

AIIMS Paramedical Biology

Sample Paper – 1

Duration: 30 Minutes

Maximum Marks: 30

Instructions

- This paper contains **30** Multiple Choice Questions (Single Correct Answer), modelled on the Biology portion of **AIIMS Paramedical** entrance.
- Each correct answer carries **+1 mark**. Each incorrect answer attracts a **penalty of $-\frac{1}{3}$ mark**. Unattempted questions carry **0 marks**.
- Only **one** option is correct. Choose carefully.
- Syllabus level: **Class 11 & 12 NCERT Biology**
- Use of mobile phones, calculators, or electronic gadgets is strictly prohibited.

Q1. Which one of the following correctly lists taxonomic categories in the order of increasing number of organisms they contain (from the category with the fewest to the most)?

- (A) Species → Genus → Family → Order
- (B) Order → Family → Genus → Species
- (C) Genus → Species → Family → Order
- (D) Family → Order → Genus → Species

Q2. According to the rules of binomial nomenclature, which of the following statements about the scientific name *Mangifera indica* is correct?

- (A) Both words begin with a capital letter
- (B) The first word is the genus and the second is the specific epithet
- (C) *indica* is the genus name



(D) The name should be underlined and printed in upright (non-italic) type

Q3. A bacterium that is spiral or coiled in shape is called a:

- (A) Coccus
- (B) Bacillus
- (C) Spirillum
- (D) Vibrio

Q4. Brown algae owe their characteristic colour mainly to the presence of which pigment?

- (A) Phycoerythrin
- (B) Chlorophyll *b*
- (C) Phycocyanin
- (D) Fucoxanthin

Q5. Which feature is characteristic of the phylum Porifera?

- (A) Presence of canal system and choanocytes (collar cells)
- (B) Presence of a true coelom and segmented body
- (C) Presence of stinging cells called cnidoblasts
- (D) Presence of a notochord at some stage of life

Q6. The swollen, food-storing roots seen in sweet potato are an example of:

- (A) Fusiform tap root
- (B) Tuberous adventitious roots
- (C) Pneumatophores
- (D) Fibrous roots

Q7. The inner lining of blood vessels and the air sacs (alveoli) of the lungs is made up of which type of epithelium?



- (A) Ciliated columnar epithelium
- (B) Stratified squamous epithelium
- (C) Simple squamous epithelium
- (D) Cuboidal epithelium

Q8. Which one of the following is present in a eukaryotic cell but absent in a typical prokaryotic cell?

- (A) Cell membrane
- (B) Ribosomes
- (C) Cell wall
- (D) Membrane-bound nucleus

Q9. During which stage of mitosis do the chromosomes align at the equatorial plate (metaphase plate) of the cell?

- (A) Metaphase
- (B) Prophase
- (C) Anaphase
- (D) Telophase

Q10. The water potential of pure water at standard temperature and pressure is taken to be:

- (A) Always positive
- (B) Zero
- (C) Always equal to the solute potential of the cell
- (D) Equal to the pressure potential alone

Q11. The splitting of water molecules during the light reaction of photosynthesis, releasing oxygen, is known as:

- (A) Carboxylation



- (B) Phosphorylation
- (C) Photolysis of water
- (D) Carbon fixation

Q12. Glycolysis, the breakdown of one molecule of glucose into two molecules of pyruvate, takes place in which part of the cell?

- (A) Inner mitochondrial membrane
- (B) Matrix of mitochondria
- (C) Thylakoid lumen
- (D) Cytoplasm

Q13. Which enzyme present in saliva begins the digestion of starch in the mouth?

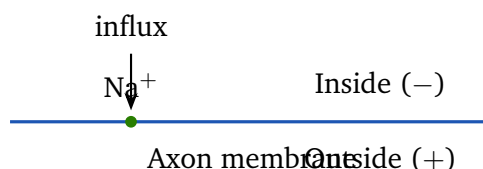
- (A) Salivary amylase (ptyalin)
- (B) Pepsin
- (C) Trypsin
- (D) Lipase

Q14. During ventricular systole of the cardiac cycle, what is the state of the atrioventricular (bicuspid and tricuspid) valves?

- (A) Open, allowing blood into the ventricles
- (B) Closed, preventing backflow into the atria
- (C) Partially open and fluttering
- (D) Replaced in function by the semilunar valves opening

Q15. The figure shows a stimulated patch of a neuron membrane. The rapid influx of which ion is responsible for the depolarisation (rising phase of the action potential)?





