PGIMER BSc Nursing Biology

Sample Paper – 4

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. The enzyme that is secreted by the pancreas and digests proteins into smaller peptides in the small intestine is:

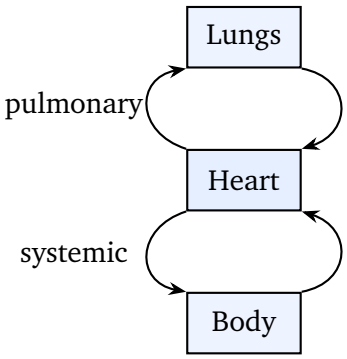
(A) Salivary amylase

(B) Pepsin

(C) Trypsin

(D) Lipase

Q2. The diagram traces the flow of blood in humans. Because the blood passes twice through the heart to complete one full round of the body (once through the lungs and once through the body), this pattern of circulation is called:



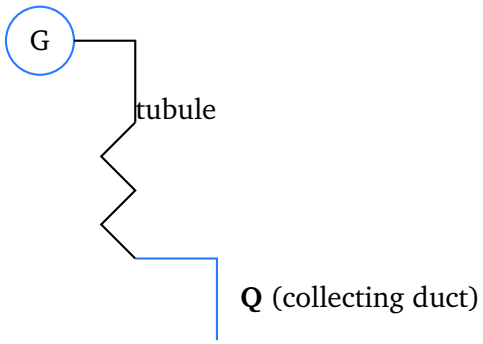
(A) Double circulation

(B) Single circulation

(C) Open circulation

(D) Incomplete circulation

Q3. The diagram shows a nephron whose collecting duct is labelled **Q**. The hormone that acts on **Q** to increase the reabsorption of water and make the urine concentrated is:



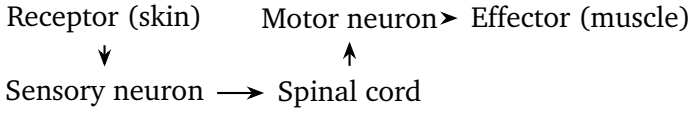
(A) Insulin

(B) Adrenaline

(C) Thyroxine

(D) ADH (vasopressin)

Q4. The diagram shows the pathway followed during a reflex action. The correct sequence of the reflex arc, from the stimulus to the response, is:



(A) Effector → motor neuron → spinal cord → sensory neuron → receptor

(B) Receptor → sensory neuron → spinal cord → motor neuron → effector

(C) Receptor → motor neuron → brain → sensory neuron → muscle

(D) Sensory neuron → receptor → effector → motor neuron → spinal cord

Q5. In human blood, most of the oxygen is carried from the lungs to the body tissues in the form of:

(A) Oxyhaemoglobin

(B) Carbaminohaemoglobin

(C) Bicarbonate ions

(D) Oxygen gas dissolved in plasma

Q6. A deficiency of a certain hormone during childhood leads to stunted growth of the body, a condition called dwarfism. This hormone is secreted by the pituitary gland and is the:

(A) Thyroxine

(B) Insulin

(C) Growth hormone

(D) Adrenaline

Q7. The law which states that the two alleles of a character separate during the formation of gametes, so that each gamete receives only one allele of the pair, is Mendel's:

(A) Law of dominance

(B) Law of segregation

(C) Law of independent assortment

(D) Law of unit characters

Q8. In human beings the mother is always XX and the father is XY. A child will be a girl (XX) when the egg is fertilised by a sperm that carries:

(A) A Y chromosome

(B) Both an X and a Y chromosome

(C) No sex chromosome at all

(D) An X chromosome

Q9. The process in which the genetic message carried by a strand of DNA is copied into a molecule of messenger RNA is called:

(A) Replication

(B) Transcription

(C) Transduction

(D) Duplication

Q10. According to Charles Darwin, the process by which organisms better adapted to their environment tend to survive, reproduce and pass on their favourable traits (survival of the fittest) is called:

(A) Natural selection

(B) Inheritance of acquired characters

(C) Artificial selection

(D) Use and disuse of organs

Q11. The cell organelle that receives materials from the endoplasmic reticulum, modifies and packages them into vesicles, and then secretes them out of the cell is the:

(A) Mitochondrion

(B) Ribosome

(C) Golgi apparatus

(D) Nucleolus

Q12. The plasma membrane is described by the fluid-mosaic model and allows only certain substances to move in or out of the cell. This property of the plasma membrane is best described as:

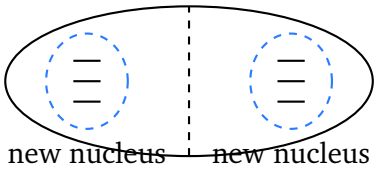
(A) Fully permeable to everything

(B) Completely impermeable

(C) Freely permeable to all ions

(D) Selectively permeable

Q13. The figure shows a stage of mitosis in which the two groups of chromosomes have reached the opposite poles and new nuclear envelopes (dashed) are reforming around them. This stage is:



(A) Telophase

(B) Anaphase

(C) Metaphase

(D) Prophase

Q14. A cell that contains two complete sets of chromosomes, one set inherited from each parent (represented as 2n), is described as:

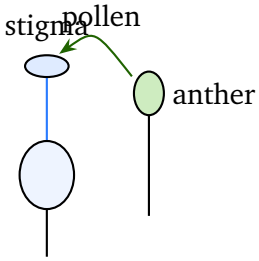
(A) Haploid

(B) Tetraploid

(C) Diploid

(D) Monoploid

Q15. The figure shows the transfer of pollen grains from the anther to the stigma of a flower, indicated by the arrow. This transfer of pollen is called:



(A) Fertilisation

(B) Pollination

(C) Germination

(D) Fragmentation

Q16. In the human male reproductive system, the long coiled tube lying over each testis in which sperms are stored and become mature and motile is the:

(A) Vas deferens

(B) Seminiferous tubule

(C) Prostate gland

(D) Epididymis

Q17. In human females, the fusion of the sperm with the egg (fertilisation) normally takes place in the:

(A) Uterus

(B) Ovary

(C) Fallopian tube (oviduct)

(D) Vagina

Q18. The dark reaction of photosynthesis, in which carbon dioxide is fixed and reduced to form sugars inside the stroma of the chloroplast, is known as the:

(A) Calvin cycle

(B) Krebs cycle

(C) Light reaction

(D) Glycolysis

Q19. The positive pressure that develops in the roots because of the active absorption of water and helps to push water a short distance up the xylem is called:

(A) Transpiration pull

(B) Root pressure

(C) Turgor pressure

(D) Osmotic pressure of the soil

Q20. The system of naming each organism with two Latin words, the first indicating the genus and the second the species, was introduced by Carolus Linnaeus. This system is called:

(A) Vernacular naming

(B) Polynomial naming

(C) Common naming

(D) Binomial nomenclature

Q21. Flowering plants (angiosperms) are divided into two classes on the basis of the number of cotyledons present in their seeds. A plant whose seed has only a single cotyledon is called a:

(A) Dicot with two cotyledons

(B) Gymnosperm

(C) Monocot

(D) Pteridophyte

Q22. The figure shows a simple food chain. The organism at the base, labelled **P**, which prepares its own food by photosynthesis (the autotroph or producer), is the:

P → Grasshopper → Frog → Snake

(A) Green grass

(B) Grasshopper

(C) Frog

(D) Snake

Q23. A graphical representation that shows the number, biomass or energy of the organisms present at each successive trophic level of an ecosystem, and is usually broad at the base, is called:

(A) Food web

(B) Ecological pyramid

(C) Food chain

(D) Biosphere

Q24. Antibodies are protein molecules that defend the body by binding specifically to antigens. In the human body, these antibodies (immunoglobulins) are produced by:

(A) Red blood cells

(B) Blood platelets

(C) Liver cells

(D) Lymphocytes (a type of white blood cell)

Q25. The laboratory technique used in biotechnology to make millions of copies of a specific segment of DNA within a short time is:

(A) Gel electrophoresis

(B) DNA ligation

(C) Polymerase chain reaction (PCR)

(D) DNA fingerprinting

Detailed Solutions

Q1.

Solution

Concept — Protein digestion by the pancreas: The pancreas pours its digestive juice (pancreatic juice) into the small intestine, where it acts on partly digested food.

