

AIIMS B.Sc Nursing Biology

Sample Paper – 8

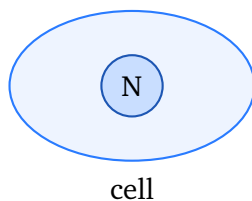
Duration: 36 Minutes

Maximum Marks: 30

Instructions

- This paper contains **30 Multiple Choice Questions (single correct answer)**, modelled on the Biology section of the **AIIMS B.Sc Nursing** entrance.
- Each correct answer carries **+1 mark**. $\frac{1}{3}$ **mark is deducted** for every wrong answer, and an unattempted question gets **0 marks**.
- Only **one** option is correct. The paper covers botany, human physiology, genetics, and ecology.
- Personal calculators, mobile phones, and other electronic gadgets are strictly prohibited.

Q1. The diagram shows a single small compartment, the smallest living part that can carry out all life processes on its own. The basic structural and functional unit of all living organisms shown here is the:



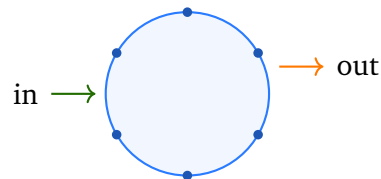
- (A) tissue
- (B) organ
- (C) cell
- (D) organ system

Q2. During animal cell division, the spindle fibres that pull the chromosomes apart radiate from a structure made of two short cylinders. This spindle-organising structure is the:



- (A) centriole (centrosome)
- (B) ribosome
- (C) lysosome
- (D) nucleolus

Q3. The thin outer boundary shown below, which acts as a selective gate-keeper and controls what enters and leaves the cell, is the:



- (A) cell wall
 - (B) plasma membrane
 - (C) nuclear membrane
 - (D) tonoplast
- Q4.** A vitamin needed for strong bones and teeth is made in the human skin when it is exposed to sunlight. This vitamin is:
- (A) vitamin A
 - (B) vitamin C
 - (C) vitamin K
 - (D) vitamin D
- Q5.** The body needs a particular mineral element to make the thyroid hormone thyroxine; its lack causes goitre. This element is:
- (A) iron
 - (B) calcium
 - (C) iodine
 - (D) phosphorus



- Q6.** Lichens that grow on rocks and tree bark are a close partnership of two different organisms living together. A lichen is a symbiotic association between:
- (A) bacteria and a virus
 - (B) two different mosses
 - (C) a fern and a fungus
 - (D) an alga and a fungus
- Q7.** A group of plants bears flowers and has its seeds enclosed inside fruits. These flowering plants are called:
- (A) angiosperms
 - (B) gymnosperms
 - (C) pteridophytes
 - (D) bryophytes
- Q8.** In photosynthesis a green leaf changes one form of energy into another and stores it in glucose. In this process, light energy is converted into:
- (A) heat energy only
 - (B) chemical energy stored in glucose
 - (C) mechanical energy
 - (D) electrical energy
- Q9.** The figure shows a tiny pore on the lower surface of a leaf, bordered by two curved kidney-shaped cells. The opening and closing of this stomatal pore is controlled by the:

guard cell



- (A) root hairs

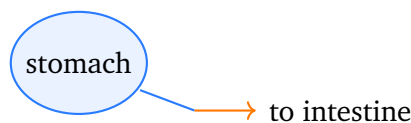


- (B) epidermal hairs
- (C) guard cells
- (D) companion cells

Q10. During heavy exercise the muscles may run short of oxygen and break down glucose without it. This anaerobic breakdown in muscle produces:

- (A) lactic acid
- (B) ethanol and carbon dioxide
- (C) carbon dioxide and water only
- (D) pyruvic acid that never changes

Q11. The diagram shows the stomach passing partly digested, acidic, semi-liquid food into the small intestine through a valve. This semi-digested acidic food leaving the stomach is called:



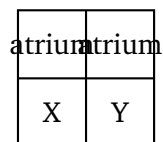
- (A) bolus
- (B) bile
- (C) faeces
- (D) chyme

Q12. Bile made by the liver helps in the digestion of fats. Before it is poured into the intestine, bile is stored in the:

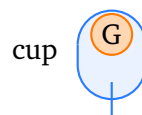
- (A) pancreas
- (B) gall bladder
- (C) spleen
- (D) appendix



- Q13.** As the undigested food moves along the alimentary canal, most of the water from it is absorbed back into the body in the:
- (A) stomach
 - (B) oesophagus
 - (C) large intestine
 - (D) mouth
- Q14.** When you place your fingers on the wrist, you can feel a rhythmic expansion of the artery with each heartbeat. This throb is called the:
- (A) pulse
 - (B) reflex
 - (C) clotting
 - (D) peristalsis
- Q15.** In the heart diagram below, the two lower chambers (marked X and Y) have thick muscular walls and pump blood out of the heart. These two lower pumping chambers are the:



- (A) atria
 - (B) auricles
 - (C) valves
 - (D) ventricles
- Q16.** In the nephron shown below, the cup-shaped structure that surrounds the ball of capillaries and collects the filtrate from the blood is the:



- (A) ureter
- (B) Bowman's capsule
- (C) urinary bladder
- (D) collecting duct

Q17. The lowest part of the brain joins it to the spinal cord and controls vital involuntary actions such as breathing and heartbeat. This part is the:

- (A) medulla oblongata
- (B) cerebrum
- (C) cerebellum
- (D) hypothalamus

Q18. The joint shown below, where the rounded head of one bone fits into a cup of another and allows movement in all directions (as at the shoulder), is a:



- (A) hinge joint
 - (B) pivot joint
 - (C) ball-and-socket joint
 - (D) fixed joint
- Q19.** When a person is suddenly frightened, a hormone prepares the body for "fight or flight" by raising the heartbeat and breathing rate. This emergency hormone is:
- (A) insulin
 - (B) adrenaline
 - (C) thyroxine



(D) oestrogen

Q20. In the human male, the paired reproductive organs that produce sperms (and also the hormone testosterone) are the:

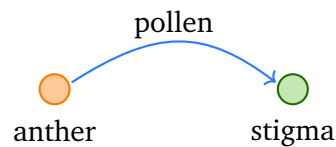
(A) ovaries

(B) kidneys

(C) prostate glands

(D) testes

Q21. In the figure, pollen from the anther of one flower is being carried to the stigma of a different flower of the same kind. This transfer is called:



(A) cross-pollination

(B) self-pollination

(C) fertilisation

(D) germination

Q22. Fungi like *Rhizopus* and plants like ferns make new individuals from special tiny reproductive bodies released into the air. This method of asexual reproduction is:

(A) budding

(B) binary fission

(C) spore formation

(D) regeneration

Q23. The hereditary material present in the chromosomes is abbreviated as DNA. The full form of DNA is:



- (A) deoxyribonucleic acid
- (B) diribonucleic acid
- (C) dinitrogenous acid
- (D) deoxyribose nitrate acid

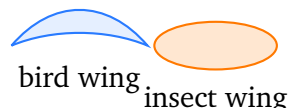
Q24. When Mendel crossed a pure tall pea plant with a pure dwarf one, all the plants of the F_1 generation were tall. The trait that appears in the F_1 generation is the:

- (A) recessive trait
- (B) acquired trait
- (C) blended trait
- (D) dominant trait

Q25. In a cross between red-flowered and white-flowered *Mirabilis* plants, the F_1 plants were pink, a blend of the two. When neither allele is fully dominant and the hybrid shows a mixed trait, the condition is called:

- (A) complete dominance
- (B) incomplete dominance
- (C) co-dominance
- (D) multiple alleles

Q26. A bird's wing and an insect's wing both help in flying, yet they are built on completely different internal plans. Organs that share the same function but differ in basic structure are called:



- (A) homologous organs
- (B) vestigial organs
- (C) analogous organs



(D) fossil organs

Q27. A fatal disease of the nervous system is caused by a virus and is usually passed to humans through the bite of an infected dog. This disease is:

(A) malaria

(B) typhoid

(C) tetanus

(D) rabies

Q28. Diabetes does not spread from one person to another by contact, air, water, or insects. A disease of this kind is described as:

(A) non-communicable

(B) communicable

(C) infectious

(D) epidemic

Q29. Bt cotton, which resists attack by certain insect pests, was developed by inserting a bacterial gene into the cotton plant. This technique of changing an organism's genes is called:

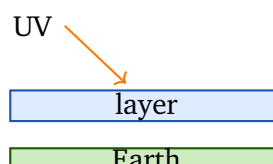
(A) tissue culture

(B) genetic engineering (biotechnology)

(C) hybridisation

(D) vaccination

Q30. High up in the atmosphere a gas layer absorbs most of the Sun's harmful ultraviolet rays and protects life on Earth. This protective layer is the:



- (A) carbon dioxide layer
- (B) smog layer
- (C) ozone layer
- (D) nitrogen layer



Detailed Solutions

Q1.

Solution

Concept — The cell as the basic unit of life: The cell is the smallest unit of life that can carry out all the basic life processes such as nutrition, respiration, growth, and reproduction on its own. Every living organism, whether a single-celled *Amoeba* or a many-celled human, is made of one or more cells. This is the central idea of the cell theory.