- (A) Chloride (Cl^-) influx
- (B) Potassium (K^+) influx
- (C) Sodium (Na^+) influx
- (D) Calcium (Ca^{2+}) efflux

Q16. The process of formation of microspores (pollen grains) from a pollen mother cell through meiosis is called:

- (A) Megasporogenesis
- (B) Oogenesis
- (C) Pollination
- (D) Microsporogenesis

Q17. In the human male, sperms are produced inside the highly coiled structures of the testis known as:

- (A) Seminiferous tubules
- (B) Vas deferens
- (C) Epididymis
- (D) Prostate gland

Q18. Which one of the following is a barrier method of contraception?

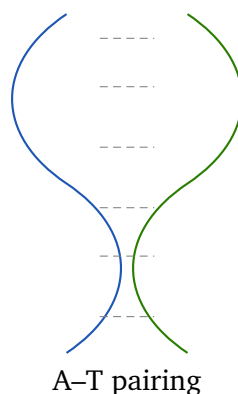
- (A) Oral contraceptive pills
- (B) Condom
- (C) Copper-T (Cu-T) intrauterine device with hormones
- (D) Tubectomy



- Q19.** In Mendel's monohybrid cross, when two heterozygous tall plants (Tt) are crossed, the Punnett square below gives which phenotypic ratio of tall to dwarf in the F₂ generation?

	T	t
T	TT	Tt
t	Tt	tt

- (A) 1 : 1
(B) 2 : 1
(C) 3 : 1
(D) 9 : 7
- Q20.** A test cross is performed by crossing an organism showing the dominant phenotype with an individual that is:
- (A) Homozygous dominant
(B) Heterozygous
(C) Of the F₁ generation
(D) Homozygous recessive
- Q21.** In the Watson–Crick double helix model of DNA shown below, the two strands are held together by hydrogen bonds between complementary bases. Adenine always pairs with which base?



- (A) Thymine, by two hydrogen bonds



- (B) Guanine, by three hydrogen bonds
- (C) Cytosine, by two hydrogen bonds
- (D) Uracil, by three hydrogen bonds

Q22. Which enzyme is responsible for joining the two strands of DNA during replication and is described as semiconservative because each new molecule retains one parental strand?

- (A) DNA replication is conservative, copying both strands anew
- (B) It is semiconservative, and DNA polymerase synthesises the new strand
- (C) It is dispersive, with no parental strand retained
- (D) RNA polymerase carries out DNA replication

Q23. The Miller–Urey experiment, which supported the Oparin–Haldane hypothesis, demonstrated that:

- (A) Life arrived on Earth from outer space (panspermia)
- (B) Cells can arise spontaneously from non-living matter today
- (C) Simple organic molecules (amino acids) could form from inorganic gases under early-Earth conditions
- (D) Oxygen was abundant in the primitive atmosphere

Q24. Which of the following is a feature of innate (non-specific) immunity?

- (A) It is highly specific to a particular pathogen
- (B) It develops memory cells after first exposure
- (C) It is mediated mainly by antibodies produced by B-lymphocytes
- (D) It is present from birth and provides barriers such as skin and phagocytes

Q25. AIDS is caused by HIV, a retrovirus that primarily attacks and destroys which cells of the immune system?



- (A) Helper T-lymphocytes (CD4⁺ cells)
- (B) Red blood cells
- (C) Platelets
- (D) Liver hepatocytes

Q26. The bacterium that converts milk into curd by producing lactic acid, and which also increases vitamin B₁₂ content, is:

- (A) *Saccharomyces cerevisiae*
- (B) *Lactobacillus* (lactic acid bacteria)
- (C) *Aspergillus niger*
- (D) *Penicillium notatum*

Q27. Restriction endonucleases are often called “molecular scissors” because they:

- (A) Join two DNA fragments together
- (B) Synthesise new DNA strands
- (C) Cut DNA at specific recognition sequences
- (D) Unwind the DNA double helix without cutting

Q28. The Bt toxin used in genetically modified Bt cotton is obtained from the bacterium *Bacillus thuringiensis* and acts by:

- (A) Increasing the photosynthetic rate of the plant
- (B) Fixing atmospheric nitrogen for the plant
- (C) Producing a fragrance that repels all insects
- (D) Killing certain insect larvae by damaging their gut on ingestion