Step 1 — Identify the protein-digesting enzyme: Pancreatic juice contains trypsin (secreted as inactive trypsinogen and activated in the intestine).

Step 2 — Identify its action: Trypsin breaks down proteins and large peptides into smaller peptides in the small intestine.

Why other options are wrong:

- Option A (Salivary amylase): acts on starch in the mouth, not on proteins.
- Option B (Pepsin): digests proteins, but in the acidic stomach, not from the pancreas.
- Option D (Lipase): digests fats, not proteins.

Final Answer: The pancreatic protein-digesting enzyme in the small intestine is trypsin $\Rightarrow$ C

Answer: (C) Go Back to Q1

Q2.

Solution

Concept — Circulation in humans: The route taken by blood around the body decides the type of circulation an animal has.

Step 1 — Trace the two loops: In the diagram, blood goes Heart $\rightarrow$ Lungs $\rightarrow$ Heart (pulmonary loop) and Heart $\rightarrow$ Body $\rightarrow$ Heart (systemic loop).

Step 2 — Count the passes through the heart: Blood passes through the heart twice to complete one full round of the body, so this is called double circulation.

Why other options are wrong:

- Option B (Single circulation): blood passes through the heart only once per cycle, as in fishes.
- Option C (Open circulation): blood flows through open spaces (sinuses), as in insects, not closed vessels.

- Option D (Incomplete circulation): not a recognised type of circulation.

Final Answer: Blood passing twice through the heart per cycle is double circulation $\Rightarrow$ A

Answer: (A) Go Back to Q2

Q3.

Solution

Concept — Hormonal control of water reabsorption: The final adjustment of water in urine happens in the collecting duct of the nephron and is under hormonal control.

Step 1 — Identify the labelled part: Part **Q** in the figure is the collecting duct, through which the tubular fluid passes before leaving as urine.

Step 2 — Identify the controlling hormone: Antidiuretic hormone (ADH), also called vasopressin, from the posterior pituitary makes the walls of the collecting duct more permeable, so more water is reabsorbed and the urine becomes concentrated.

Why other options are wrong:

- Option A (Insulin): lowers blood glucose; it has no role in water reabsorption.
- Option B (Adrenaline): the emergency hormone, prepares the body for stress.
- Option C (Thyroxine): controls the overall metabolic rate.

Final Answer: Water reabsorption in the collecting duct is controlled by ADH (vasopressin) $\Rightarrow$ D

Answer: (D) Go Back to Q3

Q4.

Solution

Concept — The reflex arc: A reflex action is a quick, automatic response to a stimulus, carried out along a fixed nerve pathway called the reflex arc.

Step 1 — List the components in order: The stimulus is picked up by a receptor, carried by a sensory (afferent) neuron to the spinal cord, where it passes to a motor (efferent) neuron.

Step 2 — Complete the pathway: The motor neuron carries the impulse to the effector (a muscle or gland), which gives the response. So the order is receptor $\rightarrow$ sensory neuron $\rightarrow$ spinal cord $\rightarrow$ motor neuron $\rightarrow$ effector.

Why other options are wrong:

- Option A: reverses the whole pathway, running from effector back to receptor.
- Option C: wrongly places the motor neuron before the spinal cord and routes it through the brain.
- Option D: starts with the sensory neuron before the receptor, which is impossible.

Final Answer: The reflex arc runs receptor $\rightarrow$ sensory neuron $\rightarrow$ spinal cord $\rightarrow$ motor neuron $\rightarrow$ effector $\Rightarrow \boxed{\text{B}}$

Answer: (B) Go Back to Q4

Q5.

Solution

Concept — Transport of oxygen in blood: Oxygen taken in at the lungs must be carried to every tissue, and the red pigment of blood does most of this work.

Step 1 — Identify the carrier: Red blood cells contain haemoglobin, an iron-containing pigment.

Step 2 — Form of transport: In the lungs, oxygen combines loosely with haemoglobin to form oxyhaemoglobin, and about 97% of oxygen is carried in this form to the tissues.

Why other options are wrong:

- Option B (Carbaminohaemoglobin): is haemoglobin combined with carbon dioxide, not oxygen.

