

PGIMER BSc Nursing Biology

Sample Paper – 14

Duration: 23 Minutes

Maximum Marks: 25

Instructions

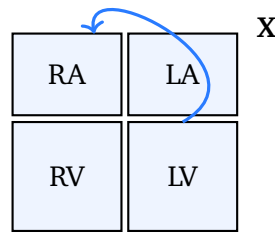
- This paper contains **25** Multiple Choice Questions (Single Correct Answer), modelled on the Biology portion of the **PGIMER BSc Nursing** entrance exam.
- Each correct answer carries **+1 mark**. **0.25 mark** is deducted for every incorrect answer. Unattempted questions carry **0 marks**.
- Only **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. Human beings show heterodont dentition, meaning the mouth has teeth of different shapes for different jobs. The chisel-edged front teeth that are used mainly for biting and cutting food are the:

- (A) Canines
- (B) Molars
- (C) Incisors
- (D) Premolars

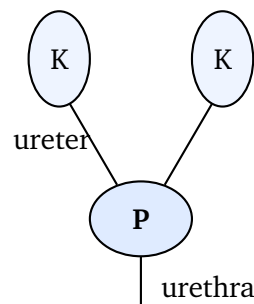
Q2. The diagram shows a schematic human heart. The large vessel labelled X arises from the left ventricle and carries oxygenated blood to the whole body. It is the largest artery of the body, the:





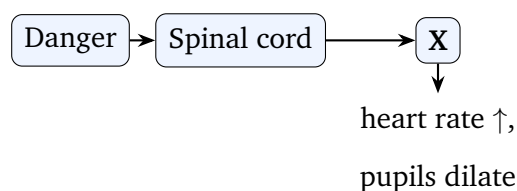
- (A) Pulmonary artery
- (B) Pulmonary vein
- (C) Superior vena cava
- (D) Aorta

Q3. The diagram shows the human excretory system. The muscular sac labelled **P**, which stores urine until it is expelled during micturition, is the:



- (A) Urinary bladder
- (B) Ureter
- (C) Kidney
- (D) Urethra

Q4. The flow diagram shows the body's response to a sudden threat. The part of the autonomic nervous system labelled **X**, which prepares the body for "fight or flight", is the:



- (A) Parasympathetic division
 - (B) Sympathetic division
 - (C) Somatic division
 - (D) Central nervous system
- Q5.** During normal inspiration in humans, the external intercostal muscles contract. As a result, the ribs and sternum move:
- (A) Downward and inward, decreasing the volume of the chest
 - (B) Without any change, since only the diaphragm moves
 - (C) Downward and inward, increasing the volume of the chest
 - (D) Upward and outward, increasing the volume of the chest
- Q6.** One endocrine gland is called the “master gland” because its hormones control the secretion of several other endocrine glands, such as the thyroid, adrenal cortex and gonads. This gland is the:
- (A) Pituitary gland
 - (B) Thyroid gland
 - (C) Adrenal gland
 - (D) Pancreas
- Q7.** In a monohybrid cross between two heterozygous tall pea plants ($Tt \times Tt$), the *genotypic* ratio of the F_2 generation (homozygous dominant : heterozygous : homozygous recessive) is:
- (A) 3 : 1
 - (B) 1 : 2 : 1
 - (C) 9 : 3 : 3 : 1
 - (D) 1 : 1
- Q8.** Albinism is a condition in which a person cannot make the pigment melanin, and it appears only when both alleles are defective. It is inherited as an:



- (A) X-linked dominant trait
- (B) Y-linked (holandric) trait
- (C) Autosomal recessive trait
- (D) Autosomal dominant trait

Q9. According to Chargaff's rule, in a double-stranded DNA molecule the amount of adenine equals thymine and the amount of guanine equals cytosine. If a DNA sample contains 30% adenine, the percentage of cytosine in it is:

- (A) 30%
- (B) 40%
- (C) 60%
- (D) 20%

Q10. During the Industrial Revolution in England, tree trunks became darkened with soot and the dark form of the peppered moth increased greatly in number, while the pale form declined. This change is a classic field example of:

- (A) Natural selection favouring the better-camouflaged moths
- (B) Deliberate artificial selection carried out by breeders
- (C) Inheritance of characters acquired by use and disuse
- (D) Spontaneous generation of dark moths from soot

Q11. The nucleus is bounded by a double membrane that is perforated by tiny openings. These openings regulate the exchange of materials, such as RNA and proteins, between the nucleus and the cytoplasm. This double membrane is the:

- (A) Cell wall
- (B) Nuclear envelope with nuclear pores
- (C) Plasma membrane

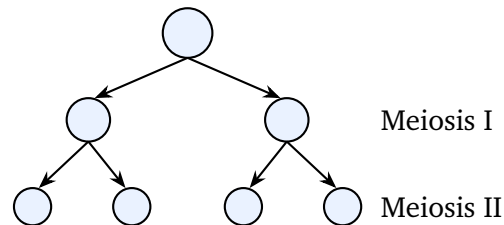


(D) Endoplasmic reticulum

Q12. Starch, glycogen and cellulose are large molecules made up of many glucose units joined together. Chemically, they are all classified as:

- (A) Monosaccharides
- (B) Proteins
- (C) Polysaccharides
- (D) Lipids

Q13. The figure traces the course of meiosis, starting from one parent cell. Based on the figure, meiosis is best described as:



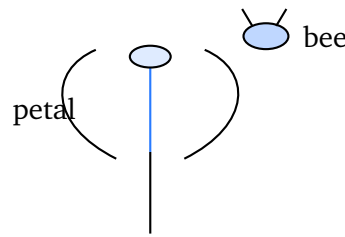
- (A) A single division that produces two daughter cells
- (B) Two successive divisions that produce four daughter cells
- (C) Three successive divisions that produce eight daughter cells
- (D) A single division that directly produces four daughter cells

Q14. A human somatic (body) cell containing 46 chromosomes divides by mitosis. Each of the two daughter cells produced will contain:

- (A) 46 chromosomes, the same number as the parent cell
- (B) 23 chromosomes, half the number of the parent cell
- (C) 92 chromosomes, double the number of the parent cell
- (D) 46 chromosomes in one cell and 23 in the other

Q15. The figure shows a bee visiting a brightly coloured, scented flower and picking up pollen grains on its body. The transfer of pollen by such insects is called:





- (A) Anemophily (pollination by wind)
- (B) Hydrophily (pollination by water)
- (C) Entomophily (pollination by insects)
- (D) Ornithophily (pollination by birds)

Q16. In human males, two hormones from the anterior pituitary act on the testis. FSH and LH stimulate the testis to carry out, respectively:

- (A) Milk secretion and uterine contraction
- (B) Water reabsorption and rise in metabolic rate
- (C) Growth of the uterus and release of the egg
- (D) Production of sperms and secretion of testosterone

Q17. Inside the mother's uterus, the developing foetus is cushioned against mechanical shocks by a fluid, and it receives nutrients and oxygen from the mother through a connecting cord. These two structures are, respectively, the:

- (A) Cerebrospinal fluid and the placenta
- (B) Lymph and the fallopian tube
- (C) Amniotic fluid and the ureter
- (D) Amniotic fluid and the umbilical cord

Q18. Photosynthesis is regarded as the most important biochemical process on Earth mainly because it:

- (A) Is the ultimate source of food and releases oxygen into the atmosphere



- (B) Breaks down glucose to release energy for the cell
- (C) Continuously removes oxygen from the air
- (D) Occurs only in the cells of animals

Q19. In a flowering plant, the absorption of water and dissolved mineral salts from the soil takes place mainly through the:

- (A) Guard cells of the leaves
- (B) Xylem vessels of the stem
- (C) Phloem tissue of the root
- (D) Root hairs of the roots

Q20. In the taxonomic hierarchy, the smallest and most basic unit of classification, made up of organisms that can interbreed among themselves to produce fertile offspring, is the:

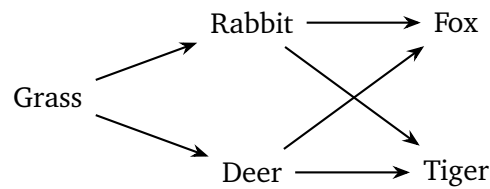
- (A) Genus
- (B) Family
- (C) Species
- (D) Kingdom

Q21. An animal with a soft, unsegmented body, a muscular foot for movement, and usually a hard calcareous shell (such as a snail) is placed in the phylum:

- (A) Arthropoda
- (B) Mollusca
- (C) Annelida
- (D) Echinodermata

Q22. The figure shows several food chains that share organisms and are inter-linked with one another in a grassland. Such a network of many inter-connected food chains is called a:





- (A) Single food chain
- (B) Trophic pyramid
- (C) Ecological succession
- (D) Food web

Q23. The gradual rise in the average temperature of the Earth's atmosphere, caused mainly by the increasing concentration of carbon dioxide and other greenhouse gases, is called:

- (A) Global warming
- (B) Eutrophication
- (C) Biomagnification
- (D) Ozone depletion

Q24. Which one of the following is a non-communicable (lifestyle) disease, that is, a disease which does not spread from one person to another?

- (A) Tuberculosis
- (B) Influenza
- (C) Diabetes mellitus
- (D) Cholera

Q25. Golden rice is a genetically modified variety of rice developed to fight a widespread nutritional deficiency in many populations. Its grains are enriched with beta-carotene, a precursor of:

- (A) Vitamin C
- (B) Vitamin A



(C) Iron

(D) Vitamin D



Detailed Solutions

Q1.

Solution

Concept — Heterodont dentition: Humans have four kinds of teeth of different shapes, each suited to a special task. This condition is called heterodont dentition.

Step 1 — List the four types and their jobs: Incisors are flat and chisel-edged for biting and cutting; canines are pointed for tearing; premolars and molars have broad grinding surfaces for crushing and chewing.

Step 2 — Match the description: The front, chisel-edged teeth used for biting and cutting food are the incisors.

Why other options are wrong:

- Option A (Canines): are pointed teeth used for tearing and holding, not for chisel-like cutting.
- Option B (Molars): are broad back teeth used for grinding food, not biting.
- Option D (Premolars): also help in grinding and crushing, not in cutting.

Final Answer: The chisel-edged biting and cutting teeth are the incisors ⇒ **C**

Answer: (C) **Go Back to Q1**

Q2.

Solution

Concept — Major blood vessels of the heart: Different vessels leave and enter the heart. The vessel that leaves the left ventricle to supply the whole body is the largest artery.

Step 1 — Trace the vessel from the left ventricle: The left ventricle pumps oxygenated blood out under high pressure. The vessel that carries this blood away from the left ventricle is the aorta.

Step 2 — Confirm from the figure: Vessel X in the diagram arises from the left ventricle and arches over to distribute blood to the body, which identifies it as the aorta, the largest artery of the body.

Why other options are wrong:

- Option A (Pulmonary artery): leaves the right ventricle and carries deoxygenated blood to the lungs.



- Option B (Pulmonary vein): brings oxygenated blood from the lungs into the left atrium; it is a vein, not an artery.
- Option C (Superior vena cava): a large vein that returns deoxygenated blood from the upper body to the right atrium.

Final Answer: The largest artery leaving the left ventricle is the aorta ⇒ D

Answer: (D) **Go Back to Q2**

Q3.

Solution

Concept — Organs of the excretory system: The urine formed in the kidneys travels down the ureters, is stored for a while, and is finally passed out through the urethra.

Step 1 — Identify the storage organ: The muscular sac that collects and holds urine until it is released is the urinary bladder.

Step 2 — Link to micturition: When the bladder is full, its wall contracts and the urine is expelled through the urethra, an act called micturition. The part **P** lying between the two ureters and the urethra is therefore the urinary bladder.

Why other options are wrong:

- Option B (Ureter): is only a narrow tube that carries urine from the kidney to the bladder; it does not store urine.
- Option C (Kidney): forms the urine by filtering blood; it is shown at the top of the figure, not at **P**.
- Option D (Urethra): is the final tube that carries urine out of the body, shown below the bladder.