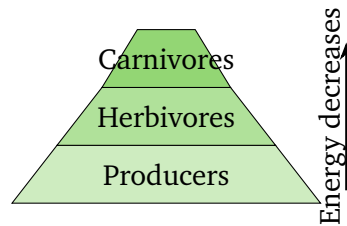
Q29. When resources are unlimited, a population grows without any restriction and its growth curve is described as:

- (A) Exponential (J-shaped) growth



- (B) Logistic (S-shaped) growth
- (C) Zero population growth
- (D) Declining growth

Q30. In an ecosystem, the amount of energy transferred from one trophic level to the next is, according to the ten percent law, approximately:



- (A) 1%
- (B) 50%
- (C) 10%
- (D) 90%



Detailed Solutions

Q1.

Solution

Concept — Taxonomic hierarchy: The taxonomic categories are arranged in a hierarchy. As we move upward from species to kingdom, each higher category includes more and more organisms that share fewer common features.

Step 1 — Order of the categories: The ascending order is Species → Genus → Family → Order → Class → Phylum → Kingdom.

Step 2 — Increasing number of organisms: Species is the smallest unit and contains the fewest, most similar organisms. A genus groups related species, a family groups related genera, and an order groups related families, so the number of organisms increases in that direction.

Why other options are wrong:

- Option B is the reverse (decreasing) order.
- Options C and D scramble the ranks; genus never lies below species, and order never lies between genus and species.

Final Answer: Species → Genus → Family → Order ⇒ A

Answer: (A) [Go Back to Q 1](#)

Q2.

Solution

Concept — Binomial nomenclature: Every species is given a two-word Latin name. The first word is the genus and the second is the specific epithet.

Step 1 — Apply the rules to *Mangifera indica*: *Mangifera* is the genus (begins with a capital letter), and *indica* is the species name (begins with a small letter). The whole name is written in italics, or underlined when handwritten.

Step 2 — Identify the correct statement: The first word being the genus and the second being the specific epithet is exactly the rule, so option B is correct.

Why other options are wrong:

- Option A: only the genus is capitalised, not both words.
- Option C: *indica* is the specific epithet, not the genus.
- Option D: when printed the name is in italics, not upright type.



Final Answer: First word is genus, second is specific epithet $\Rightarrow$ **B**

Answer: (B) [Go Back to Q 2](#)

Q3.

Solution

Concept — Bacterial shapes: Bacteria are classified by their shape into cocci (spherical), bacilli (rod-shaped), vibrio (comma-shaped) and spirilla (spiral or coiled).

Step 1 — Match the shape: A spiral or coiled bacterium is termed a spirillum (plural spirilla).

Why other options are wrong:

- Coccus is spherical.
- Bacillus is rod-shaped.
- Vibrio is comma- or slightly curved-shaped, not fully spiral.

Final Answer: Spiral bacterium = Spirillum $\Rightarrow$ **C**

Answer: (C) [Go Back to Q 3](#)

Q4.

Solution

Concept — Algal pigments: The colour of an alga depends on its dominant accessory pigment. Brown algae (Phaeophyceae) appear brown because of the carotenoid pigment fucoxanthin.

Step 1 — Identify the brown-algal pigment: Fucoxanthin masks the green of chlorophyll and gives the brown colour.

Why other options are wrong:

- Phycoerythrin is the red pigment of red algae (Rhodophyceae).
- Chlorophyll *b* gives the grass-green colour of green algae.
- Phycocyanin is a blue pigment of cyanobacteria, not brown algae.

Final Answer: Brown colour is due to fucoxanthin $\Rightarrow$ **D**

Answer: (D) [Go Back to Q 4](#)



Q5.

Solution

Concept — Phylum Porifera: Sponges (Porifera) are the simplest multicellular animals. They have a body with pores (ostia), a central cavity, and a water-transport canal system.

Step 1 — Identify the key feature: The flow of water through the canal system is driven by special flagellated collar cells called choanocytes, which line the canals. This canal system with choanocytes is the hallmark of Porifera.

Why other options are wrong:

- A true coelom and segmentation belong to higher phyla like Annelida.
- Cnidoblasts (stinging cells) are found in Cnidaria.
- A notochord is a chordate feature.

Final Answer: Canal system and choanocytes ⇒ A

Answer: (A) [Go Back to Q 5](#)

Q6.