- Option C (Bicarbonate ions): are the main form in which carbon dioxide, not oxygen, is carried.
- Option D (Dissolved in plasma): only a very small fraction of oxygen (about 3%) travels this way.

Final Answer: Oxygen is mainly transported as oxyhaemoglobin $\Rightarrow$ $\boxed{A}$

Answer: (A) Go Back to Q5

Q6.

Solution

Concept — Pituitary control of body growth: The pituitary gland (the master gland) secretes several hormones, one of which controls the growth of the whole body.

Step 1 — Identify the growth-controlling hormone: Growth hormone (somatotropin) from the anterior pituitary regulates the growth of bones and muscles.

Step 2 — Link deficiency to the disorder: If growth hormone is deficient in childhood, the body remains small and short, a condition called dwarfism (its excess causes gigantism).

Why other options are wrong:

- Option A (Thyroxine): its lack in children causes cretinism, and in adults it slows metabolism, but it is not the pituitary growth hormone.
- Option B (Insulin): controls blood glucose, not body growth.
- Option D (Adrenaline): the emergency hormone from the adrenal medulla.

Final Answer: Deficiency of pituitary growth hormone causes dwarfism $\Rightarrow$ $\boxed{C}$

Answer: (C) Go Back to Q6

Q7.

Solution

Concept — Mendel's laws of inheritance: Mendel proposed three principles to explain how traits are passed to offspring.

Step 1 — Focus on gamete formation: During the formation of gametes, the two alleles of a gene present in a parent separate from each other.

Step 2 — State the law: Because each gamete then carries only one allele (its

gametes remain pure for that trait), this is the law of segregation, also called the law of purity of gametes.

Why other options are wrong:

- Option A (Law of dominance): explains why one allele masks the other in the F_1, not the separation of alleles.
- Option C (Law of independent assortment): deals with two different gene pairs assorting independently.
- Option D (Law of unit characters): is not one of Mendel's stated laws of allele separation.

Final Answer: Separation of alleles keeping gametes pure is the law of segregation $\Rightarrow$ B

Answer: (B) Go Back to Q7

Q8.

Solution

Concept — Sex determination in humans: Sex is decided by the sex chromosomes; females are XX and males are XY.

Step 1 — Look at the gametes: The mother (XX) forms eggs that all carry an X chromosome. The father (XY) forms two kinds of sperm, half carrying X and half carrying Y.

Step 2 — Work out a girl child: If an X-bearing sperm fertilises the egg, the child is XX, that is, a girl. So the sperm must carry an X chromosome.

Why other options are wrong:

- Option A (Y chromosome): an X egg plus a Y sperm gives XY, a boy.
- Option B (Both X and Y): a normal sperm carries only one sex chromosome, not both.
- Option C (No sex chromosome): a normal human sperm always carries one sex chromosome.

Final Answer: A girl (XX) results when the sperm carries an X chromosome $\Rightarrow$ D

Answer: (D) Go Back to Q8

Q9.

Solution

Concept — Flow of genetic information: The message stored in DNA is first copied into RNA before it can be used to make proteins.

Step 1 — Name the copying step: The process in which one strand of DNA acts as a template and its sequence is copied into a complementary strand of messenger RNA is called transcription.

Step 2 — State the product: The product of transcription is an mRNA molecule that carries the coded message out of the nucleus to the ribosomes.

Why other options are wrong:

- Option A (Replication): makes an exact DNA copy from DNA, not RNA.
- Option C (Transduction): the transfer of genes from one bacterium to another by a virus.
- Option D (Duplication): a general term for doubling, not the specific DNA-to-mRNA step.

Final Answer: Copying of DNA into mRNA is transcription $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q9

Q10.

Solution

Concept — Darwin's theory of evolution: Charles Darwin explained how species change over time through a natural process acting on inherited variations.

Step 1 — Recall the mechanism: Individuals vary; those with variations that suit the environment survive better and leave more offspring.

Step 2 — Name the process: Nature, in effect, selects the fittest individuals to reproduce, and their favourable traits become common. Darwin called this natural selection, summed up as survival of the fittest.

