 - (D) PCR amplification



Detailed Solutions**Q1.****Solution**

Concept — Role of the large intestine: By the time food reaches the large intestine, almost all the useful nutrients have already been digested and absorbed in the small intestine.

Step 1 — Recall what enters the colon: Only undigested and unabsorbed material, along with a large amount of water, enters the large intestine.

Step 2 — Identify the function: The wall of the large intestine absorbs most of this water and some salts back into the body. The remaining semi-solid material forms the faeces.

Step 3 — Complete the process: The faeces are stored in the rectum and finally removed through the anus, a process called egestion.

Why other options are wrong:

- Option A (Protein digestion by pepsin): happens in the stomach, not the large intestine.
- Option B (Digestion of fats): fats are digested in the small intestine with the help of bile and pancreatic lipase.
- Option D (Absorption of most nutrients): the digested nutrients are absorbed mainly in the small intestine through its villi.

Final Answer: The large intestine absorbs water and salts and forms faeces for egestion ⇒

Answer: (C) [Go Back to Q1](#)

Q2.**Solution**

Concept — Cellular components of blood: Blood contains red cells, white cells and platelets suspended in plasma, each with a distinct job.

Step 1 — Read the diagram: Tiny cell fragments (labelled X) are gathering at the cut in the vessel wall and sticking together.

Step 2 — Identify the fragments: These are platelets (thrombocytes), small colourless fragments of cells. At the site of injury they clump together to form a plug and release factors that start the clotting (coagulation) process.



Why other options are wrong:

- Option B (Red blood cells): carry oxygen with the help of haemoglobin; they do not plug wounds.
- Option C (White blood cells): defend the body against germs; they are not the clotting fragments.
- Option D (Mast cells of the plasma): are not blood cells that form the clot at a cut; plasma is only the fluid part.

Final Answer: The fragments that gather to plug a cut and start clotting are platelets ⇒

Answer: (A) [Go Back to Q2](#)

Q3.

Solution

Concept — Artificial kidney: When a person's kidneys fail, wastes such as urea build up in the blood and must be removed by a machine.

Step 1 — Read the diagram: Blood is drawn from the patient and passed through tubes surrounded by a dialysing fluid; wastes diffuse out across the membrane, and the cleaned blood is returned.

Step 2 — Name the process: This removal of wastes from the blood using a machine and a dialysing membrane is called haemodialysis, and the machine is the artificial kidney.

Why other options are wrong:

- Option A (Filtration in the glomerulus): is a natural step inside a real kidney, not the machine process shown.
- Option B (Osmoregulation): is the body's control of water and salt balance, a broader idea, not this specific technique.
- Option C (Deamination): is the removal of the amino group from amino acids in the liver to form urea, not blood cleaning by a machine.

Final Answer: Cleaning the blood of a patient with an artificial kidney is haemodialysis ⇒

Answer: (D) [Go Back to Q3](#)



Q4.

Solution

Concept — Types of neurons: Neurons are classified by the direction in which they carry the nerve impulse.

Step 1 — Read the diagram: The neuron labelled Y carries the impulse from the central nervous system towards a muscle.

Step 2 — Match the type: A neuron that carries impulses away from the CNS to an effector (a muscle or a gland) is a motor neuron, also called an efferent neuron. Here it makes the muscle contract.

Why other options are wrong:

- Option A (Sensory or afferent neuron): carries impulses in the opposite direction, from a receptor towards the CNS.
- Option C (Relay neuron): lies entirely within the CNS and connects sensory and motor neurons.
- Option D (Receptor cell): detects a stimulus; it is not the neuron that stimulates the muscle.

Final Answer: A neuron carrying the impulse from the CNS to a muscle is a motor (efferent) neuron $\Rightarrow$ **B**

Answer: (B) [Go Back to Q4](#)

Q5.

Solution

Concept — Stages of respiration: Respiration includes breathing, gas exchange at the lungs, gas exchange at the tissues, and the release of energy inside cells.

Step 1 — Locate the exchange described: The question describes exchange between the blood in the capillaries and the body tissues, where oxygen leaves the blood and carbon dioxide enters it.

Step 2 — Name the stage: Gas exchange between the blood and the tissue cells is called internal respiration (tissue respiration).

Why other options are wrong:

- Option B (External respiration): is the gas exchange between the air in the lungs and the blood, not at the tissues.
- Option C (Breathing or ventilation): is only the mechanical movement of air



in and out of the lungs.