Final Answer: The muscular sac that stores urine before micturition is the urinary bladder ⇒ A

Answer: (A) **Go Back to Q3**



Q4.

Solution

Concept — Divisions of the autonomic nervous system: The autonomic nervous system has two parts that work against each other: the sympathetic and the parasympathetic divisions.

Step 1 — Recall the role of each division: The sympathetic division prepares the body for emergency action (“fight or flight”), while the parasympathetic division calms the body and conserves energy (“rest and digest”).

Step 2 — Match the effects shown: The figure shows the heart rate rising and the pupils dilating in response to danger. These are exactly the changes brought about by the sympathetic division, so X is the sympathetic division.

Why other options are wrong:

- Option A (Parasympathetic division): slows the heart and constricts the pupils, the opposite of what is shown.
- Option C (Somatic division): controls voluntary skeletal muscles, not involuntary organs like the heart.
- Option D (Central nervous system): is the brain and spinal cord, not a division of the autonomic system.

Final Answer: The division that drives the “fight or flight” response is the sympathetic division ⇒ B

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

Q5.

Solution

Concept — Mechanism of breathing: Breathing depends on changing the volume of the chest cavity using the diaphragm and the intercostal muscles between the ribs.

Step 1 — Action of the external intercostal muscles: When the external intercostal muscles contract during inspiration, they pull the ribs and the sternum upward and outward.

Step 2 — Effect on chest volume: This upward and outward movement increases the volume of the thoracic cavity. The pressure inside the lungs falls below the outside air pressure, so air rushes in.

Why other options are wrong:



- Option A (Downward and inward, decreasing volume): describes expiration, when the muscles relax and air is pushed out.
- Option B (No rib movement): is wrong because the ribs clearly move during breathing; the diaphragm is not the only structure involved.
- Option C (Downward and inward, increasing volume): is self-contradictory, since moving the ribs inward would reduce, not raise, the chest volume.

Final Answer: In inspiration the ribs move upward and outward, increasing chest volume $\Rightarrow$

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

Q6.

Solution

Concept — The master endocrine gland: Some endocrine glands are controlled by hormones released from one central gland that oversees the others.

Step 1 — Identify the controlling gland: The pituitary gland, at the base of the brain, secretes many trophic hormones such as TSH, ACTH, FSH and LH.

Step 2 — Explain the control: These hormones act on the thyroid, adrenal cortex and gonads and stimulate them to release their own hormones. Because it directs several other glands, the pituitary is called the master gland.

Why other options are wrong:

- Option B (Thyroid gland): is itself controlled by the pituitary hormone TSH; it does not control the others.
- Option C (Adrenal gland): is stimulated by the pituitary hormone ACTH; it is not the master gland.
- Option D (Pancreas): controls blood sugar through insulin and glucagon but does not direct other endocrine glands.

Final Answer: The gland that controls several other endocrine glands is the pituitary $\Rightarrow$

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



Q7.

Solution

Concept — Genotypic ratio of a monohybrid cross: The genotypic ratio counts the combinations of alleles in the offspring, which is different from the phenotypic (appearance) ratio.

Step 1 — Set up the cross: Cross $Tt \times Tt$. Each parent forms two kinds of gametes, T and t.

Step 2 — Fill the Punnett square: Combining the gametes gives TT, Tt, Tt and tt.

Step 3 — Write the genotypic ratio: Grouping these gives one TT (homozygous dominant), two Tt (heterozygous) and one tt (homozygous recessive), a genotypic ratio of 1 : 2 : 1.

Why other options are wrong:

- Option A (3 : 1): is the phenotypic ratio (tall : dwarf), not the genotypic ratio.
- Option C (9 : 3 : 3 : 1): is the phenotypic ratio of a dihybrid cross.
- Option D (1 : 1): is the ratio obtained from a test cross ($Tt \times tt$).

Final Answer: The monohybrid F_2 genotypic ratio is 1 : 2 : 1 $\Rightarrow$ **B**

Answer: (B) **Go Back to Q7**

Q8.