Step 1 — Read the figure: the single bounded compartment with a nucleus (N) inside represents one complete cell.

Step 2 — Apply the definition: because it is the smallest part able to perform all life functions independently, the cell is the basic structural and functional unit of all living organisms.

Why each other option is wrong:

- (A) A tissue is a group of similar cells working together; it is larger than a single cell.
- (B) An organ is made of several tissues and is larger still.
- (D) An organ system is a set of organs; it is far above the cell level.

Key point: Levels of organisation run cell → tissue → organ → organ system → organism. The cell is the lowest, basic unit.

Final Answer: Cell ⇒

[Go Back to Q1](#)

Q2.

Solution

Concept — The centriole (centrosome): The centrosome of an animal cell contains a pair of short cylindrical bodies called centrioles, made of microtubules. During cell division the centrioles move to opposite poles and organise the spindle fibres that attach to the chromosomes and pull them apart into the two daughter cells.

Step 1 — Identify the ask: the structure that forms (organises) the spindle fibres in a dividing animal cell.

Step 2 — Match it: this spindle-organising job is done by the centriole (centro-



some).

Why each other option is wrong:

- (B) The ribosome is the site of protein synthesis, not spindle formation.
- (C) The lysosome contains digestive enzymes that break down waste.
- (D) The nucleolus inside the nucleus makes ribosomes; it does not form the spindle.

Key point: Animal cells have centrioles that form the spindle; most plant cells lack centrioles yet still build a spindle.

Final Answer: Centriole (centrosome) ⇒

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

Q3.

Solution

Concept — The plasma membrane: The plasma membrane (cell membrane) is the thin, living outer covering of every cell. It is selectively permeable, meaning it allows only certain substances to pass in and out while keeping others back. In this way it controls the exchange of materials between the cell and its surroundings.

Step 1 — Read the figure: the boundary with arrows showing some substances entering and others leaving is acting as a selective gatekeeper.

Step 2 — Name the structure: the membrane that controls what enters and leaves the cell is the plasma membrane.

Why each other option is wrong:

- (A) The cell wall (in plants/fungi/bacteria) is a rigid outer layer that is freely permeable, not the selective gate.
- (C) The nuclear membrane surrounds the nucleus, not the whole cell.
- (D) The tonoplast is the membrane around the vacuole, an inner membrane only.

Key point: The plasma membrane is selectively permeable and present in all cells; the cell wall is merely a rigid, freely permeable jacket outside it.

Final Answer: Plasma membrane ⇒

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



Q4.

Solution

Concept — Vitamin D and sunlight: Vitamin D is needed for the absorption of calcium and phosphorus, which make bones and teeth strong. Unlike most vitamins, it can be made in our own skin: when sunlight (ultraviolet light) falls on the skin, it converts a substance there into vitamin D. Its lack causes rickets in children.

Step 1 — Identify the clue: a vitamin for strong bones that is made in the skin in the presence of sunlight.

Step 2 — Name it: this is vitamin D, often called the "sunshine vitamin".

Why each other option is wrong:

- (A) Vitamin A is needed for healthy eyes and vision; it is not made in skin by sunlight.
- (B) Vitamin C prevents scurvy and is obtained from citrus fruits.
- (C) Vitamin K helps blood to clot.

Key point: Vitamin D is the only vitamin our body can make using sunlight; it builds strong bones and prevents rickets.

Final Answer: Vitamin D ⇒

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

Q5.

Solution

Concept — Iodine and thyroxine: The thyroid gland in the neck makes the hormone thyroxine, which controls the rate of metabolism in the body. To make thyroxine the gland needs the mineral element iodine. If the diet lacks iodine, the thyroid cannot make enough thyroxine and it swells, causing a disease called goitre.

Step 1 — Identify the link: the element required to make the hormone thyroxine.

Step 2 — Name it: that element is iodine.

Why each other option is wrong:

- (A) Iron is needed to make haemoglobin in red blood cells, not thyroxine.
- (B) Calcium is needed for bones, teeth, and blood clotting.



- (D) Phosphorus is needed for bones and for energy molecules like ATP.

Key point: Iodine → thyroxine; its deficiency causes goitre. Iodised salt is used to supply iodine in the diet.

Final Answer: Iodine ⇒

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

Q6.

Solution

Concept — Lichens: A lichen is not one organism but a close partnership (symbiosis) of two: an alga and a fungus living together. The alga makes food by photosynthesis and shares it with the fungus, while the fungus gives shelter, water, and minerals to the alga. Both partners benefit, so it is a mutualistic association.