Why other options are wrong:

- Option B (Inheritance of acquired characters): is Lamarck's idea, not Darwin's.
- Option C (Artificial selection): is selection done by humans, as in breeding, not by nature.
- Option D (Use and disuse of organs): again a part of Lamarck's theory.

Final Answer: Survival of the fittest by nature is Darwin's natural selection $\Rightarrow$ A

Answer: (A) Go Back to Q10

Q11.

Solution

Concept — Functions of cell organelles: Different organelles share the work of the cell, and one of them specialises in packaging and secretion.

Step 1 — Identify the packaging organelle: The Golgi apparatus is a stack of flattened sacs that receives materials from the endoplasmic reticulum.

Step 2 — Describe its role: It modifies, sorts and packs these materials into vesicles, which are then secreted from the cell, so it acts like the cell's post office.

Why other options are wrong:

- Option A (Mitochondrion): releases energy as ATP; it does not package secretions.
- Option B (Ribosome): is the site of protein synthesis only.
- Option D (Nucleolus): makes ribosomes inside the nucleus; it does not secrete materials.

Final Answer: The organelle that packages and secretes materials is the Golgi apparatus $\Rightarrow$ C

Answer: (C) Go Back to Q11

Q12.

Solution

Concept — Nature of the plasma membrane: The outer boundary of the cell is not a solid wall but a dynamic layer that controls what enters and leaves.

Step 1 — Recall its structure: The plasma membrane is made of a lipid bilayer with proteins floating in it, described by the fluid-mosaic model.

Step 2 — Recall its permeability: It allows only certain molecules to pass through while stopping others, so it is said to be selectively (semi) permeable.

Why other options are wrong:

- Option A (Fully permeable): would let everything through, which is not true of a living membrane.

- Option B (Completely impermeable): would stop even essential nutrients, killing the cell.
- Option C (Freely permeable to all ions): the membrane actually regulates ion movement carefully.

Final Answer: The plasma membrane is selectively permeable $\Rightarrow$ D

Answer: (D) Go Back to Q12

Q13.

Solution

Concept — Stages of mitosis: Mitosis passes through prophase, metaphase, anaphase and telophase, each recognised by the state of the chromosomes.

Step 1 — Read the figure: The two sets of chromosomes have already reached the opposite poles, and dashed nuclear envelopes are forming around each set.

Step 2 — Match the stage: Reformation of the nuclear envelopes at the poles, along with the start of cell cleavage, is the defining feature of telophase.

Why other options are wrong:

- Option B (Anaphase): sister chromatids are still moving towards the poles and no envelope has reformed.
- Option C (Metaphase): chromosomes are lined up at the equator, not at the poles.
- Option D (Prophase): chromosomes are just condensing and the old nuclear envelope is breaking down.

Final Answer: Reforming of nuclear envelopes at the poles marks telophase $\Rightarrow$ A

Answer: (A) Go Back to Q13

Q14.

Solution

Concept — Chromosome number of cells: Cells are described by how many sets of chromosomes they carry.

Step 1 — Define the two sets: A cell with two complete sets of chromosomes, one from the mother and one from the father, is written as 2n.

Step 2 — Name this condition: A cell with two sets (2n) is called diploid, while a cell with a single set (n), such as a gamete, is called haploid.

Why other options are wrong:

- Option A (Haploid): has only one set (n), as in sperm and egg.
- Option B (Tetraploid): has four sets (4n).
- Option D (Monoploid): carries a single basic set, essentially one set, not two.

Final Answer: A cell with two chromosome sets (2n) is diploid $\Rightarrow$ C

Answer: (C) Go Back to Q14

Q15.

Solution

Concept — Sexual reproduction in flowers: Before seeds can form, the male gamete must reach the female part, and this begins with the movement of pollen.

Step 1 — Read the figure: The arrow shows pollen grains moving from the anther (the male part) to the stigma (the tip of the female part).

Step 2 — Name the process: The transfer of pollen from the anther to the stigma is called pollination.

Why other options are wrong:

- Option A (Fertilisation): is the later fusion of male and female gametes, after the pollen reaches the ovule.
- Option C (Germination): is the sprouting of a seed into a seedling.
- Option D (Fragmentation): is an asexual method where the body breaks into pieces.

