MDCAT (UHS entry test, Paper ID-D) — 2026 · Solved Past Paper

Body: University of Health Sciences, Lahore (UHS) · **Post:** MDCAT (UHS entry test, Paper ID-D) · **Year:** 2026 · **Questions:** 180 in the original paper — **180 solved and verified**, none excluded · **Price:** Free

> **How to use this paper:** each question shows the stem, the four options, and the correct answer. Click “Why each option?” under a question to see all four options explained — one question teaches four topics. General Knowledge answers are as of the 2026 sitting.

Source note: Question stems and options: official UHS question paper PDF, MDCAT 2026, Paper ID-D (uhs.edu.pk/images/D.pdf, 18 pp.; accessed 9 Nov 2026). Answer key: the official Key D as published in typed form by eprepare (eprepare.org/blog/uhs-mdcat-paper-answer-key), cross-checked against the same page's fully solved Paper A section and the official paper images for Keys A–D; Key D letter counts 31 A / 64 B / 50 C / 35 D match the page's own statement. Exam held Sunday 20 September 2026 (first scheduled 16 August 2026, then moved); UHS released all four paper IDs after Lahore High Court order Writ Petition 3516/2026 (16 October 2026). Same sitting as Paper IDs A, B and C — do not build a second UHS 2026 ID. Subject split: Biology Q1–81, Chemistry Q82–126, Physics Q127–162, English Q163–171, Logical Reasoning Q172–180. 1 PICK-ONE (Q143). Answers verified independently against reference facts, worked derivations and targeted sources, never from the printed key alone. Decisions by the assistant under the owner's 8 Nov 2026 delegation.

Question 1 Haemophilia inheritance

A hemophilic father can pass the genes of hemophilia to his:

s only

- B. Daughters only ✓ **Correct answer**
- C. Both sons and daughters equally
- D. Both sons and daughters in 2:1 ratio respectively

A. wrong: a father passes his Y chromosome to his sons, not his X chromosome, so he cannot pass the haemophilia gene (which sits on the X) to a son.

B. correct: a daughter always receives her father's X chromosome, so every daughter of a haemophilic father receives the haemophilia gene and is at least a carrier.

C. wrong: sons receive the father's Y, not the X carrying the gene.

D. wrong: there is no 2:1 inheritance pattern here; sons receive no copy from the father at all.

Question 2 cDNA synthesis enzyme

This enzyme is used to synthesize cDNA from RNA:

- A. Restriction Endonuclease
- B. Reverse Transcriptase ✓ **Correct answer**
- C. Ligase
- D. Helicase

A. wrong: this enzyme cuts DNA at specific sites; it does not build DNA from an RNA template.

B. correct: it copies RNA into complementary DNA (cDNA), the reverse of normal transcription.

C. wrong: ligase joins DNA fragments by sealing nicks in the sugar-phosphate backbone.

D. wrong: helicase unwinds the DNA double helix during replication.

3 Prokaryotic cell contents

Which of the following is ABSENT in Prokaryotic cells:

- A. Mitochondria ✓ **Correct answer**
- B. Circular DNA
- C. Ribosomes
- D. Cell membrane

A. correct: prokaryotes have no membrane-bound organelles, so they have no mitochondria and make ATP at the cell membrane.

B. wrong: the prokaryotic chromosome is a single circular DNA molecule and is present.

C. wrong: prokaryotes have 70S ribosomes for protein synthesis.

D. wrong: every prokaryotic cell is bounded by a cell membrane.

Question 4 Resting membrane potential

In unstimulated stage, a neuron has a membrane potential of:

- A. −50 mV
- B. +50 mV
- C. −70 mV ✓ **Correct answer**
- D. +70 mV

A. wrong: this is nearer the threshold potential at which an action potential is triggered, not the resting value.

B. wrong: the inside of a resting neuron is negative, never positive.

C. correct: the resting membrane potential is about −70 mV, the inside negative relative to the outside.

D. wrong: the value has the wrong sign; the resting potential is negative.

5 Reduced synovial fluid disease

Which of the following diseases is associated with reduced synovial fluid in a joint?

- A. Gout
- B. Arthritis ✓ **Correct answer**
- C. Rickets
- D. Sciatica

A. wrong: gout is caused by uric acid crystals deposited in a joint, not by loss of synovial fluid.

B. correct: in arthritis the joint cartilage wears down and synovial fluid is reduced, so movement becomes stiff and painful.

C. wrong: rickets is a bone-softening disease of children caused by vitamin D deficiency.

D. wrong: sciatica is pain along the sciatic nerve, not a joint-fluid disease.

Question 6 Nodes of Ranvier

Points on the axon where myelin sheath is not present is called:

- A. Nodes of Ranvier ✓ **Correct answer**
- B. Schwann cells
- C. Neuroglia
- D. Dendron

A. correct: these are the gaps between Schwann cells where the axon is bare, and the impulse jumps from node to node (saltatory conduction).