- Option D (Cellular respiration): is the biochemical breakdown of glucose inside cells to release ATP, not the exchange of gases with the blood.

Final Answer: Gas exchange between blood and tissues is internal (tissue) respiration ⇒

Answer: (A) [Go Back to Q5](#)

Q6.

Solution

Concept — The pineal gland: The pineal gland is a small endocrine gland located deep in the brain.

Step 1 — Recall its hormone: The pineal gland secretes the hormone melatonin.

Step 2 — State its role: Melatonin regulates the sleep–wake cycle (the body's biological clock or circadian rhythm). Its level rises in darkness and helps induce sleep.

Why other options are wrong:

- Option A (Thyroxine): from the thyroid gland, controls the rate of metabolism.
- Option B (Insulin): from the pancreas, lowers blood glucose.
- Option C (Adrenaline): from the adrenal medulla, prepares the body for emergencies.

Final Answer: The pineal-gland hormone that regulates sleep is melatonin ⇒

Answer: (D) [Go Back to Q6](#)

Q7.

Solution

Concept — Mendel's choice of material: The success of Mendel's experiments depended heavily on choosing a suitable plant.

Step 1 — Recall the features of the pea plant: The garden pea shows several pairs of clearly contrasting characters (for example tall/dwarf, round/wrinkled seeds, green/yellow pods) that are easy to tell apart.

Step 2 — Explain why this helped: Because the traits were clear-cut, and



the plant grows quickly, is easy to cultivate, and can be self-pollinated or cross-pollinated at will, Mendel could follow the inheritance of each character accurately.

Why other options are wrong:

- Option A (Takes several years per generation): wrong; the pea has a short life cycle, which was an advantage.
- Option C (Reproduces only vegetatively): wrong; the pea reproduces sexually by seeds, which is essential for a breeding experiment.
- Option D (Produces very few seeds): wrong; each cross gives many seeds, allowing reliable counting of ratios.

Final Answer: Mendel chose the pea for its clear contrasting characters $\Rightarrow$ **B**

Answer: (B) [Go Back to Q7](#)

Q8.

Solution

Concept — Genes on the same chromosome: Not all genes assort independently; those on the same chromosome tend to travel together.

Step 1 — Describe the situation: When two genes lie close together on the same chromosome, they are usually passed on to the offspring as a single unit.

Step 2 — Name the phenomenon: This tendency of genes on the same chromosome to be inherited together is called linkage, first demonstrated by Thomas Hunt Morgan in *Drosophila*.

Why other options are wrong:

- Option A (Crossing over): is the exchange of segments between homologous chromosomes, which actually breaks linkage.
- Option B (Independent assortment): applies to genes on different chromosomes, the opposite situation.
- Option D (Segregation): is the separation of the two alleles of a single gene into different gametes.

Final Answer: Inheritance of genes on the same chromosome together is linkage $\Rightarrow$ **C**

Answer: (C) [Go Back to Q8](#)



Q9.

Solution

Concept — Molecular definition of a gene: A gene is the functional unit of heredity, and modern biology defines it in terms of DNA.

Step 1 — Recall the structure: DNA is a long chain of nucleotides. Only certain stretches of this chain carry the code for making proteins.

Step 2 — State the definition: A gene is a segment of DNA that carries the information (code) for a particular polypeptide, which folds into a protein. This is the molecular definition of a gene.

Why other options are wrong:

- Option B (One complete chromosome): a chromosome carries many genes, so it is far larger than a single gene.
- Option C (A single nucleotide): one nucleotide is only a building block; a gene contains hundreds or thousands of them.
- Option D (A transfer RNA molecule): tRNA helps in protein synthesis but is not the definition of a gene.

Final Answer: A gene is a DNA segment coding for a polypeptide $\Rightarrow$ A

Answer: (A) [Go Back to Q9](#)

Q10.

Solution

Concept — Chemical origin of life: The Oparin–Haldane idea suggested that life arose from simple chemicals; Miller and Urey tested this in the laboratory.

Step 1 — Recall the set-up: They filled a closed apparatus with methane, ammonia, hydrogen and water vapour, resembling the early-earth atmosphere, and passed electric sparks through it to imitate lightning.

Step 2 — State the result: After some days, simple organic molecules, including amino acids, were formed. This showed that the building blocks of life could form on their own under early-earth conditions.

Why other options are wrong:

- Option A (A full cell overnight): the experiment produced only simple molecules, not a living cell.
- Option C (Abundant oxygen): the early atmosphere was reducing and lacked



free oxygen; that is why such reactions were possible.