Solution

Concept — Inheritance of albinism: Albinism is caused by a defective gene that cannot make the enzyme needed for melanin production.

Step 1 — Note the pattern of appearance: Albinism appears only when a person inherits two copies of the defective allele, one from each parent. A single normal allele is enough to prevent the condition.

Step 2 — Classify the trait: Because two defective alleles are needed and the gene is on a body (non-sex) chromosome, albinism is an autosomal recessive trait.

Why other options are wrong:

- Option A (X-linked dominant): would show a sex-linked, dominant pattern, which albinism does not.



- Option B (Y-linked): would pass only from father to son, but albinism affects both sexes equally.
- Option D (Autosomal dominant): would appear even with a single defective allele, but albinism needs two.

Final Answer: Albinism is inherited as an autosomal recessive trait $\Rightarrow$ **C**

Answer: (C) Go Back to Q8

Q9.

Solution

Concept — Chargaff's rule: In double-stranded DNA, adenine pairs with thymine and guanine pairs with cytosine, so their amounts are equal: $\%A = \%T$ and $\%G = \%C$.

Step 1 — Use the given adenine value: Given $\%A = 30$. By Chargaff's rule $\%T = \%A = 30$.

Step 2 — Find the total of G and C: The four bases add up to 100%, so $\%G + \%C = 100 - (\%A + \%T) = 100 - (30 + 30) = 40\%$.

Step 3 — Split G and C equally: Since $\%G = \%C$, each is half of 40%, giving $\%C = \frac{40}{2} = 20\%$.

Why other options are wrong:

- Option A (30%): is the value of adenine (and thymine), not cytosine.
- Option B (40%): is the combined total of guanine and cytosine, not cytosine alone.
- Option C (60%): is the combined total of adenine and thymine.

Final Answer: With 30% adenine, cytosine is 20% $\Rightarrow$ **D**

Answer: (D) Go Back to Q9



Q10.

Solution

Concept — Industrial melanism: The peppered moth exists in a pale form and a dark (melanic) form. Which form survives better depends on how well it is camouflaged from predatory birds.

Step 1 — Explain the change: Before industry, pale moths were well hidden on light, lichen-covered bark and survived better. After soot darkened the trunks, the dark moths were now better camouflaged and the pale ones were easily eaten.

Step 2 — Name the process: Birds acting as selective agents allowed the better-camouflaged (dark) moths to survive and reproduce more. This differential survival is natural selection.

Why other options are wrong:

- Option B (Artificial selection): needs a human breeder choosing the parents, but here birds and the environment did the selecting.
- Option C (Use and disuse): is Lamarck's discarded idea; wing colour is not changed by use.
- Option D (Spontaneous generation): wrongly suggests moths arise from soot, which is biologically impossible.

Final Answer: The spread of the dark peppered moth is an example of natural selection ⇒

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

Q11.

Solution

Concept — Boundary of the nucleus: The nucleus is separated from the cytoplasm by a special double-layered membrane that controls what goes in and out.

Step 1 — Identify the structure: The nucleus is surrounded by a double membrane called the nuclear envelope.

Step 2 — Explain the pores: The nuclear envelope is dotted with tiny openings called nuclear pores. These pores allow selected molecules, such as messenger RNA leaving and proteins entering, to move between the nucleus and the cytoplasm.

Why other options are wrong:



- Option A (Cell wall): is a rigid outer covering found in plant cells, not the boundary of the nucleus.
- Option C (Plasma membrane): surrounds the whole cell, not the nucleus.
- Option D (Endoplasmic reticulum): is a network of tubes in the cytoplasm for transport and synthesis, not the nuclear boundary.

Final Answer: The pore-bearing double membrane around the nucleus is the nuclear envelope $\Rightarrow$ **B**

Answer: (B) **Go Back to Q11**

Q12.

Solution

Concept — Classes of carbohydrates: Carbohydrates are grouped by size into monosaccharides, disaccharides and polysaccharides.

Step 1 — Recall what a polysaccharide is: A polysaccharide is a very large carbohydrate made of many monosaccharide (sugar) units joined together in long chains.