Final Answer: Transfer of pollen from anther to stigma is pollination $\Rightarrow$ B

Answer: (B) Go Back to Q15

Q16.

Solution

Concept — Path of sperm in the male: After sperms are formed in the testis, they pass through a series of ducts before being released.

Step 1 — Locate the storage tube: Lying over each testis is a long, coiled tube called the epididymis.

Step 2 — Describe its role: The sperms are stored in the epididymis, where they mature and gain the ability to swim (become motile).

Why other options are wrong:

- Option A (Vas deferens): only carries mature sperm forward from the epididymis; it is not the storage-maturation site.
- Option B (Seminiferous tubule): is where sperms are formed inside the testis, not where they mature.
- Option C (Prostate gland): adds fluid to the semen; it does not store sperm.

Final Answer: Sperms are stored and matured in the epididymis $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q16

Q17.

Solution

Concept — Site of fertilisation in humans: The egg and sperm must meet at a particular place in the female tract for fertilisation to occur.

Step 1 — Track the egg and the sperm: After ovulation, the egg is picked up by the fallopian tube (oviduct). Sperms deposited in the vagina swim up through the uterus into the same tube.

Step 2 — Locate the fusion: The sperm and the egg meet and fuse in the upper part of the fallopian tube, so fertilisation normally takes place there.

Why other options are wrong:

- Option A (Uterus): is where the fertilised egg later implants and develops, not where fusion happens.
- Option B (Ovary): only produces and releases the egg.
- Option D (Vagina): receives sperm but is not the site of fertilisation.

Final Answer: Fertilisation normally occurs in the fallopian tube (oviduct) $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q17

Q18.

Solution

Concept — The two phases of photosynthesis: Photosynthesis has a light reaction on the thylakoids and a dark reaction in the stroma.

Step 1 — Locate the dark reaction: The dark reaction takes place in the stroma of the chloroplast and does not directly need light.

Step 2 — Name the cycle: In this phase, carbon dioxide is fixed and reduced to form sugars using ATP and NADPH; this series of reactions is called the Calvin cycle.

Why other options are wrong:

- Option B (Krebs cycle): is a stage of cellular respiration in the mitochondria, not photosynthesis.
- Option C (Light reaction): occurs on the thylakoid membranes and produces ATP, NADPH and oxygen, but does not fix carbon dioxide.
- Option D (Glycolysis): is the breakdown of glucose in the cytoplasm during respiration.

Final Answer: CO_2 fixation in the stroma is the Calvin cycle $\Rightarrow$ A

Answer: (A) Go Back to Q18

Q19.

Solution

Concept — Upward movement of water in plants: Water absorbed by the roots has to rise through the xylem, and more than one force helps in this.

Step 1 — Recall root activity: The active absorption of ions and water by root cells builds up a positive pressure in the root xylem.

Step 2 — Name the pressure: This positive pressure, which pushes water a short distance up the xylem (especially at night), is called root pressure.

Why other options are wrong:

- Option A (Transpiration pull): pulls water up from above due to evaporation at the leaves; it does not push from below.

- Option C (Turgor pressure): is the pressure of cell contents against the cell wall, not the force lifting water in the xylem.
- Option D (Osmotic pressure of the soil): the soil solution is dilute, so this does not push water up the stem.

Final Answer: The root force that pushes water up the xylem is root pressure $\Rightarrow$ $\boxed{\text{B}}$

Answer: (B) Go Back to Q19

Q20.

Solution

Concept — Scientific naming of organisms: To avoid confusion caused by local names, every organism is given one universal scientific name.

Step 1 — Recall the format: The scientific name has two words: the first is the genus (capitalised) and the second is the species.

Step 2 — Name the system: This two-word naming system was given by Carolus Linnaeus and is called binomial nomenclature (for example, *Homo sapiens*).

Why other options are wrong:

- Option A (Vernacular naming): uses local common names that differ from place to place.
- Option B (Polynomial naming): the older system using many descriptive words, which Linnaeus replaced.
- Option C (Common naming): the same as everyday local names, not a scientific system.

Final Answer: The two-word system of genus + species is binomial nomenclature $\Rightarrow$ $\boxed{\text{D}}$

Answer: (D) Go Back to Q20

Q21.