- Option D (DNA appeared first): the experiment did not show DNA forming first; it produced small molecules such as amino acids.

Final Answer: Miller and Urey showed amino acids could form under early-earth conditions ⇒

Answer: (B) [Go Back to Q10](#)

Q11.

Solution

Concept — Locomotory structures of cells: Some cells bear thread-like projections that beat to produce movement.

Step 1 — Describe the structures: Cilia are short and numerous, while flagella are long and few. Both are made of microtubules and can beat rhythmically.

Step 2 — State their function: By beating, cilia and flagella either move the cell itself (as the flagellum moves a sperm) or move fluids and particles over the cell surface (as cilia do in the respiratory tract).

Why other options are wrong:

- Option A (Microvilli): are tiny finger-like folds that increase surface area for absorption; they do not beat for movement.
- Option B (Pseudopodia): are temporary flowing extensions of cytoplasm used by amoeba, not permanent hair-like organelles.
- Option D (Centrioles): help organise the spindle during cell division; they are not surface projections for movement.

Final Answer: The hair-like and whip-like locomotory projections are cilia and flagella ⇒

Answer: (C) [Go Back to Q11](#)



Q12.

Solution

Concept — Tonicity of solutions: Whether a cell gains or loses water depends on how the solute concentration of the surrounding solution compares with that inside the cell.

Step 1 — Read the observation: The cell neither gains nor loses water and keeps its normal shape, so there is no net movement of water in or out.

Step 2 — Name the solution: No net osmosis occurs only when the outside solution has the same solute concentration (same water potential) as the cell. Such a solution is called isotonic.

Why other options are wrong:

- Option A (Hypotonic): is more dilute than the cell, so water would enter and the cell would swell.
- Option B (Hypertonic): is more concentrated than the cell, so water would leave and the cell would shrink.
- Option C (A strongly concentrated salt solution): is a hypertonic solution and would cause the cell to lose water.

Final Answer: A solution causing no net osmosis is isotonic $\Rightarrow$ **D**

Answer: (D) [Go Back to Q12](#)

Q13.

Solution

Concept — Mitosis conserves chromosome number: Mitosis is an equational division that keeps the chromosome number unchanged.

Step 1 — Read the figure: The parent body cell has $2n = 4$ chromosomes and divides into two daughter cells.

Step 2 — Apply the rule of mitosis: Before division the DNA is copied, and during mitosis the copies are shared equally between the two daughter cells. So each daughter cell receives the same number of chromosomes as the parent, that is $2n = 4$.

Why other options are wrong:

- Option B (2, the haploid number): halving happens only in meiosis, not in mitosis.



- Option C (8): the number is not doubled in the daughter cells; the copies are shared, not added.
- Option D (16): there is no fourfold increase in a single mitotic division.

Final Answer: Each daughter cell keeps the diploid number, $2n = 4 \Rightarrow$ **A**

Answer: (A) [Go Back to Q13](#)

Q14.

Solution

Concept — Doubling of cells in mitosis: Each mitotic division turns one cell into two, so the number of cells doubles every division.

Step 1 — Track the divisions: After the first division: $1 \rightarrow 2$ cells. After the second division: $2 \rightarrow 4$ cells. After the third division: $4 \rightarrow 8$ cells.

Step 2 — Use the formula: The number of cells after n divisions is 2^n . For $n = 3$, the number is $2^3 = 8$.

Why other options are wrong:

- Option A (3): this counts the number of divisions, not the number of cells produced.
- Option B (6): this comes from multiplying 2×3 , which is not how cell doubling works.
- Option D (16): this is 2^4 , the result of four divisions, not three.

Final Answer: Three mitotic divisions give $2^3 = 8$ cells $\Rightarrow$ **C**

Answer: (C) [Go Back to Q14](#)

Q15.

Solution

Concept — Vegetative propagation: Many plants can grow new individuals from a vegetative part such as a root, stem or leaf, without seeds.

Step 1 — Read the figure: The *Bryophyllum* leaf carries tiny buds along its margin, and each bud can grow into a new plant.

Step 2 — Identify the organ involved: Since the new plantlets arise from buds on the leaf, this is vegetative propagation by leaves (leaf-margin buds), a classic example shown by *Bryophyllum*.



Why other options are wrong:

- Option A (Roots): some plants propagate by roots (for example sweet potato), but the figure shows a leaf.
- Option B (Underground stems): potato and ginger use stems, but here the buds are on a leaf, not a stem.
- Option C (Seeds): seeds are a method of sexual reproduction, whereas the buds shown are vegetative (asexual).