Solution

Concept — Root modifications: Roots may be modified for storage, support or respiration. Adventitious roots (those not arising from the radicle) can swell to store food.

Step 1 — Identify the sweet-potato root: In sweet potato, adventitious roots become swollen at irregular places to store food; these are tuberous (or tuberous adventitious) roots.

Why other options are wrong:

- A fusiform tap root (e.g. radish) is a modified tap root, but sweet-potato storage roots are adventitious.
- Pneumatophores are breathing roots of mangroves.
- Fibrous roots are thin and not food-storing.

Final Answer: Tuberous adventitious roots ⇒ B

Answer: (B) [Go Back to Q 6](#)



Q7.

Solution

Concept — Epithelial tissues: Squamous epithelium is made of thin, flat cells. Its extreme thinness makes it ideal for surfaces where rapid diffusion or filtration occurs.

Step 1 — Match the lining: The inner lining of blood vessels and of the alveoli of the lungs is a single layer of flat cells, i.e. simple squamous epithelium, which allows gases and substances to diffuse across easily.

Why other options are wrong:

- Ciliated columnar epithelium lines the respiratory tract and oviducts.
- Stratified squamous epithelium forms the skin and is many layers thick.
- Cuboidal epithelium lines ducts of glands and kidney tubules.

Final Answer: Simple squamous epithelium ⇒

Answer: (C) [Go Back to Q 7](#)

Q8.

Solution

Concept — Prokaryotes vs eukaryotes: The defining difference is the nucleus. Prokaryotic cells lack a true, membrane-bound nucleus and membrane-bound organelles, while eukaryotic cells possess them.

Step 1 — Find the eukaryote-only structure: A membrane-bound nucleus is present in eukaryotes but absent in prokaryotes, where the genetic material lies free in the cytoplasm (nucleoid).

Why other options are wrong:

- Cell membrane, ribosomes and cell wall are all present in typical prokaryotic cells.

Final Answer: Membrane-bound nucleus ⇒

Answer: (D) [Go Back to Q 8](#)



Q9.

Solution

Concept — Stages of mitosis: Mitosis proceeds through prophase, metaphase, anaphase and telophase. Each stage has a characteristic chromosome behaviour.

Step 1 — Identify the alignment stage: During metaphase the chromosomes line up at the equator of the cell, forming the metaphase (equatorial) plate, with spindle fibres attached to their centromeres.

Why other options are wrong:

- In prophase chromosomes condense but do not yet align.
- In anaphase the sister chromatids separate and move to the poles.
- In telophase the chromosomes reach the poles and nuclei reform.

Final Answer: Alignment at the equator occurs in metaphase $\Rightarrow$ **A**

Answer: (A) [Go Back to Q 9](#)

Q10.

Solution

Concept — Water potential: Water potential (Ψ_w) measures the tendency of water to move. Water moves from a region of higher to lower water potential.

Step 1 — Reference value: By convention, the water potential of pure water at standard temperature and pressure is set at zero.

Step 2 — Effect of solutes: Adding solute lowers the water potential, making it negative ($\Psi_w = \Psi_s + \Psi_p$), so a solution always has a lower (negative) water potential than pure water.

Why other options are wrong:

- It is not always positive; solutions are negative.
- It is not defined as equal to the cell's solute potential.
- It equals the sum of solute and pressure potentials, not pressure potential alone.

Final Answer: Pure water has $\Psi_w = 0 \Rightarrow$ **B**

Answer: (B) [Go Back to Q 10](#)



Q11.

Solution

Concept — Light reaction: In the light reaction of photosynthesis, light energy is used to split water and generate ATP and NADPH.

Step 1 — Name the water-splitting step: The light-driven splitting of water into hydrogen ions, electrons and oxygen is called photolysis of water. The released oxygen is the source of atmospheric O₂.

Why other options are wrong:

- Carboxylation and carbon fixation occur in the dark (Calvin) cycle, not water-splitting.
- Phosphorylation is the synthesis of ATP, not the splitting of water.

Final Answer: Splitting of water = Photolysis ⇒ C

Answer: (C) [Go Back to Q 11](#)

Q12.

Solution

Concept — Glycolysis: Glycolysis is the first stage of respiration, in which glucose is partially broken down to two molecules of pyruvate.

Step 1 — Locate glycolysis: Glycolysis takes place entirely in the cytoplasm and does not require oxygen.

Step 2 — What follows: The pyruvate then enters the mitochondria for the Krebs cycle and electron transport in aerobic respiration.