Step 1 — Recall the two partners: the green photosynthetic partner is an alga and the other is a fungus.

Step 2 — State the relationship: a lichen is a symbiotic association between an alga and a fungus.

Why each other option is wrong:

- (A) Lichens do not involve a virus; viruses are not free-living partners.
- (B) Two mosses are not partners in a lichen.
- (C) A fern is a higher plant and is not the partner; the partner is an alga.

Key point: Lichen = alga + fungus (mutualism). Lichens are also good natural indicators of air pollution.

Final Answer: An alga and a fungus ⇒

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



Q7.

Solution

Concept — Angiosperms: Angiosperms are the flowering plants. In them the seeds are not naked but are enclosed and protected inside a fruit, which develops from the ovary after fertilisation. Mango, pea, wheat, and rose are all angiosperms. They form the largest and most advanced group of plants.

Step 1 — Identify the features: plants that bear flowers and have seeds enclosed in fruits.

Step 2 — Name the group: such plants are the angiosperms.

Why each other option is wrong:

- (B) Gymnosperms (e.g. pine) bear naked seeds, not enclosed in fruits, and have no true flowers.
- (C) Pteridophytes (e.g. ferns) reproduce by spores and bear no seeds at all.
- (D) Bryophytes (e.g. mosses) are simple, non-flowering plants without seeds.

Key point: Angiosperms = flowers + seeds inside fruits; gymnosperms = naked seeds, no fruit. This enclosed seed is the key difference.

Final Answer: Angiosperms ⇒

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

Q8.

Solution

Concept — Energy conversion in photosynthesis: In photosynthesis green leaves use chlorophyll to capture sunlight and combine carbon dioxide and water to make glucose. The light energy of the Sun is thereby trapped and stored as chemical energy in the bonds of glucose. This stored energy is later released during respiration.

Step 1 — Identify the starting energy: the input is light (solar) energy.

Step 2 — Identify the stored form: this light energy is converted into chemical energy held in glucose.

Why each other option is wrong:

- (A) Photosynthesis stores energy in glucose; it does not merely turn light into heat.



- (C) No mechanical (movement) energy is produced in photosynthesis.
- (D) No electrical energy is the stored product of photosynthesis.

Key point: Photosynthesis: light energy → chemical energy in glucose. Respiration later releases this stored chemical energy as usable ATP.

Final Answer: Chemical energy stored in glucose ⇒

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

Q9.

Solution

Concept — Guard cells and stomata: The tiny pores on the surface of a leaf, called stomata, allow exchange of gases and loss of water vapour. Each pore is bordered by two kidney-shaped guard cells. When the guard cells take in water and swell (become turgid) the pore opens; when they lose water and become flaccid the pore closes.

Step 1 — Read the figure: the two curved cells surrounding the central pore are the guard cells.

Step 2 — Link to function: by changing their turgidity they open and close the stomatal pore.

Why each other option is wrong:

- (A) Root hairs absorb water and minerals from the soil; they are not on leaves.
- (B) Epidermal hairs reduce water loss but do not control stomatal opening.
- (D) Companion cells help the phloem sieve tubes; they do not open stomata.

Key point: Stomata are opened and closed by the turgidity of the two guard cells, regulating transpiration and gas exchange.

Final Answer: Guard cells ⇒

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



Q10.

Solution

Concept — Anaerobic respiration in muscle: During heavy exercise the muscles use oxygen faster than the blood can supply it. The cells then break down glucose without enough oxygen (anaerobic respiration). In human muscle this produces lactic acid, whose build-up causes muscle fatigue and cramps.

Step 1 — Identify the conditions: glucose is broken down in muscle without oxygen.

Step 2 — Name the product: the end product in human muscle is lactic acid.

Why each other option is wrong:

- (B) Ethanol and carbon dioxide are the anaerobic products in yeast (fermentation), not in human muscle.
- (C) Carbon dioxide and water only are formed in *aerobic* respiration, when oxygen is present.
- (D) Pyruvic acid is an intermediate; in muscle it is further changed to lactic acid, so it does not stay unchanged.

Key point: In muscle, glucose \rightarrow lactic acid (anaerobic); in yeast, glucose \rightarrow ethanol + CO₂. Lactic acid causes the cramp during heavy exercise.

Final Answer: Lactic acid \Rightarrow

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

Q11.

Solution

Concept — Chyme: In the stomach the food is churned and mixed with gastric juice containing hydrochloric acid and enzymes. This turns it into a semi-digested, acidic, semi-liquid paste called chyme. The chyme is then released little by little through a valve into the small intestine for further digestion.