Final Answer: *Bryophyllum* propagates by buds on its leaves ⇒ D

Answer: (D) [Go Back to Q15](#)

Q16.

Solution

Concept — The male urethra: In the male, the reproductive and urinary systems share a final passage.

Step 1 — Trace the two paths: Urine formed in the kidneys is stored in the urinary bladder, while semen is carried from the testis through the vas deferens.

Step 2 — Identify the common tube: Both the bladder and the reproductive ducts open into the urethra, which runs through the penis. So the urethra is the common passage for urine and semen in the male.

Why other options are wrong:

- Option A (Ureter): only carries urine from the kidney to the bladder and has no reproductive role.
- Option C (Vas deferens): carries only sperm from the testis, not urine.
- Option D (Epididymis): only stores and matures the sperm; it does not carry urine.

Final Answer: The common passage for urine and semen in the male is the urethra ⇒ B

Answer: (B) [Go Back to Q16](#)



Q17.

Solution

Concept — Hormonal control of milk: Milk production and its release are controlled by two different hormones.

Step 1 — Focus on milk production: The formation of milk in the mammary glands (lactation) is stimulated by the hormone prolactin, secreted by the anterior pituitary.

Step 2 — Link to colostrum: The first milk after birth, called colostrum, is thin, yellowish and rich in antibodies; its production is also driven by prolactin.

Why other options are wrong:

- Option B (Oxytocin): causes the ejection (let-down) of the already-formed milk, but it does not make the milk.
- Option C (Progesterone): prepares the breast tissue during pregnancy, but high progesterone actually suppresses milk secretion.
- Option D (Relaxin): softens the pelvic ligaments and cervix for childbirth; it does not drive milk production.

Final Answer: The hormone that stimulates milk production is prolactin $\Rightarrow$ A

Answer: (A) [Go Back to Q17](#)

Q18.

Solution

Concept — Control of the stoma: A stoma is a tiny pore on the leaf surface, bordered by two special cells.

Step 1 — Identify the bordering cells: Each stoma is surrounded by two bean-shaped guard cells.

Step 2 — Explain the mechanism: When the guard cells take in water and become turgid, the pore opens, allowing carbon dioxide in and water vapour out; when they lose water and become flaccid, the pore closes. So the guard cells regulate the opening and closing of the stoma.

Why other options are wrong:

- Option A (Ordinary epidermal cells): form the surface layer but do not control the pore.
- Option B (Mesophyll cells): carry out photosynthesis inside the leaf but do



not open or close stomata.

- Option D (Root hair cells): absorb water and minerals in the roots and have nothing to do with the leaf stomata.

Final Answer: The opening and closing of a stoma is controlled by the guard cells

⇒

Answer: (C) [Go Back to Q18](#)

Q19.

Solution

Concept — Plant movements: Plant movements are classified by whether they are directional (tropic) or non-directional (nastic).

Step 1 — Read the response: When *Mimosa pudica* is touched, its leaves fold and droop quickly, and the direction of folding does not depend on the direction of the touch.

Step 2 — Name the movement: A quick, non-directional movement in response to the stimulus of touch is called thigmonasty (a nastic movement).

Why other options are wrong:

- Option A (Phototropism): is a directional growth movement towards light, not a touch response.
- Option B (Geotropism): is a directional growth movement in response to gravity.
- Option C (Hydrotropism): is a directional growth movement towards water.

Final Answer: The touch response of *Mimosa* is thigmonasty ⇒

Answer: (D) [Go Back to Q19](#)

Q20.

Solution

Concept — Nutrition in fungi: The mode of nutrition is a key feature used to place organisms in the five-kingdom system.

Step 1 — Recall how fungi feed: Fungi cannot make their own food. They secrete enzymes onto their food, digest it outside the body, and then absorb the simple nutrients.



Step 2 — Classify the mode: Feeding on dead and decaying matter is saprophytic nutrition, and feeding on a living host is parasitic nutrition. Both are forms of heterotrophic nutrition, which is what fungi show.

Why other options are wrong:

- Option A (Autotrophic): fungi lack chlorophyll and cannot photosynthesise.
- Option C (Chemosynthetic): this is seen in some bacteria that make food from inorganic chemicals, not in fungi.
- Option D (Holozoic like animals): animals ingest solid food and digest it inside the body, whereas fungi digest outside and then absorb.

Final Answer: Fungi are heterotrophic, feeding saprophytically or parasitically ⇒

B

Answer: (B) [Go Back to Q20](#)

Q21.