B. wrong: Schwann cells make the myelin sheath itself; they are not the gaps.

C. wrong: neuroglia are the supporting cells of nervous tissue generally.

D. wrong: a dendron is a single process of a sensory neuron that carries impulses toward the cell body.

7 Enzyme denaturation

_____ can denature enzymes resulting in slow catalysis.

- A. Low temperature
- B. High temperature ✓ **Correct answer**
- C. High water content
- D. Low water content

A. wrong: low temperature only slows enzyme activity by reducing molecular movement; it does not denature the enzyme.

B. correct: heat breaks the bonds holding the enzyme's shape, denaturing it and stopping catalysis.

C. wrong: water is the normal medium of enzymes and does not denature them.

D. wrong: low water reduces activity but does not denature the enzyme.

Question 8 Parietal cells

Parietal cells of gastric glands are responsible for the secretion of:

- A. HCl ✓ **Correct answer**
- B. Pepsinogen
- C. Mucus
- D. Gastrin

A. correct: parietal (oxyntic) cells secrete hydrochloric acid, which acidifies the stomach and activates pepsin.

B. wrong: pepsinogen is secreted by chief (zymogen) cells, not parietal cells.

C. wrong: mucus is secreted by goblet and mucous neck cells to protect the stomach lining.

D. wrong: gastrin is a hormone secreted by G cells of the stomach wall.

9 Pepsinogen activation

Pepsinogen is converted into pepsin due to:

- A. Low pH ✓ **Correct answer**
- B. High pH
- C. Optimum temperature
- D. Freezing temperature

A. correct: the acid (low pH) of the stomach clips pepsinogen into active pepsin.

B. wrong: pepsinogen is not activated in alkaline conditions; pepsin itself is destroyed above pH 5.

C. wrong: temperature affects the rate of the reaction, but the trigger for activation is the acid pH.

D. wrong: freezing would halt the reaction, not activate the enzyme.

Question 10 ATP-producing organelle

During active transport across the cell membrane, a cell requires a continuous supply of ATP to move substances against the concentration gradient. The organelle responsible for producing this energy is:

- A. Nucleus
- B. Mitochondria ✓ **Correct answer**
- C. Golgi apparatus
- D. Endoplasmic reticulum

A. wrong: the nucleus stores genetic information; it does not make ATP.

B. correct: mitochondria produce most of the cell's ATP by aerobic respiration.

C. wrong: the Golgi modifies, sorts and packages proteins; it does not make ATP.

D. wrong: the endoplasmic reticulum synthesises lipids and proteins; it does not make

Question 11 Virus classification

Viruses are classified on the basis of:

- A. Color and size only
- B. Structure and nucleic acid ✓ **Correct answer**
- C. Habitat only
- D. Temperature tolerance

A. wrong: viruses have no colour of their own, and size alone does not classify them.

B. correct: viruses are classified by their capsid structure and by whether their genome is DNA or RNA, single- or double-stranded.

C. wrong: habitat is not a basis of viral classification.

D. wrong: temperature tolerance does not classify viruses.

Question 12 Gene linkage

If two genes are said to be linked, what is meant by the term 'linked'?

- A. Two genes are both at the same loci on a chromosome
- B. Two genes both occupy the same chromosome ✓ **Correct answer**
- C. They are both alleles of the same gene
- D. The phenotypes of the genes are both influenced by the gender of their owner

A. wrong: each gene has its own locus; linked genes sit at different loci on the same chromosome.

B. correct: linked genes are carried on the same chromosome, so they tend to be inherited together.

C. wrong: alleles are alternative forms of one gene at one locus; linked genes are different

D. wrong: that describes sex-influenced inheritance, not linkage.

Question 13 Ribosomes in prokaryotes and eukaryotes

Which statement correctly compares ribosomes in prokaryotic and eukaryotic cells?

- A. Both have 80S ribosomes
- B. Prokaryotes have 80S, eukaryotes have 70S
- C. Prokaryotes have 70S, eukaryotes have 80S ✓ **Correct answer**
- D. Both lack ribosomes

A. wrong: prokaryotes do not have 80S ribosomes.

B. wrong: this is the reverse of the real sizes.

C. correct: prokaryotic ribosomes sediment at 70S and eukaryotic cytoplasmic ribosomes at 80S.

D. wrong: all living cells have ribosomes for protein synthesis.

Question 14 Peritubular capillaries

Which of the following best describes the correct function of peritubular capillaries?

- A. Oxygen uptake from the kidney cells
- B. Supply of carbon dioxide to the kidney cells
- C. Reabsorption of urea
- D. Reabsorption of useful constituents ✓ **Correct answer**

A. wrong: peritubular capillaries do not take oxygen from kidney cells; they deliver blood to the tubule surroundings.

B. wrong: carbon dioxide supply is not their function.

C. wrong: urea is mostly left in the tubule to be excreted; only a small amount is

and that is not the capillaries' main role.

D. correct: the peritubular capillaries collect the glucose, salts, amino acids and water reabsorbed from the tubule fluid back into the blood.

Question 15 Reducing variation in progeny

Which of the following is responsible for reducing variations in progeny?

- A. Meiosis
- B. Epistasis
- C. Crossing over
- D. Gene Linkage ✓ **Correct answer**

A. wrong: meiosis increases variation through independent assortment and crossing over.

B. wrong: epistasis (one gene masking another) changes how traits appear but does not reduce variation itself.

C. wrong: crossing over creates new gene combinations and increases variation.

D. correct: linked genes are inherited together, so fewer new combinations appear in the offspring and variation is reduced.