Step 1 — Read the figure: the stomach is passing acidic, partly digested food onward to the intestine.

Step 2 — Name it: this semi-digested acidic food leaving the stomach is chyme.

Why each other option is wrong:

- (A) The bolus is the chewed, rounded ball of food formed in the mouth, before the stomach.



- (B) Bile is a digestive juice from the liver, not the food itself.
- (C) Faeces is the undigested waste formed at the end of the intestine.

Key point: Food becomes a bolus in the mouth and chyme in the stomach; chyme is acidic, but later turns alkaline (chyle) in the small intestine.

Final Answer: Chyme ⇒

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

Q12.

Solution

Concept — The gall bladder: Bile is a greenish-yellow juice made by the liver. It is not used at once, so it is stored and concentrated in a small sac called the gall bladder. When fatty food enters the intestine, the gall bladder releases bile, which breaks the fat into tiny droplets (emulsification) for easier digestion.

Step 1 — Trace the path of bile: the liver makes bile, which is then stored before use.

Step 2 — Name the storage organ: bile is stored in the gall bladder.

Why each other option is wrong:

- (A) The pancreas makes pancreatic juice and insulin; it does not store bile.
- (C) The spleen stores and destroys blood cells; it has no role in bile storage.
- (D) The appendix is a small vestigial outgrowth of the large intestine.

Key point: Liver makes bile → gall bladder stores it → bile emulsifies fats in the small intestine.

Final Answer: Gall bladder ⇒

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



Q13.

Solution

Concept — Water absorption in the large intestine: After digestion and absorption of nutrients in the small intestine, the leftover watery material passes into the large intestine. Here most of the remaining water is absorbed back into the body, leaving behind semi-solid undigested waste (faeces) that is later removed.

Step 1 — Trace the canal: undigested food with water reaches the large intestine.

Step 2 — Identify the site: most water is absorbed in the large intestine.

Why each other option is wrong:

- (A) The stomach mainly stores and churns food; little water is absorbed there.
- (B) The oesophagus is just a food pipe that carries food to the stomach.
- (D) The mouth begins digestion of starch; it does not absorb water.

Key point: Most water is reabsorbed in the large intestine. If this fails, watery stool (diarrhoea) results and the body loses water.

Final Answer: Large intestine ⇒

[Go Back to Q13](#)

Q14.

Solution

Concept — The pulse: Each time the heart beats, the left ventricle pumps a spurt of blood into the arteries. This sudden push makes the artery wall expand and then return. The rhythmic expansion that can be felt where an artery lies near the skin (such as the wrist) is called the pulse, and its rate equals the heartbeat rate.

Step 1 — Identify the event: the throb felt in an artery with each heartbeat.

Step 2 — Name it: this is the pulse.

Why each other option is wrong:

- (B) A reflex is a quick automatic response to a stimulus, unrelated to the artery throb.
- (C) Clotting is the forming of a plug to stop bleeding.
- (D) Peristalsis is the wave-like contraction that moves food along the gut.

Key point: The pulse rate equals the heart rate (about 72 beats per minute in a



resting adult) and is felt where an artery runs close to the skin.

Final Answer: Pulse ⇒

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

Q15.

Solution

Concept — The ventricles: The human heart has four chambers: two upper atria that receive blood and two lower ventricles that pump it out. The ventricles have thick muscular walls because they must push blood with force, the right ventricle to the lungs and the left ventricle (the thickest) to the whole body.

Step 1 — Read the figure: the two lower chambers X and Y, below the atria, are the pumping chambers.

Step 2 — Name them: the two lower pumping chambers are the ventricles.

Why each other option is wrong:

- (A) The atria are the two *upper* chambers that receive blood, not the lower ones.
- (B) "Auricles" is another name for the atria (upper chambers), so it is wrong here.
- (C) Valves are flaps that prevent backflow of blood; they are not chambers.

Key point: Atria (upper) receive blood; ventricles (lower) pump it out. The left ventricle has the thickest wall as it pumps to the whole body.

Final Answer: Ventricles ⇒

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

Q16.

Solution

Concept — Bowman's capsule: Each nephron of the kidney begins with a double-walled, cup-shaped structure called Bowman's capsule. It surrounds a ball of capillaries (the glomerulus). Blood is filtered under pressure in the glomerulus, and the cup of Bowman's capsule collects this filtrate and passes it into the tubule that follows.

Step 1 — Read the figure: the cup wrapping around the ball of capillaries (G) is Bowman's capsule.



Step 2 — State its role: it collects the filtrate squeezed out of the blood.