Why other options are wrong:

- The mitochondrial matrix and inner membrane host the Krebs cycle and electron transport, not glycolysis.
- The thylakoid lumen belongs to chloroplasts and the light reaction.

Final Answer: Glycolysis occurs in the cytoplasm ⇒ D

Answer: (D) [Go Back to Q 12](#)



Q13.

Solution

Concept — Digestive enzymes: Digestion of starch begins in the mouth, where saliva contains a carbohydrate-digesting enzyme.

Step 1 — Identify the enzyme: Salivary amylase (also called ptyalin) hydrolyses starch into maltose in the buccal cavity.

Why other options are wrong:

- Pepsin (in the stomach) and trypsin (in the small intestine) digest proteins.
- Lipase digests fats.

Final Answer: Starch digestion in mouth is by salivary amylase $\Rightarrow$ **A**

Answer: (A) [Go Back to Q 13](#)

Q14.

Solution

Concept — Cardiac cycle: During ventricular systole the ventricles contract and pump blood into the arteries. Valve positions ensure one-way flow.

Step 1 — State of the AV valves: As the ventricles contract, the rising pressure forces the atrioventricular (bicuspid and tricuspid) valves shut, preventing back-flow of blood into the atria. The first heart sound “lubb” is produced by their closure.

Step 2 — Companion event: At the same time, the semilunar valves open so blood leaves the ventricles into the aorta and pulmonary artery.

Why other options are wrong:

- If the AV valves were open, blood would flow back into the atria.
- The valves are fully closed, not partially fluttering.
- The semilunar valves opening does not replace the AV-valve closure; both occur.

Final Answer: AV valves are closed during ventricular systole $\Rightarrow$ **B**

Answer: (B) [Go Back to Q 14](#)



Q15.

Solution

Concept — Action potential: A resting neuron is polarised, with the inside negative relative to the outside. A stimulus changes the membrane's permeability to ions.

Step 1 — Depolarisation: On stimulation, sodium (Na^+) channels open and Na^+ rushes into the axon. This influx makes the inside momentarily positive, i.e. depolarisation, which is the rising phase of the action potential.

Step 2 — Recovery: Afterwards, potassium (K^+) flows out to restore the negative interior (repolarisation).

Why other options are wrong:

- Cl^- influx would make the inside more negative, not depolarise it.
- K^+ influx is incorrect; K^+ moves out during repolarisation.
- Ca^{2+} efflux is not the cause of axonal depolarisation.

Final Answer: Depolarisation is due to Na^+ influx $\Rightarrow$

Answer: (C) [Go Back to Q 15](#)

Q16.

Solution

Concept — Pollen formation: Inside the anther, diploid pollen mother cells (microspore mother cells) undergo meiosis to form haploid microspores.

Step 1 — Name the process: The formation of microspores from a pollen mother cell by meiosis is called microsporogenesis. The microspores later develop into pollen grains.

Why other options are wrong:

- Megasporogenesis is the formation of megaspores in the ovule.
- Oogenesis is egg formation in animals.
- Pollination is the transfer of pollen, not its formation.

Final Answer: Microspore formation = Microsporogenesis $\Rightarrow$

Answer: (D) [Go Back to Q 16](#)



Q17.

Solution

Concept — Male reproductive system: The testis is the male gonad and is divided into compartments containing coiled tubules where sperm form.

Step 1 — Site of spermatogenesis: Sperms are produced inside the highly coiled seminiferous tubules of the testis by the process of spermatogenesis.

Why other options are wrong:

- The epididymis stores and matures sperm but does not produce them.
- The vas deferens transports sperm.
- The prostate gland adds secretions to semen.

Final Answer: Sperms form in seminiferous tubules $\Rightarrow$ A

Answer: (A) [Go Back to Q 17](#)

Q18.

Solution

Concept — Contraceptive methods: Contraceptives are grouped as natural, barrier, intrauterine devices (IUDs), hormonal pills and surgical methods. Barrier methods physically prevent sperm and ovum from meeting.

Step 1 — Identify the barrier method: A condom is a barrier that prevents sperms from reaching the egg, so it is a barrier method.

Why other options are wrong:

- Oral pills are hormonal contraceptives.
- Cu-T is an intrauterine device.
- Tubectomy is a surgical (sterilisation) method.

Final Answer: Condom is a barrier method $\Rightarrow$ B

Answer: (B) [Go Back to Q 18](#)



Q19.