Step 2 — Apply to the examples: Starch (storage in plants), glycogen (storage in animals) and cellulose (structural in plant cell walls) are all long chains of glucose units, so they are polysaccharides.

Why other options are wrong:

- Option A (Monosaccharides): are single sugar units like glucose, not large chains.
- Option B (Proteins): are polymers of amino acids, not of glucose.
- Option D (Lipids): are fats and oils made of fatty acids and glycerol, not sugar chains.

Final Answer: Starch, glycogen and cellulose are polysaccharides $\Rightarrow$ **C**

Answer: (C) **Go Back to Q12**



Q13.

Solution

Concept — Nature of meiosis: Meiosis is a special cell division that occurs during the formation of gametes and reduces the chromosome number.

Step 1 — Read the figure: One parent cell first divides into two cells (Meiosis I), and then each of these divides again into two (Meiosis II), giving four cells in all.

Step 2 — Describe meiosis: Meiosis therefore consists of two successive divisions, Meiosis I followed by Meiosis II, which together produce four daughter cells from a single parent cell.

Why other options are wrong:

- Option A (One division, two cells): describes mitosis, not meiosis.
- Option C (Three divisions, eight cells): meiosis has only two divisions, not three.
- Option D (One division, four cells): four cells cannot form from a single division; two divisions are needed.

Final Answer: Meiosis is two successive divisions giving four daughter cells $\Rightarrow$ **B**

Answer: (B) **Go Back to Q13**

Q14.

Solution

Concept — Chromosome number in mitosis: Mitosis is the division of body (somatic) cells and it keeps the chromosome number unchanged.

Step 1 — Recall what happens to the DNA: Before mitosis, each chromosome is copied. During division the two copies (sister chromatids) are shared equally, one to each daughter cell.

Step 2 — Apply to the human cell: A human body cell has 46 chromosomes. After mitosis, each of the two daughter cells also receives 46 chromosomes, exactly the same number as the parent cell.

Why other options are wrong:

- Option B (23 chromosomes): is the haploid number produced by meiosis, not mitosis.
- Option C (92 chromosomes): mitosis does not double the final number in the daughter cells.



- Option D (Unequal 46 and 23): mitosis shares chromosomes equally, so both cells get the same number.

Final Answer: Mitosis conserves the number, giving each daughter cell 46 chromosomes $\Rightarrow$ **A**

Answer: (A) **Go Back to Q14**

Q15.

Solution

Concept — Agents of pollination: Pollination is the transfer of pollen from the anther to the stigma, and it can be carried out by different agents. Each agent has its own name.

Step 1 — Read the figure: The figure shows a bee, an insect, visiting a brightly coloured and scented flower and carrying pollen on its body.

Step 2 — Name the process: When insects such as bees carry pollen from one flower to another, the process is called entomophily (insect pollination). Bright colour, scent and nectar are typical features of insect-pollinated flowers.

Why other options are wrong:

- Option A (Anemophily): is pollination by wind, seen in flowers that are small, dull and without scent.
- Option B (Hydrophily): is pollination by water, found in some aquatic plants.
- Option D (Ornithophily): is pollination by birds, not by insects.

Final Answer: Pollination by insects such as a bee is entomophily $\Rightarrow$ **C**

Answer: (C) **Go Back to Q15**

Q16.

Solution

Concept — Pituitary control of the testis: Two gonadotropic hormones from the anterior pituitary, FSH and LH, regulate the two main functions of the testis.

Step 1 — Action of FSH: Follicle stimulating hormone (FSH) acts on the Sertoli cells and supports spermatogenesis, the production of sperms.

Step 2 — Action of LH: Luteinising hormone (LH) acts on the Leydig (interstitial) cells and stimulates them to secrete the male hormone testosterone.



Why other options are wrong:

- Option A (Milk secretion and uterine contraction): are the effects of prolactin and oxytocin in females, not of FSH and LH on the testis.
- Option B (Water reabsorption and metabolic rate): are controlled by ADH and thyroxine, unrelated to the testis.
- Option C (Uterine growth and egg release): are female functions and do not occur in the male testis.