Question 16 Reflex arc direction

Nerve impulses are transmitted in reflex action in the following direction:

- A. From CNS to Effectors and from CNS to the Receptors
- B. From Effectors to CNS and from CNS to the Receptors
- C. From Receptors to the CNS and from CNS to the Effectors ✓ **Correct answer**
- D. From CNS to Receptors and from Effectors to CNS

A. wrong: the impulse does not start in the CNS, and it never travels to the receptors.

B. wrong: effectors receive impulses; they do not send them to the CNS.

e receptor detects the stimulus, the sensory neuron carries the impulse to the CNS, and the motor neuron carries the response to the effector.

D. wrong: the flow is reversed in both halves.

Question 17 Blood vessel leaving the glomerulus

Which blood vessel carries filtered blood away from glomerulus?

- A. Renal artery
- B. Renal vein
- C. Afferent arteriole
- D. Efferent arteriole ✓ **Correct answer**

A. wrong: the renal artery brings blood into the kidney, not away from the glomerulus.

B. wrong: the renal vein drains the whole kidney into the vena cava; it is not the vessel that leaves the glomerulus.

C. wrong: the afferent arteriole carries blood INTO the glomerulus.

D. correct: the efferent arteriole carries the filtered blood away from the glomerulus toward the peritubular capillaries.

Question 18 Ganglia structure

Structurally ganglia are clusters of:

- A. Complete neurons
- B. Cell bodies of neurons ✓ **Correct answer**
- C. Axonal fibers
- D. Both axon & dendrites

A. wrong: a ganglion does not contain whole neurons with their axons; it contains only the cell bodies.

ganglion is a cluster of neuronal cell bodies outside the central nervous system.

C. wrong: bundles of axons form nerves, not ganglia.

D. wrong: ganglia are defined by their cell bodies, not by axons and dendrites.

Question 19 Calcium release in muscle

Upon arrival of nerve impulse, which of the following allows calcium ions to enter the cytosol?

- A. Sarcolemma
- B. Sarcomere
- C. Sarcoplasmic reticulum ✓ **Correct answer**
- D. Myofilaments

A. wrong: the sarcolemma is the muscle cell membrane; it conducts the action potential inward but does not store calcium.

B. wrong: the sarcomere is the contractile unit of the muscle fibre, not a calcium store.

C. correct: this specialised endoplasmic reticulum stores calcium and releases it into the cytosol when the impulse arrives.

D. wrong: myofilaments (actin and myosin) contract when calcium binds troponin; they do not release calcium.

Question 20 Corpus luteum hormone

Which of the following hormones is produced by Corpus Luteum?

- A. Leutinizing
- B. Progesterone ✓ **Correct answer**
- C. Testosterone
- D. Secretin

...elinising hormone (LH) is a pituitary hormone that causes ovulation and forms the corpus luteum; it is not made by it.

B. correct: the corpus luteum secretes progesterone, which maintains the uterine lining for pregnancy.

C. wrong: testosterone is made by the interstitial cells of Leydig in the testes.

D. wrong: secretin is a duodenal hormone that stimulates the pancreas.

Question 21 Glomerular filtrate

In a kidney tubule, which substances are filtered out of the blood in the glomerulus?

- A. Glucose, protein, salts and water
- B. Glucose, protein, urea and water
- C. Glucose, salts, urea and water ✓ **Correct answer**
- D. Protein, salts, urea and water

A. wrong: proteins are too large to pass through the glomerular filter.

B. wrong: protein is retained in the blood because of its size.

C. correct: these small molecules pass freely into the tubule; protein and blood cells do not.

D. wrong: protein is not filtered, and glucose (which is filtered) is missing.

Question 22 Antibody-producing cells

During an immune response, what type of cells are PRIMARILY involved in the production of antibodies?

- A. T lymphocytes
- B. B lymphocytes ✓ **Correct answer**
- C. Macrophages

A. wrong: T cells coordinate cell-mediated immunity and help B cells, but they do not make antibodies.

B. correct: B cells differentiate into plasma cells that secrete antibodies.

C. wrong: macrophages engulf pathogens and present antigens; they do not produce antibodies.

D. wrong: platelets are involved in blood clotting, not antibody production.

Question 23 Lymphatic screening structure

A patient develops a swollen area where lymph is actively being screened for pathogens and immune cells are rapidly multiplying. The lymphatic structure that is involved in this process is:

- A. spleen
- B. lymph nodes ✓ **Correct answer**
- C. lymphatic ducts
- D. lymphatic capillaries

A. wrong: the spleen filters blood, not lymph, and it does not swell as a local lymphatic screening site.

B. correct: lymph nodes filter lymph, trap pathogens, and are where lymphocytes multiply — which is why they swell during infection.

C. wrong: ducts only transport lymph; they do not screen it or multiply immune cells.

D. wrong: capillaries only collect tissue fluid into the lymphatic system.

Question 24 Thickest heart chamber

Which chamber of the heart has the thickest muscular tissues?

- B. Right ventricle
- C. Left atrium
- D. Left ventricle ✓ **Correct answer**

A. wrong: the atria are thin-walled because they only pump blood a short distance into the ventricles.

B. wrong: the right ventricle pumps blood only to the lungs, so its wall is thinner than the left ventricle's.

C. wrong: the left atrium is thin-walled like the right atrium.

D. correct: it must pump blood to the whole body, so its muscle wall is the thickest of all four chambers.

Question 25 Colon disease absorption

A person is diagnosed with colon disease. Absorption of which of the following may be affected?