Solution

Concept — Monohybrid cross: When two heterozygotes ($Tt \times Tt$) are crossed, the Punnett square gives genotypes TT , Tt , Tt and tt .

Step 1 — Read the Punnett square: The four boxes give TT , Tt , Tt , tt = a genotypic ratio of $1 : 2 : 1$.

Step 2 — Convert to phenotype: TT , Tt and Tt are all tall (T is dominant) and only tt is dwarf, so the phenotypic ratio of tall to dwarf is $3 : 1$.

Why other options are wrong:

- $1 : 1$ is the test-cross ratio.
- $2 : 1$ is not a standard Mendelian monohybrid ratio.
- $9 : 7$ arises in certain dihybrid gene-interaction cases.

Final Answer: Tall : dwarf = $3 : 1 \Rightarrow$ C

Answer: (C) [Go Back to Q 19](#)

Q20.

Solution

Concept — Test cross: A test cross is used to find whether an organism showing the dominant trait is homozygous (TT) or heterozygous (Tt).

Step 1 — The cross: The organism is crossed with a homozygous recessive individual (tt). If any recessive offspring appear, the dominant parent was heterozygous.

Why other options are wrong:

- Crossing with a homozygous dominant or heterozygous individual would not cleanly reveal the unknown genotype.
- “ F_1 generation” does not specify a recessive tester, so it cannot define a test cross.

Final Answer: Test cross is with a homozygous recessive parent $\Rightarrow$ D

Answer: (D) [Go Back to Q 20](#)



Q21.

Solution

Concept — DNA base pairing: In the Watson–Crick double helix, the two antiparallel strands are joined by hydrogen bonds between complementary bases, following Chargaff's rule.

Step 1 — Pairing of adenine: Adenine (A) always pairs with thymine (T) by two hydrogen bonds, while guanine (G) pairs with cytosine (C) by three hydrogen bonds.

Why other options are wrong:

- A does not pair with guanine or cytosine.
- Uracil replaces thymine in RNA, not in DNA, and the bond count for A–U would still be two, not three.

Final Answer: Adenine pairs with thymine by two H-bonds $\Rightarrow$ **A**

Answer: (A) [Go Back to Q 21](#)

Q22.

Solution

Concept — DNA replication: DNA replication is semiconservative, meaning each daughter DNA molecule has one old (parental) strand and one newly synthesised strand.

Step 1 — Enzyme involved: DNA polymerase synthesises the new complementary strand using each parental strand as a template.

Step 2 — Why semiconservative: Because one parental strand is conserved in each new molecule, the mode is called semiconservative, as confirmed by the Meselson–Stahl experiment.

Why other options are wrong:

- Replication is not conservative or dispersive.
- RNA polymerase carries out transcription, not DNA replication.

Final Answer: Semiconservative replication by DNA polymerase $\Rightarrow$ **B**

Answer: (B) [Go Back to Q 22](#)



Q23.

Solution

Concept — Origin of life: The Oparin–Haldane hypothesis proposed that life arose from simple inorganic molecules under the conditions of the primitive Earth (chemical evolution).

Step 1 — Miller–Urey experiment: Miller and Urey passed electric sparks through a mixture of methane, ammonia, hydrogen and water vapour and obtained amino acids, showing organic molecules could form from inorganic gases.

Why other options are wrong:

- Panspermia (life from space) is a different theory not demonstrated by this experiment.
- It did not show spontaneous generation of cells in the present day.
- The early atmosphere was reducing and lacked free oxygen.

Final Answer: Organic molecules can form from inorganic gases $\Rightarrow$

Answer: (C) [Go Back to Q 23](#)

Q24.

Solution

Concept — Innate vs acquired immunity: Innate immunity is present from birth and is non-specific, whereas acquired (adaptive) immunity develops after exposure and is specific with memory.

Step 1 — Feature of innate immunity: Innate immunity is present from birth and provides general defences such as physical barriers (skin, mucous membranes) and phagocytic cells.

Why other options are wrong:

- High specificity and memory cells are features of acquired immunity.
- Antibody-mediated defence by B-lymphocytes is part of acquired (humoral) immunity.

Final Answer: Innate immunity is inborn and non-specific $\Rightarrow$

Answer: (D) [Go Back to Q 24](#)



Q25.