Why each other option is wrong:

- (A) The ureter is the tube that carries urine from the kidney to the bladder.
- (C) The urinary bladder stores urine before it is passed out.
- (D) The collecting duct receives urine from many nephrons much later, after the filtrate has been processed.

Key point: Glomerulus + Bowman's capsule = the filtering unit (renal corpuscle) of the nephron; the cup collects the filtrate.

Final Answer: Bowman's capsule \Rightarrow

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

Q17.

Solution

Concept — The medulla oblongata: The medulla oblongata is the lowest part of the brain, lying just above and continuous with the spinal cord. It controls many vital involuntary actions such as breathing, heartbeat, blood pressure, swallowing, coughing, and vomiting. Damage to it can be fatal because these life functions stop.

Step 1 — Identify the clues: the part that connects to the spinal cord and controls breathing and heartbeat.

Step 2 — Name it: this is the medulla oblongata.

Why each other option is wrong:

- (B) The cerebrum controls thinking, memory, and voluntary actions, not automatic breathing.
- (C) The cerebellum controls balance and coordination of movement.
- (D) The hypothalamus controls body temperature, hunger, thirst, and links to the pituitary.

Key point: Medulla oblongata = control of involuntary vital functions (breathing, heartbeat) and the link to the spinal cord.

Final Answer: Medulla oblongata \Rightarrow

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



Q18.

Solution

Concept — The ball-and-socket joint: In a ball-and-socket joint the rounded head (ball) of one bone fits into the cup-shaped hollow (socket) of another. This design allows movement in all directions, that is, rotation and movement in many planes. The shoulder joint and the hip joint are the two main ball-and-socket joints in the body.

Step 1 — Read the figure: a rounded head fitting into a cup, exactly as described, is a ball-and-socket joint.

Step 2 — Match it: the joint allowing all-round movement (as at the shoulder) is the ball-and-socket joint.

Why each other option is wrong:

- (A) A hinge joint (knee, elbow) allows movement in only one plane, like a door.
- (B) A pivot joint (between the first two neck vertebrae) allows only rotation.
- (D) A fixed (immovable) joint, as in the skull bones, allows no movement at all.

Key point: Ball-and-socket = movement in all directions (shoulder, hip); hinge = one-plane movement (knee, elbow).

Final Answer: Ball-and-socket joint ⇒

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

Q19.

Solution

Concept — Adrenaline: Adrenaline (also called epinephrine) is secreted by the adrenal glands sitting on top of the kidneys. In moments of fear, anger, or danger it prepares the body for "fight or flight" by speeding up the heartbeat and breathing, raising blood sugar, and sending more blood to the muscles.

Step 1 — Identify the situation: a hormone for sudden emergencies (fight or flight).

Step 2 — Name it: this emergency hormone is adrenaline.

Why each other option is wrong:

- (A) Insulin lowers blood sugar; it is not an emergency hormone.



- (C) Thyroxine controls the general rate of metabolism, not the instant stress response.
- (D) Oestrogen is a female sex hormone controlling secondary sexual characters.

Key point: Adrenaline from the adrenal glands is the "fight-or-flight" hormone that gears the body up to face an emergency.

Final Answer: Adrenaline ⇒

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

Q20.

Solution

Concept — The testes: The testes are the paired male reproductive organs (gonads), held in a sac called the scrotum outside the body. They produce the male gametes, the sperms, and also secrete the male sex hormone testosterone, which brings about male secondary sexual characters.

Step 1 — Identify the ask: the male organs that produce sperm.

Step 2 — Name them: these are the testes.

Why each other option is wrong:

- (A) Ovaries are the *female* gonads that produce eggs, not sperm.
- (B) Kidneys are excretory organs and have no role in making sperm.
- (C) Prostate glands add fluid to the semen but do not produce sperm.

Key point: Testes make sperm and testosterone; they lie in the scrotum, which keeps them slightly cooler than body temperature for sperm formation.

Final Answer: Testes ⇒

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



Q21.

Solution

Concept — Cross-pollination: Pollination is the transfer of pollen grains from the anther to the stigma. When the pollen is carried to the stigma of a *different* flower of the same kind of plant, it is called cross-pollination. It is usually carried out by agents such as insects, wind, or water and increases variation in the offspring.

Step 1 — Read the figure: pollen from the anther of one flower is moving to the stigma of another flower.

Step 2 — Name the event: transfer between two different flowers is cross-pollination.

Why each other option is wrong:

- (B) Self-pollination is transfer of pollen to the stigma of the *same* flower (or same plant), not a different one.
- (C) Fertilisation is the fusion of male and female gametes, which happens *after* pollination.
- (D) Germination is the sprouting of a seed into a seedling, a later stage altogether.