- A. Glucose
- B. Water ✓ **Correct answer**
- C. Fats
- D. Amino acids

A. wrong: glucose is absorbed in the small intestine, not the colon.

B. correct: the colon's main absorptive job is reclaiming water (and salts) from the faeces.

C. wrong: fats are absorbed in the small intestine.

D. wrong: amino acids are absorbed in the small intestine.

26 Testosterone source

Testosterone in males is produced by:

- A. Interstitial cells of Leydig ✓ **Correct answer**
- B. Sertoli Cells
- C. Spermatogonia
- D. Primary spermatocytes

A. correct: these cells between the seminiferous tubules secrete testosterone.

B. wrong: Sertoli cells nourish developing sperm; they do not make testosterone.

C. wrong: spermatogonia are the stem cells that divide to produce sperm.

D. wrong: primary spermatocytes are the cells that undergo meiosis I; they do not secrete hormones.

Question 27 Lymphatic system function

Which of the following is a function of lymphatic system?

- A. Absorption of glucose from intestine
- B. Blood clotting after an injury
- C. Filtering out and destroying germs and toxins ✓ **Correct answer**
- D. Temperature regulation

A. wrong: glucose is absorbed directly into blood capillaries, not by the lymphatic system.

B. wrong: clotting is the work of platelets and clotting factors in the blood.

C. correct: lymph nodes filter lymph and destroy pathogens.

D. wrong: temperature regulation is mainly the work of the skin, blood vessels and hypothalamus.

28 LH surge

In human reproduction, a sudden rise in LH causes:

- A. Menstrual flow
- B. Ovulation ✓ **Correct answer**
- C. Fertilization to form zygote
- D. Implantation of embryo

A. wrong: menstrual flow follows the fall of progesterone and oestrogen when no fertilisation occurs.

B. correct: the LH surge triggers the release of the secondary oocyte from the Graafian follicle.

C. wrong: fertilisation happens later, in the fallopian tube, and is not triggered by LH.

D. wrong: implantation occurs about a week after fertilisation.

Question 29 Krebs cycle products

Main products of Krebs cycle reactions are:

- A. Glucose and Oxygen
- B. NADH and $FADH_2$ ✓ **Correct answer**
- C. ATP and glyceraldehyde 3-phosphate (G3P)
- D. Pyruvate and Acetyl Co-A

A. wrong: these are the raw materials of photosynthesis, not the products of the Krebs cycle.

B. correct: each turn of the cycle produces 3 NADH and 1 $FADH_2$ (plus 1 ATP/GTP and 2 CO_2); these reduced carriers feed the electron transport chain.

C. wrong: G3P is a product of the Calvin cycle, not the Krebs cycle.

D. wrong: these are the inputs that feed the cycle, not its main products.

30 Pulmonary semilunar valve

During heart surgery, a surgeon fixes a valve that stops blood from flowing backward into the right ventricle. Based on the given situation, the valve that was repaired is:

- A. Mitral valve
- B. Aortic semilunar valve
- C. Tricuspid valve
- D. Pulmonary semilunar valve ✓ **Correct answer**

A. wrong: the mitral valve sits between the left atrium and left ventricle.

B. wrong: this valve prevents backflow into the left ventricle, not the right.

C. wrong: the tricuspid valve prevents backflow into the right atrium, not the right ventricle.

D. correct: it sits at the exit of the right ventricle into the pulmonary artery and stops blood flowing back into the right ventricle.

Question 31 Bile salts

Bile salts are helpful in the digestion of:

- A. Amino acids
- B. Fatty acids ✓ **Correct answer**
- C. Nucleic acids
- D. Carbohydrates

A. wrong: amino acids are the products of protein digestion; bile salts do not act on them.

B. correct: bile salts emulsify large fat droplets into tiny ones, giving lipase a large surface area to work on.

C. wrong: nucleic acids are digested by nucleases in the small intestine.

D. wrong: carbohydrates are digested by amylase and the intestinal enzymes.

32 Pancreatic amylase

Exocrine tissue of the pancreas produces an enzyme for carbohydrate digestion known as:

- A. Lipase
- B. Trypsin
- C. Enterokinase
- D. Amylase ✓ **Correct answer**

A. wrong: lipase digests fats, not carbohydrates.

B. wrong: trypsin digests proteins.

C. wrong: enterokinase is an intestinal enzyme that activates trypsinogen.

D. correct: pancreatic amylase breaks starch into maltose in the small intestine.

Question 33 Secretin release

Endocrine cells of duodenum are stimulated by to release hormone secretin.

- A. Acetylcholine
- B. Acidic chyme ✓ **Correct answer**
- C. Bile salts
- D. Sodium bicarbonate in bile juice

A. wrong: acetylcholine is a neurotransmitter, not the stimulus for secretin release.

B. correct: when acidic chyme enters the duodenum from the stomach, S cells release secretin, which makes the pancreas secrete bicarbonate.

C. wrong: bile salts emulsify fats; they do not trigger secretin.

D. wrong: bicarbonate neutralises the acid; it is the result of the secretin response, not its trigger.

34 Chordae tendineae

Chordae tendineae are:

- A. Blood vessels
- B. Fibrous cords ✓ **Correct answer**
- C. Cardiac muscles
- D. Epithelial tissue

A. wrong: chordae tendineae carry no blood; they are cords of connective tissue.

B. correct: these tough fibrous cords attach the atrioventricular valve flaps to the papillary muscles and stop them inverting.