Solution

Concept — HIV and AIDS: AIDS (Acquired Immuno Deficiency Syndrome) is caused by the Human Immunodeficiency Virus (HIV), a retrovirus.

Step 1 — Target cells: HIV enters and multiplies within helper T-lymphocytes ($CD4^+$ cells), progressively destroying them. The fall in these cells weakens immunity, leaving the body open to infections.

Why other options are wrong:

- Red blood cells and platelets are not the primary HIV targets.
- Liver hepatocytes are targeted by hepatitis viruses, not by HIV.

Final Answer: HIV destroys helper T-cells ($CD4^+$) $\Rightarrow$ **A**

Answer: (A) [Go Back to Q 25](#)

Q26.

Solution

Concept — Microbes in food: Several useful microbes are used to make fermented foods. Curd is formed by the action of lactic acid bacteria on milk.

Step 1 — Identify the curd organism: *Lactobacillus* (lactic acid bacteria, LAB) convert the milk sugar into lactic acid, which curdles the milk into curd and also increases its vitamin B_{12} content.

Why other options are wrong:

- *Saccharomyces cerevisiae* (yeast) is used to leaven dough and brew alcohol.
- *Aspergillus niger* produces citric acid.
- *Penicillium notatum* produces the antibiotic penicillin.

Final Answer: Curd is made by *Lactobacillus* $\Rightarrow$ **B**

Answer: (B) [Go Back to Q 26](#)



Q27.

Solution

Concept — Restriction enzymes: Restriction endonucleases are key tools of recombinant DNA technology. Each recognises a specific palindromic sequence on the DNA.

Step 1 — Their action: They cut the DNA at or near these specific recognition sequences, producing fragments (often with sticky ends), which is why they are called molecular scissors.

Why other options are wrong:

- Joining DNA fragments is done by DNA ligase, the molecular glue.
- Synthesising new strands is the role of DNA polymerase.
- Unwinding the helix is done by helicase, which does not cut.

Final Answer: Restriction enzymes cut DNA at specific sites ⇒

Answer: (C) [Go Back to Q 27](#)

Q28.

Solution

Concept — Bt cotton: Bt cotton is a genetically modified crop carrying a gene from *Bacillus thuringiensis* that codes for an insecticidal Bt (Cry) protein.

Step 1 — Mechanism of the toxin: The protoxin is taken up by feeding insect larvae and, in the alkaline gut, is converted to the active toxin. It binds to the gut lining, creating pores that damage the gut and kill the larvae.

Why other options are wrong:

- It does not change photosynthesis or fix nitrogen.
- It does not act through a repelling fragrance; it must be ingested.

Final Answer: Bt toxin kills insect larvae by damaging their gut ⇒

Answer: (D) [Go Back to Q 28](#)



Q29.

Solution

Concept — Population growth models: Population growth depends on resource availability. Two main patterns are recognised.

Step 1 — Unlimited resources: When food and space are unlimited, the population grows in an unrestricted, accelerating manner giving an exponential or J-shaped growth curve.

Step 2 — Limited resources: When resources are limited, growth slows near the carrying capacity, giving a logistic or S-shaped curve.

Why other options are wrong:

- Logistic (S-shaped) growth applies to limited resources, not unlimited.
- Zero growth and declining growth describe other situations, not unlimited resources.

Final Answer: Unlimited resources give exponential (J-shaped) growth $\Rightarrow$ **A**

Answer: (A) [Go Back to Q 29](#)

Q30.

Solution

Concept — Energy flow: Energy flows through an ecosystem in one direction along the food chain, from producers to successive consumers. At each step much energy is lost as heat.

Step 1 — Ten percent law: According to Lindeman's ten percent law, only about 10% of the energy at one trophic level is passed on to the next higher trophic level; the rest is lost in respiration and as heat.

Why other options are wrong:

- 1% and 50% do not match the ten percent law.
- 90% is the fraction lost, not the fraction transferred.

Final Answer: About 10% of energy passes to the next trophic level $\Rightarrow$ **C**

Answer: (C) [Go Back to Q 30](#)



Answer Key

Q	Ans	Q	Ans	Q	Ans	Q	Ans	Q	Ans
1	A	2	B	3	C	4	D	5	A
6	B	7	C	8	D	9	A	10	B
11	C	12	D	13	A	14	B	15	C
16	D	17	A	18	B	19	C	20	D
21	A	22	B	23	C	24	D	25	A
26	B	27	C	28	D	29	A	30	C