Final Answer: FSH drives sperm production and LH drives testosterone secretion

⇒

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

Q17.

Solution

Concept — Protection and nourishment of the foetus: The foetus developing in the uterus is both cushioned by a fluid and supplied by a connecting cord.

Step 1 — Identify the protective fluid: The foetus floats in a fluid held within the amniotic sac. This amniotic fluid absorbs shocks and protects the foetus from mechanical injury.

Step 2 — Identify the connecting structure: Nutrients and oxygen pass from the mother to the foetus through the umbilical cord, which links the foetus to the placenta.

Why other options are wrong:

- Option A (Cerebrospinal fluid and placenta): cerebrospinal fluid surrounds the brain and spinal cord, not the foetus.
- Option B (Lymph and fallopian tube): lymph does not cushion the foetus, and the fallopian tube is the site of fertilisation, not of foetal nourishment.
- Option C (Amniotic fluid and ureter): the fluid is correct, but the ureter carries urine and has no role in feeding the foetus.

Final Answer: The foetus is cushioned by amniotic fluid and fed through the umbilical cord ⇒

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



Q18.

Solution

Concept — Significance of photosynthesis: Photosynthesis is the process by which green plants make their own food using sunlight, and it also affects the whole living world.

Step 1 — Food for all life: Green plants build glucose during photosynthesis. All other organisms depend, directly or indirectly, on this food, so plants are the ultimate source of food for the living world.

Step 2 — Supply of oxygen: Photosynthesis releases oxygen into the atmosphere as a by-product. This oxygen is used by living organisms for respiration.

Why other options are wrong:

- Option B (Breaks down glucose for energy): that describes respiration, which is the reverse of photosynthesis.
- Option C (Removes oxygen from the air): photosynthesis adds oxygen to the air; it does not remove it.
- Option D (Occurs only in animals): photosynthesis occurs in green plants and some other autotrophs, not in animals.

Final Answer: Photosynthesis is vital because it is the source of food and of atmospheric oxygen ⇒ **A**

Answer: (A) **Go Back to Q18**

Q19.

Solution

Concept — Absorption of water in plants: Plants take up water and dissolved minerals from the soil through a specialised region of the root.

Step 1 — Identify the absorbing structures: The root tips bear countless fine, hair-like outgrowths called root hairs.

Step 2 — Explain their role: Root hairs greatly increase the surface area of the root in contact with the soil, and it is through them that most water and mineral salts are absorbed by osmosis and active uptake.

Why other options are wrong:

- Option A (Guard cells of leaves): control the opening and closing of stomata for gas exchange, not water absorption from soil.



- Option B (Xylem vessels of the stem): conduct the absorbed water upward but do not absorb it from the soil.
- Option C (Phloem of the root): transports food, not water and minerals from the soil.

Final Answer: Water and minerals are absorbed mainly through the root hairs ⇒

D

Answer: (D) **Go Back to Q19**

Q20.

Solution

Concept — The taxonomic hierarchy: Organisms are classified in a series of ranks, from the largest group (kingdom) down to the smallest (species).

Step 1 — Recall the order of ranks: The main ranks in order are kingdom, phylum, class, order, family, genus and species.

Step 2 — Identify the basic unit: The species is the smallest unit. It is a group of organisms so similar that they can interbreed among themselves to produce fertile offspring, so it is the basic unit of classification.

Why other options are wrong:

- Option A (Genus): is a group of closely related species; it is larger than a species.
- Option B (Family): is a still larger group made of related genera.
- Option D (Kingdom): is the largest and most general rank, not the basic unit.

Final Answer: The basic unit of classification is the species ⇒ **C**

Answer: (C) **Go Back to Q20**



Q21.

Solution

Concept — Phylum Mollusca: Animals are placed in phyla according to their body plan. Molluscs have a characteristic soft body and a muscular foot.

Step 1 — List the features of Mollusca: Molluscs have a soft, unsegmented body, a muscular foot used for movement, and most of them secrete a hard calcareous shell for protection.

Step 2 — Match the example: A snail has a soft body, a muscular foot and a coiled shell, so it fits the phylum Mollusca.