C. wrong: the papillary muscles are cardiac muscle, but the chordae themselves are fibrous cords.

D. wrong: they are connective tissue, not epithelium.

Question 35 Rr × Rr cross

The cross between two heterozygous round-seeded plants having Rr X Rr would result in _____ during segregation of the alleles in next generation.

- A. 100 % round seeds
- B. 50% round seeds and 50% wrinkled seeds
- C. 75% round seeds and 25% wrinkled seeds ✓ **Correct answer**
- D. 100% wrinkled seeds

A. wrong: one quarter of the offspring are rr and wrinkled.

B. wrong: the genotypic ratio is 1 RR : 2 Rr : 1 rr, so only 25% are wrinkled.

C. correct: RR and Rr (three quarters) are round; only rr (one quarter) is wrinkled.

D. wrong: the dominant round allele appears in three quarters of the offspring.

36 Protein transport from nucleus

Which of the following provides passage of transportation of protein from nucleus to other organelles?

- A. Endoplasmic Reticulum ✓ **Correct answer**
- B. Mitochondria
- C. Golgi complex
- D. Nuclear membrane

A. correct: the rough endoplasmic reticulum is continuous with the outer nuclear membrane and carries proteins made on its ribosomes onward to the Golgi and beyond.

B. wrong: mitochondria make ATP; they do not transport proteins from the nucleus.

C. wrong: the Golgi receives proteins after the endoplasmic reticulum and modifies and packages them.

D. wrong: the nuclear membrane encloses the nucleus; the transport passage itself is provided by the endoplasmic reticulum system.

Question 37 Immunological memory

The ability of the immune system to mount a larger and more rapid response to an antigen that has already been encountered before is termed as:

- A. Primary Immune response
- B. Immunological Memory ✓ **Correct answer**
- C. Short-term Memory
- D. Long-term Memory

A. wrong: the primary response is the first, slow response to a new antigen.

B. correct: memory cells from the first exposure let the body respond faster and more strongly the next time it meets the same antigen.

s is a psychological term, not an immune one.

D. wrong: this is also a psychological term; the immune term is immunological memory.

Question 38 DNA coding strand

Let X, Y and Z be three amino acids which are encoded by UCA=X, ACU=Y and GUC=Z. What will be the sequence of nucleotide in DNA coding/sense strand that comprises information for following polypeptide: Polypeptide= Y-X-Y-Y-X-Z-Z-X-Z-Y

- A. 5′-ACUUCAACUACUUCAGUCGUCUCAGUCACU-3′
- B. 5′-ACTTCAACTACTTCAGTCGTCTCAGTCACT-3′ ✓ **Correct answer**
- C. 3′-TGAAGTTGATGAAGTCAGCAGAGTCAGTGA-5′
- D. 3′-UGAAGUUGAUGAAGUCAGCAGAGUCAGUGA-5′

A. wrong: this is the mRNA sequence (it contains U); the question asks for the DNA coding strand.

B. correct: the coding strand has the same sequence as the mRNA with T in place of U, so ACU→ACT, UCA→TCA, GUC→GTC, giving ACT-TCA-ACT-ACT-TCA-GTC-GTC-TCA-GTC-ACT.

C. wrong: this is the template strand (complementary), not the coding strand.

D. wrong: a DNA strand cannot contain U, and this is the template-strand complement of the mRNA.

Question 39 Lamarck's ideas

All of the following ideas were proposed by Lamarck, EXCEPT:

- A. Use and disuse of organs
- B. Acquired characters are inherited by the offspring
- C. Organs not used will become vestigial
- D. Over production leads to evolution ✓ **Correct answer**

A. wrong: this is one of Lamarck's central ideas, so it is not the exception.

inheritance of acquired characters is Lamarck's best-known idea.

C. wrong: this follows from Lamarck's use-and-disuse principle.

D. correct: overproduction leading to a struggle for existence is Darwin's (and Malthus's) idea, not Lamarck's.

Question 40 Enzyme saturation

In an experiment, increasing substrate concentration increases the rate of reaction until it reaches a steady state. At this stage, which of the following changes would most effectively increase the rate of reaction?

- A. Increasing substrate concentration
- B. Decreasing temperature
- C. Increasing enzyme concentration ✓ **Correct answer**
- D. Adding a non-competitive inhibitor

A. wrong: the rate has already levelled off because all the enzyme's active sites are occupied; more substrate changes nothing.

B. wrong: lowering the temperature slows the reaction further.

C. correct: adding more enzyme provides more active sites, so more substrate can be processed at once and the rate rises.

D. wrong: a non-competitive inhibitor would reduce the rate, not increase it.

Question 41 Quaternary protein folding

Which of the following bonding or interaction is responsible for quaternary protein folding?

- A. 1,4 Glycosidic Bond
- B. Hydrophobic interaction ✓ **Correct answer**
- C. Ester Bond

Glycosidic Bond

A. wrong: glycosidic bonds join sugar units in carbohydrates, not protein subunits.

B. correct: the association of separate polypeptide subunits into a quaternary structure is held mainly by hydrophobic interactions between non-polar side chains (with hydrogen bonds and ionic bonds also contributing).

C. wrong: ester bonds join acids and alcohols (as in lipids); they do not hold protein subunits together.

D. wrong: this is a carbohydrate linkage, not a protein interaction.

Question 42 Brain control of heart rate and breathing

Which part of the brain controls heart rate and breathing?