Key point: Cross-pollination = pollen to a different flower (more variation); self-pollination = pollen to the same flower. Pollination precedes fertilisation.

Final Answer: Cross-pollination ⇒

[Go Back to Q21](#)

Q22.

Solution

Concept — Spore formation: In spore formation an organism produces large numbers of tiny, light reproductive bodies called spores, usually inside a sac. When the sac bursts, the spores are scattered by air or water, and each spore can grow into a new individual under suitable conditions. Fungi like *Rhizopus* and plants like ferns reproduce this way.

Step 1 — Identify the method: new individuals arise from spores in fungi and ferns.

Step 2 — Name it: this is spore formation.

Why each other option is wrong:



- (A) Budding is the growth of a small bud that detaches, as in yeast and *Hydra*.
- (B) Binary fission is the splitting of one parent into two, as in *Amoeba* and bacteria.
- (D) Regeneration is the regrowth of a whole organism from a body part, as in *Planaria*.

Key point: Spore formation produces many wind-borne spores from one parent; it is common in fungi, ferns, and mosses.

Final Answer: Spore formation \Rightarrow

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

Q23.

Solution

Concept — Full form of DNA: DNA stands for deoxyribonucleic acid. It is the hereditary material found in the chromosomes that carries genetic information from parents to offspring. The "deoxyribo" part refers to its sugar (deoxyribose), and it is a nucleic acid built of repeating nucleotide units.

Step 1 — Expand the abbreviation letter by letter: D for deoxyribo, N for nucleic, A for acid.

Step 2 — Combine: the full form is deoxyribonucleic acid.

Why each other option is wrong:

- (B) "Diribonucleic acid" is not a real term; the prefix is "deoxyribo", not "di".
- (C) "Dinitrogenous acid" is wrong; DNA is not named after nitrogen.
- (D) "Deoxyribose nitrate acid" is incorrect; DNA contains no nitrate group.

Key point: DNA = deoxyribonucleic acid; its close relative RNA = ribonucleic acid (which has the sugar ribose instead).

Final Answer: Deoxyribonucleic acid \Rightarrow

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



Q24.

Solution

Concept — Dominant trait: A trait controlled by a dominant allele shows itself even when only one copy is present. When Mendel crossed pure tall (TT) with pure dwarf (tt) pea plants, all F_1 plants were Tt and looked tall. Tall therefore masked dwarf, so tall is the dominant trait and dwarf is recessive.

Step 1 — Note the result: the trait that appears in every F_1 plant is the one that shows up.

Step 2 — Name it: the trait appearing in the F_1 generation is the dominant trait.

Why each other option is wrong:

- (A) The recessive trait is hidden in the F_1 and reappears only in the F_2 generation.
- (B) An acquired trait is gained during life and is not the inherited F_1 trait studied here.
- (C) A blended trait belongs to incomplete dominance; here tall fully masks dwarf, so it is not a blend.

Key point: In the F_1 of a Mendelian cross, only the dominant trait appears; the recessive trait stays hidden until F_2 .

Final Answer: Dominant trait \Rightarrow

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

Q25.

Solution

Concept — Incomplete dominance: In incomplete dominance neither of the two alleles is fully dominant over the other, so the hybrid (heterozygote) shows a new, in-between (blended) appearance. The classic example is the four o'clock plant (*Mirabilis jalapa*): a red-flowered plant crossed with a white-flowered one gives pink F_1 flowers.

Step 1 — Note the result: the hybrid is pink, a blend of red and white, not one parent's colour.

Step 2 — Name the condition: when neither allele is fully dominant and a blend appears, it is incomplete dominance.

Why each other option is wrong:



- (A) In complete dominance the hybrid looks exactly like the dominant parent, with no blend.
- (C) In co-dominance *both* alleles show fully and separately (e.g. AB blood group), not as a blend.
- (D) Multiple alleles means a gene has more than two forms in the population (e.g. blood groups); it does not describe this blending.

Key point: Incomplete dominance gives a blended (intermediate) hybrid; co-dominance shows both traits together side by side.

Final Answer: Incomplete dominance \Rightarrow

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

Q26.

Solution

Concept — Analogous organs: Analogous organs are organs that perform the *same function* but are built on a *different basic structure* and have a different origin. A bird's wing (made of bone and feathers) and an insect's wing (a thin membrane) both serve for flight but are structurally unlike, so they are analogous. They show convergent evolution.

Step 1 — Read the figure: two wings of very different build, both used for flying.

Step 2 — Name them: same function but different structure means analogous organs.