Solution

Concept — Class Pisces: Vertebrates are grouped into classes by features such as body covering, breathing organs and body temperature.

Step 1 — List the features given: The animals live in water, breathe through gills, swim using fins, and have a scaly body; they are also cold-blooded.

Step 2 — Match the class: These are the defining features of fishes, which belong to the class Pisces.

Why other options are wrong:

- Option B (Amphibia): breathe through gills only as larvae, and adults use lungs and moist skin; they lack scales.
- Option C (Reptilia): breathe with lungs and have dry scaly skin, but they are not gill-breathing swimmers with fins.
- Option D (Aves): are warm-blooded birds with feathers and wings, not gill-breathing fishes.

Final Answer: Gill-breathing, finned, scaly aquatic vertebrates are Pisces ⇒ **A**

Answer: (A) [Go Back to Q21](#)



Q22.

Solution

Concept — Types of food chains: A food chain may start either with living green plants or with dead organic matter.

Step 1 — Read the figure: The chain begins with dead leaves (detritus), which are eaten by an earthworm, then a frog, then a snake.

Step 2 — Name the food chain: A food chain that starts from dead organic matter and passes through detritus-feeding organisms is called a detritus (or decomposer) food chain.

Why other options are wrong:

- Option A (Grazing food chain): starts with living green plants (producers), not with dead matter.
- Option B (Parasitic food chain): involves parasites living on or in a host; that is not what the figure shows.
- Option C (Predator food chain): describes a chain based on predators hunting prey, whereas this one begins with detritus.

Final Answer: A food chain beginning with dead matter is a detritus food chain
⇒ D

Answer: (D) [Go Back to Q22](#)

Q23.

Solution

Concept — Concentration of harmful chemicals in a food chain: Some pollutants cannot be broken down or excreted and so accumulate in living bodies.

Step 1 — Follow the pesticide: DDT taken in by producers is passed on to herbivores, then to carnivores. Since it is not broken down, its amount stored in the body keeps rising at each higher trophic level.

Step 2 — Name the phenomenon: This progressive increase in the concentration of a non-degradable substance along the food chain is called biomagnification (biological magnification).

Why other options are wrong:

- Option A (Eutrophication): is the over-enrichment of a water body with nutrients, causing excessive plant growth, not the build-up of a toxin in bodies.



- Option B (Bioremediation): is the use of living organisms to clean up pollutants, the opposite of pollution build-up.
- Option D (Biodegradation): is the breakdown of substances by microbes; DDT resists this, which is why it magnifies.

Final Answer: The increasing concentration of DDT up a food chain is biomagnification $\Rightarrow$

Answer: (C) [Go Back to Q23](#)

Q24.

Solution

Concept — Vector-borne diseases: Many diseases are spread from person to person by insect carriers called vectors.

Step 1 — Recall the disease: Filariasis (elephantiasis) is caused by the filarial worm *Wuchereria bancrofti*, which blocks the lymph vessels and leads to swelling of the limbs.

Step 2 — Identify the vector: The worm is carried from an infected person to a healthy person by the bite of the female *Culex* mosquito.

Why other options are wrong:

- Option B (*Aedes* mosquito): spreads dengue and chikungunya, not filariasis.
- Option C (*Anopheles* mosquito): spreads malaria.
- Option D (Common housefly): spreads diseases such as typhoid and cholera by contaminating food, but not filariasis.

Final Answer: Filariasis is transmitted by the *Culex* mosquito $\Rightarrow$

Answer: (A) [Go Back to Q24](#)

Q25.

Solution

Concept — Separating DNA fragments: In DNA fingerprinting, DNA is first cut into fragments and these must be sorted by size.

Step 1 — Recall the technique: The DNA fragments are loaded onto a gel and an electric field is applied. Because DNA carries a negative charge, the fragments move towards the positive electrode.



Step 2 — Explain the separation: Smaller fragments move faster and travel farther, while larger fragments move slowly, so the fragments get separated according to size. This method is called gel electrophoresis.

Why other options are wrong:

- Option A (Centrifugation): separates particles by density using high-speed spinning, not by moving DNA through a gel.
- Option C (Paper chromatography): separates dissolved substances such as pigments on paper, not DNA fragments by size.
- Option D (PCR amplification): makes many copies of a DNA segment; it does not separate fragments by size.

Final Answer: DNA fragments are separated by size using gel electrophoresis ⇒

B

Answer: (B) [Go Back to Q25](#)



Answer Key

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