- A. Cerebellum
- B. Hypothalamus
- C. Medulla oblongata ✓ **Correct answer**
- D. Cerebrum

A. wrong: the cerebellum coordinates smooth movement and balance.

B. wrong: the hypothalamus controls body temperature, hunger and hormone release; the direct control of heart rate and breathing sits in the medulla.

C. correct: the medulla contains the cardiac and respiratory centres that set heart rate and breathing rhythm.

D. wrong: the cerebrum handles conscious thought, memory and voluntary action.

Question 43 Muscle at rest

When the muscle is at rest, is disposed in such a way that it covers the sites on the chain where the head of becomes attached.

- tropomyosin : actin : myosin ✓ **Correct answer**
- B. myosin : actin : tropomyosin
- C. actin : tropomyosin : myosin
- D. actin : myosin : tropomyosin

A. correct: at rest, tropomyosin lies over the myosin-binding sites on the actin filament, blocking the myosin heads from attaching.

B. wrong: myosin is the head that attaches; it does not cover the binding sites.

C. wrong: actin is the filament carrying the sites, not the cover.

D. wrong: this mixes up the three roles; tropomyosin is the covering protein.

Question 44 Homozygotes in F2

If green is a dominant and yellow is a recessive trait then what would be the ratio of homozygotes in F2 generation?

- A. 0%
- B. 25%
- C. 50% ✓ **Correct answer**
- D. 75%

A. wrong: homozygous offspring certainly appear in the F2.

B. wrong: the F2 ratio is 1 GG : 2 Gg : 1 gg, so homozygotes (GG + gg) are 2 of 4.

C. correct: GG (25%) plus gg (25%) gives 50% homozygotes.

D. wrong: 75% is the share of the dominant phenotype, not of homozygotes.

Question 45 Bronchioles

In human respiratory system, bronchioles have:

- A. Cartilage rings

- C. Circular smooth muscles ✓ **Correct answer**
- D. Longitudinal smooth muscles

A. wrong: cartilage rings support the trachea, not the bronchioles.

B. wrong: cartilage plates are found in the larger bronchi; they disappear in the bronchioles.

C. correct: bronchioles are supported by rings of circular smooth muscle, which can constrict or dilate the airways.

D. wrong: the smooth muscle of bronchioles runs circularly, not longitudinally.

Question 46 Hyaline cartilage

Which of the following cartilage is most commonly found in the ribs, nose, and trachea?

- A. Hyaline Cartilage ✓ **Correct answer**
- B. Elastic Cartilage
- C. Fibrocartilage
- D. Osteoblast

A. correct: hyaline cartilage forms the costal cartilages of the ribs, the nose and the tracheal rings.

B. wrong: elastic cartilage is found in the ear pinna and epiglottis.

C. wrong: fibrocartilage is found in the intervertebral discs and the pubic symphysis.

D. wrong: an osteoblast is a bone-forming cell, not a cartilage type.

Question 47 Corpus luteum degeneration

If the corpus luteum degenerates prematurely, the most likely outcome is:

- A. Enhanced ovulation and fertilization

- C. Increased estrogen secretion
- D. Implantation failure and end of pregnancy ✓ **Correct answer**

A. wrong: losing the corpus luteum does not cause extra ovulation.

B. wrong: the corpus luteum does not control LH in this way, and no extra egg is released.

C. wrong: the corpus luteum is the main source of progesterone, not oestrogen, and its loss lowers hormone levels.

D. correct: without progesterone from the corpus luteum the uterine lining breaks down, so the embryo cannot implant or the pregnancy is lost.

Question 48 Hepatic portal vein

Which one of the following veins connects the small intestines to the liver?

- A. Renal vein
- B. Hepatic portal vein ✓ **Correct answer**
- C. Iliac vein
- D. Hepatic vein

A. wrong: the renal vein drains the kidney into the vena cava.

B. correct: it carries nutrient-rich blood from the small intestine (and other gut organs) to the liver.

C. wrong: the iliac veins drain the legs and pelvis.

D. wrong: the hepatic vein carries blood away from the liver to the vena cava.

Question 49 Segregation of alleles

The segregation of alleles occurs during the process of in eukaryotic organisms.

- A. Mitosis

- C. Meiosis ✓ **Correct answer**
- D. DNA replication before cell division

A. wrong: mitosis produces identical daughter cells; alleles do not segregate because homologous chromosomes do not separate.

B. wrong: binary fission is the division of prokaryotic cells, not the segregation of alleles in eukaryotes.

C. correct: during meiosis I, homologous chromosomes (and hence the alleles they carry) separate into different gametes.

D. wrong: replication copies each chromosome; it does not separate alleles.

Question 50 Sweet pea linkage

Over time, many dihybrid cross experiments of autosomally-linked genes in sweet pea plants (Lathyrus odoratus) have been carried out by reputed scientists. Which of the following best explains the presence of some non-parental phenotypes in the offspring of such crosses?

- A. Crossing over has occurred, leading to the production of recombinant plants ✓ **Correct answer**
- B. The scientists made errors such as not cleaning the small paint brush that they used to transfer pollen grains between plants
- C. Independent assortment had occurred, so unusual phenotypes are to be expected
- D. Only plants of one gender exhibit parental phenotypes due to linkage

A. correct: linked genes are usually inherited together, but crossing over between them in prophase I swaps alleles and creates new (recombinant) combinations.