Why each other option is wrong:

- (A) Homologous organs have the *same basic structure* but may do different jobs (e.g. a human arm and a whale's flipper), the opposite of this case.
- (B) Vestigial organs are reduced, functionless remains (e.g. the human appendix).
- (D) "Fossil organs" is not a recognised category of comparison.

Key point: Analogous = same function, different structure (convergent evolution); homologous = same structure, different function (divergent evolution).

Final Answer: Analogous organs \Rightarrow

Answer: (C) [Go Back to Q26](#)



Q27.

Solution

Concept — Rabies: Rabies is a fatal disease of the nervous system caused by a virus (the rabies virus). It spreads to humans mainly through the bite of an infected dog, whose saliva carries the virus. Once symptoms appear it is almost always fatal, which is why anti-rabies vaccination after a dog bite is so important.

Step 1 — Identify the clues: a fatal disease caused by a virus and spread by a dog bite.

Step 2 — Name it: this disease is rabies.

Why each other option is wrong:

- (A) Malaria is caused by a protozoan (*Plasmodium*) and spread by a mosquito, not a dog bite.
- (B) Typhoid is a bacterial disease spread through contaminated food and water.
- (C) Tetanus is a bacterial disease entering through a deep wound, not a viral disease from a dog bite.

Key point: Rabies is a viral disease transmitted by the bite of an infected animal (usually a dog); prompt anti-rabies vaccination can prevent it.

Final Answer: Rabies ⇒

Answer: (D) [Go Back to Q27](#)

Q28.

Solution

Concept — Non-communicable diseases: Diseases are of two broad kinds. Communicable (infectious) diseases are caused by pathogens and spread from one person to another. Non-communicable diseases do *not* spread from person to person; they arise from causes such as faulty lifestyle, diet, genes, or organ malfunction. Diabetes, caused by faulty insulin control, is a non-communicable disease.

Step 1 — Note the key feature: diabetes does not pass from one person to another.

Step 2 — Classify it: a disease that does not spread between people is non-communicable.

Why each other option is wrong:



- (B) Communicable means it *does* spread between people, which is the opposite of diabetes.
- (C) Infectious also means it is caused by pathogens and spreads, again the opposite.
- (D) An epidemic is a sudden wide outbreak of a (usually communicable) disease, not a category for diabetes.

Key point: Non-communicable diseases (diabetes, cancer, high blood pressure) do not spread; communicable ones (cold, typhoid, malaria) do.

Final Answer: Non-communicable \Rightarrow

Answer: (A) [Go Back to Q28](#)

Q29.

Solution

Concept — Genetic engineering (biotechnology): Genetic engineering is the technique of changing the genes of an organism by inserting a desired gene from another organism. Bt cotton was made by transferring a gene from the bacterium *Bacillus thuringiensis* into cotton; this gene makes a protein toxic to certain insect pests, so the crop becomes pest-resistant.

Step 1 — Identify the technique: a bacterial gene is put into the cotton plant to make it pest-resistant.

Step 2 — Name it: transferring genes in this way is genetic engineering (biotechnology).

Why each other option is wrong:

- (A) Tissue culture grows many plants from a few cells but does not by itself insert a foreign gene.
- (C) Hybridisation crosses two varieties; it mixes whole genomes rather than inserting a single chosen gene.
- (D) Vaccination protects against disease and has nothing to do with making crops pest-resistant.

Key point: Bt cotton is a genetically engineered (transgenic) crop; genetic engineering moves a specific gene from one organism into another.

Final Answer: Genetic engineering (biotechnology) \Rightarrow

Answer: (B) [Go Back to Q29](#)



Q30.

Solution

Concept — The ozone layer: High in the stratosphere there is a layer rich in ozone gas (O_3). This ozone layer absorbs most of the Sun's harmful ultraviolet (UV) rays before they reach the Earth's surface, protecting living things from skin cancer and other damage. Certain chemicals (like CFCs) thin this layer, creating the "ozone hole".

Step 1 — Read the figure: the upper layer is stopping the incoming UV rays from reaching the Earth.

Step 2 — Name it: the layer that absorbs harmful ultraviolet rays is the ozone layer.

Why each other option is wrong:

- (A) A "carbon dioxide layer" traps heat (greenhouse effect); it does not shield us from UV rays.
- (B) Smog is harmful low-level pollution near the ground, not a protective UV shield.
- (D) Nitrogen is the most abundant gas in air but does not absorb the UV rays.

Key point: The ozone layer in the upper atmosphere shields life by absorbing harmful UV rays; CFCs damage it and cause the ozone hole.

Final Answer: Ozone layer \Rightarrow

[Go Back to Q30](#)



Answer Key

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