Solution

Concept — Classes of angiosperms: Flowering plants are grouped by the number of seed leaves (cotyledons) in their seeds.

Step 1 — Recall the two classes: Angiosperms are divided into monocotyledons (one cotyledon) and dicotyledons (two cotyledons).

Step 2 — Match the description: A seed with only a single cotyledon belongs to a monocot (for example, maize or wheat).

Why other options are wrong:

- Option A (Dicot with two cotyledons): a dicot has two cotyledons, not one.
- Option B (Gymnosperm): bears naked seeds and is not an angiosperm.
- Option D (Pteridophyte): is a seedless plant like a fern, so it has no cotyledons at all.

Final Answer: A seed with a single cotyledon is a monocot $\Rightarrow$ $\boxed{\text{C}}$

Answer: (C) Go Back to Q21

Q22.

Solution

Concept — Producers in a food chain: Every food chain begins with an organism that makes its own food and captures energy for the rest of the chain.

Step 1 — Identify the base organism: Position **P** is at the start of the chain, eaten by the grasshopper. The base is occupied by a green plant.

Step 2 — Apply the definition: Green grass carries out photosynthesis to make its own food, so it is the autotroph or producer of the chain.

Why other options are wrong:

- Option B (Grasshopper): is a herbivore and so is the primary consumer, not the producer.
- Option C (Frog): eats the grasshopper and is a secondary consumer.
- Option D (Snake): is the top carnivore at the end of the chain.

Final Answer: The producer at the base of the chain is green grass $\Rightarrow$ $\boxed{\text{A}}$

Answer: (A) Go Back to Q22

Q23.

Solution

Concept — Representing trophic structure: The relationship among the trophic levels of an ecosystem can be shown as a diagram.

Step 1 — Describe the diagram: When the number, biomass or energy of organisms at each trophic level is drawn as horizontal bars placed one above another, the figure is usually broad at the base and narrow at the top.

Step 2 — Name it: This pyramid-shaped graphical representation is called an ecological pyramid (a pyramid of numbers, biomass or energy).

Why other options are wrong:

- Option A (Food web): is a network of many interconnected food chains, not a pyramid.
- Option C (Food chain): is a single straight-line sequence of who eats whom.
- Option D (Biosphere): is the whole zone of the earth where life exists.

Final Answer: The pyramid of numbers, biomass or energy is the ecological pyramid $\Rightarrow$ B

Answer: (B) Go Back to Q23

Q24.

Solution

Concept — Defence by antibodies: The immune system produces special proteins to neutralise foreign substances (antigens).

Step 1 — Recall the defensive proteins: Antibodies, also called immunoglobulins, bind specifically to antigens and help destroy them.

Step 2 — Identify the producer cells: These antibodies are made by lymphocytes, a kind of white blood cell (the B-lymphocytes in particular).

Why other options are wrong:

- Option A (Red blood cells): carry oxygen and have no nucleus to make antibodies.
- Option B (Blood platelets): are cell fragments that help in blood clotting.
- Option C (Liver cells): make many plasma proteins, but not the antibodies of immunity.

Final Answer: Antibodies are produced by lymphocytes (white blood cells) $\Rightarrow$ D

Answer: (D) Go Back to Q24

Q25.

Solution

Concept — Amplifying DNA: Many biotechnology methods need a large quantity of a particular piece of DNA, obtained by copying it many times.

Step 1 — Name the technique: The polymerase chain reaction (PCR) makes millions of copies of a chosen DNA segment in a very short time.

Step 2 — Recall how it works: PCR repeats cycles of heating and cooling with the enzyme DNA polymerase and primers to double the DNA in each cycle.

Why other options are wrong:

- Option A (Gel electrophoresis): separates DNA fragments by size; it does not copy them.
- Option B (DNA ligation): joins DNA fragments together, it does not amplify them.
- Option D (DNA fingerprinting): identifies individuals from DNA patterns; it uses copies but does not itself amplify DNA.

Final Answer: Making many copies of a DNA segment is done by PCR $\Rightarrow$ C

Answer: (C) Go Back to Q25

Answer Key

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