B. wrong: the recombinants appear in consistent, predictable proportions; they are not the result of careless technique.

dependent assortment applies to genes on different chromosomes; these genes are linked on the same chromosome.

D. wrong: linkage affects both sexes equally in these autosomal crosses.

Question 51 HIV

HIV stands for:

- A. Human Immunodeficiency Virus ✓ **Correct answer**
- B. Human Internal Virus
- C. High Impact Virus
- D. Human Immunogenic Vaccine

A. correct: HIV is the virus that causes AIDS by destroying helper T cells.

B. wrong: this is not a name for the virus.

C. wrong: this is not a name for the virus.

D. wrong: this describes a vaccine, not the virus.

Question 52 Digestive system part not directly involved in digestion

The part of digestive system which is NOT directly involved in digestion is:

- A. Mouth
- B. Oesophagus ✓ **Correct answer**
- C. Stomach
- D. Small intestine

A. wrong: the mouth digests food mechanically (teeth) and chemically (salivary amylase).

B. correct: the oesophagus only transports food to the stomach by peristalsis; no digestion takes place in it.

e stomach digests protein with pepsin and acid.

D. wrong: the small intestine is the main site of digestion and absorption.

Question 53 Pacinian corpuscles

Pacinian corpuscles are present in the:

- A. Retina
- B. Lungs
- C. Liver
- D. Skin ✓ **Correct answer**

A. wrong: the retina contains photoreceptors (rods and cones), not Pacinian corpuscles.

B. wrong: the lungs have stretch receptors, not Pacinian corpuscles.

C. wrong: the liver has no Pacinian corpuscles.

D. correct: Pacinian corpuscles are pressure and vibration receptors in the deep skin (and also in joints and tendons).

Question 54 Hearing and equilibrium receptors

The receptors for hearing and equilibrium are the example of:

- A. Mechanoreceptors ✓ **Correct answer**
- B. Thermoreceptors
- C. Nociceptors
- D. Photoreceptors

A. correct: hair cells in the ear detect the mechanical movement of fluid and membranes, so hearing and balance use mechanoreceptors.

B. wrong: thermoreceptors detect temperature change.

C. wrong: nociceptors detect pain.

photoreceptors detect light in the eye.

Question 55 Smell receptors

Receptors that detect smell of food are:

- A. Chemoreceptors ✓ **Correct answer**
- B. Mechanoreceptors
- C. Nociceptors
- D. Photoreceptors

A. correct: olfactory receptors detect dissolved chemicals (odour molecules), so they are chemoreceptors.

B. wrong: mechanoreceptors detect pressure and movement.

C. wrong: nociceptors detect painful stimuli.

D. wrong: photoreceptors detect light.

Question 56 Most abundant voluntary muscles

The most abundant voluntary muscles in human body are:

- A. Cardiac
- B. Skeletal ✓ **Correct answer**
- C. Smooth
- D. Smooth & Cardiac

A. wrong: cardiac muscle is found only in the heart wall, so it is the least abundant by mass.

B. correct: skeletal muscle makes up about 40% of body mass and is the voluntary muscle system.

C. wrong: smooth muscle is involuntary and lines the gut and vessels.

both of these are involuntary muscle types.

Question 57 mRNA share of total RNA

mRNA forms _____ % of the total RNA in the cell

- A. 3-4% ✓ **Correct answer**
- B. 4-5%
- C. 5-6%
- D. 6-7%

A. correct: messenger RNA is a small fraction of total cellular RNA; the FSc textbook figure is about 3–4% (rRNA is about 80% and tRNA about 15%).

B. wrong: this range is above the textbook figure for mRNA.

C. wrong: this is too high for mRNA's share.

D. wrong: this is well above mRNA's share of total RNA.

Question 58 Inner stomach layer

The inner layer of stomach whose glands secrete digestive enzymes, HCl and mucus is known as:

- A. submucosa
- B. mucosa ✓ **Correct answer**
- C. muscularis
- D. serosa

A. wrong: the submucosa is a connective tissue layer beneath the mucosa; it contains blood vessels and nerves, not the secreting glands.

B. correct: the mucosa is the innermost layer, and its gastric glands secrete pepsinogen, HCl and mucus.

muscularis is the muscle layer that churns the stomach contents.

D. wrong: the serosa is the outermost covering of the stomach.

Question 59 Lamarck's acquired characters

According to Lamarck, the characteristics which are developed during the lifetime of an individual due to use and disuse of organs are called as:

- A. prominent characters
- B. biological characters
- C. acquired characters ✓ **Correct answer**
- D. physical characters

A. wrong: this is not Lamarck's term.

B. wrong: this is not Lamarck's term.

C. correct: Lamarck called traits gained during life by use and disuse "acquired characters" and held that they are inherited.