Why other options are wrong:

- Option A (Arthropoda): have a jointed, segmented body with a hard external skeleton and jointed legs, such as insects.
- Option C (Annelida): have a long body divided into many ring-like segments, such as the earthworm.
- Option D (Echinodermata): have a spiny skin and a water-vascular system, such as the starfish, and lack a muscular foot.

Final Answer: A soft-bodied animal with a muscular foot and shell belongs to Mollusca ⇒ **B**

Answer: (B) **Go Back to Q21**

Q22.

Solution

Concept — Food chains and food webs: A food chain is a single straight-line pathway of energy from one organism to the next, but in nature many such chains are interconnected.

Step 1 — Read the figure: The figure shows grass feeding both a rabbit and a deer, and these in turn are eaten by more than one predator (fox and tiger). The arrows cross and share organisms.

Step 2 — Name the network: When several food chains are interlinked and share organisms in this way, the whole network is called a food web.

Why other options are wrong:

- Option A (Single food chain): is only one straight pathway, but the figure shows many interlinked pathways.



- Option B (Trophic pyramid): is a diagram of the numbers, biomass or energy at each level, not a network of chains.
- Option C (Ecological succession): is the gradual change of a community over time, not a feeding network.

Final Answer: Many interlinked food chains together form a food web ⇒ D

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

Q23.

Solution

Concept — Greenhouse effect and global warming: Certain gases in the atmosphere trap heat radiated from the Earth's surface, and rising levels of these gases raise the planet's temperature.

Step 1 — Identify the cause: Carbon dioxide, along with methane and other greenhouse gases, is increasing due to the burning of fossil fuels and deforestation. These gases trap more of the Earth's heat.

Step 2 — Name the effect: The resulting steady rise in the average temperature of the atmosphere is called global warming.

Why other options are wrong:

- Option B (Eutrophication): is the over-enrichment of water bodies with nutrients, causing algal blooms, not atmospheric warming.
- Option C (Biomagnification): is the increasing concentration of toxins along a food chain, unrelated to temperature.
- Option D (Ozone depletion): is the thinning of the ozone layer by CFCs, a different problem from CO₂-driven warming.

Final Answer: The CO₂-driven rise in atmospheric temperature is global warming ⇒ A

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



Q24.

Solution

Concept — Communicable versus non-communicable diseases: Communicable diseases spread from person to person through germs, while non-communicable (lifestyle) diseases do not spread and arise from internal or lifestyle factors.

Step 1 — Test each disease for spread: Tuberculosis, influenza and cholera are all caused by microorganisms (bacteria or viruses) that pass from one person to another, so they are communicable.

Step 2 — Find the odd one out: Diabetes mellitus results from faulty insulin production or action; it is linked to genetics and lifestyle and does not spread from one person to another, making it a non-communicable disease.

Why other options are wrong:

- Option A (Tuberculosis): is a communicable bacterial disease spread through the air.
- Option B (Influenza): is a communicable viral disease spread by droplets.
- Option D (Cholera): is a communicable disease spread through contaminated water and food.

Final Answer: The non-communicable (lifestyle) disease is diabetes mellitus ⇒

C

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

Q25.

Solution

Concept — Golden rice and biofortification: Golden rice is a genetically engineered crop designed to add a missing nutrient to the staple diet, a strategy called biofortification.

Step 1 — Recall what golden rice contains: The grains of golden rice are engineered to accumulate beta-carotene, which gives them a golden colour.

Step 2 — Link to the vitamin: Beta-carotene is converted in the human body into vitamin A. Golden rice was therefore developed to combat vitamin A deficiency, which causes blindness in many children.

Why other options are wrong:



- Option A (Vitamin C): is found in citrus fruits and is not the nutrient added to golden rice.
- Option C (Iron): is a mineral targeted by other biofortified crops, not the beta-carotene of golden rice.
- Option D (Vitamin D): is made in the skin in sunlight and is not the aim of golden rice.

Final Answer: Golden rice is enriched with beta-carotene, a precursor of vitamin A $\Rightarrow$

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



Answer Key

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