D. wrong: this is not Lamarck's term.

Question 60 Bone hardening minerals

The collagen fibers of bone are hardened by deposition of:

- A. Calcium and oxalates
- B. Calcium and phosphates ✓ **Correct answer**
- C. Magnesium and nitrates
- D. Iron and glycogen

A. wrong: oxalates do not mineralise bone; calcium oxalate is what forms some kidney stones.

B. correct: bone is hardened by calcium phosphate (hydroxyapatite) deposited on the

C. wrong: magnesium and nitrates are not the minerals that harden bone.

D. wrong: iron is carried in blood and glycogen is stored in liver and muscle; neither hardens bone.

Question 61 Intestinal movement muscles

The type of muscles responsible for the movement of food through lumen of intestine are:

- A. Smooth muscles ✓ **Correct answer**
- B. Cardiac muscles
- C. Skeletal muscles
- D. Skeletal & cardiac muscles

A. correct: the smooth muscle of the gut wall produces peristalsis, pushing food through the intestinal lumen.

B. wrong: cardiac muscle is found only in the heart.

C. wrong: skeletal muscle is voluntary and is not in the gut wall.

D. wrong: neither of these muscle types lines the intestine.

Question 62 DNA helix turn

According to Watson and Crick's model, each complete turn of the DNA double helix, consists of:

- A. 6 base pairs
- B. 8 base pairs
- C. 10 base pairs ✓ **Correct answer**
- D. 12 base pairs

full turn contains more than 6 base pairs.

B. wrong: a full turn contains more than 8 base pairs.

C. correct: the Watson–Crick double helix has 10 base pairs per complete turn (3.4 nm).

D. wrong: a full turn contains fewer than 12 base pairs.

Question 63 Purpose of mastication

The major purpose of mastication is to:

- A. Make morsel soft
- B. Make food moist
- C. Increase surface area ✓ **Correct answer**
- D. Improve the taste

A. wrong: softening happens through saliva and chewing, but the main purpose of chewing is to increase surface area for enzymes.

B. wrong: moistening is done by saliva, not by chewing itself.

C. correct: chewing breaks food into small pieces, hugely increasing the surface area available to digestive enzymes.

D. wrong: taste improvement is a side effect, not the digestive purpose of chewing.

Question 64 Primary follicle development hormone

Which of the following hormones stimulates the development of primary follicles in the ovary?

- A. Estrogen
- B. Progesterone
- C. Luteinizing hormone
- D. Follicle stimulating hormone ✓ **Correct answer**

strogen is produced by the developing follicle; it does not start follicle development.

B. wrong: progesterone is produced by the corpus luteum after ovulation.

C. wrong: LH triggers ovulation and the formation of the corpus luteum; FSH starts follicle growth.

D. correct: FSH from the pituitary stimulates the growth and development of primary follicles in the ovary.

Question 65 Sensory neuron characteristic

What unique characteristic is typically found in sensory neurons of spinal nerves?

- A. A single axon
- B. A single dendron ✓ **Correct answer**
- C. Multiple dendrites
- D. Multiple nodes of Ranvier

A. wrong: both sensory and motor neurons have a single axon, so this is not unique to sensory neurons.

B. correct: a typical sensory neuron of a spinal nerve has a single long dendron carrying impulses from the receptor to the cell body.

C. wrong: multiple dendrites are typical of motor neurons, not of these sensory neurons.

D. wrong: nodes of Ranvier occur on myelinated axons generally, not uniquely on sensory neurons.

Question 66 Nissl's granules

In which part of the neuron, Nissl's granules are present?

- A. Axoplasm

- C. Dendrite
- D. Soma (Cell body) ✓ **Correct answer**

A. wrong: Nissl's granules (rough endoplasmic reticulum) are absent from the axon.

B. wrong: the myelin sheath is a fatty insulating layer with no granules.

C. wrong: Nissl's granules are found in the cell body and the bases of dendrites, but the standard answer is the soma.

D. correct: Nissl's granules (stacks of rough endoplasmic reticulum) are concentrated in the cell body of the neuron.

Question 67 Cerebellum functions

Functions of cerebellum include:

- A. To act as relay station
- B. Conversion of short-term memories into long term memories
- C. To guide smooth and accurate motions and maintain body position ✓ **Correct answer**
- D. To act as link between nervous and chemical coordination

A. wrong: the thalamus is the brain's relay station, not the cerebellum.

B. wrong: memory consolidation is mainly the work of the hippocampus and cerebrum.

C. correct: the cerebellum coordinates precise, smooth movement and maintains posture and balance.

D. wrong: the hypothalamus links the nervous and endocrine systems, not the cerebellum.

Question 68 Specific immunity blood cells

What type of blood cells are primarily and specifically responsible for specific immunity?

hrocytes

- B. Thrombocytes
- C. Neutrophils
- D. Lymphocytes ✓ **Correct answer**

A. wrong: red blood cells carry oxygen; they have no immune role.

B. wrong: platelets are involved in blood clotting.

C. wrong: neutrophils are phagocytes of non-specific (innate) immunity.

D. correct: B and T lymphocytes provide specific (adaptive) immunity through antibodies and cell-mediated responses.

Question 69 Competitive inhibition

Which type of enzyme inhibition can be overcome by increasing substrate concentration?

- A. Non-competitive inhibition
- B. Competitive inhibition ✓ **Correct answer**
- C. Irreversible inhibition
- D. Allosteric inhibition

A. wrong: a non-competitive inhibitor binds elsewhere on the enzyme, so adding substrate cannot displace it.

B. correct: the inhibitor competes with the substrate for the active site, so raising the substrate concentration out-competes it.

C. wrong: an irreversible inhibitor binds permanently, so substrate cannot overcome it.

D. wrong: an allosteric inhibitor binds at a site other than the active site, so substrate cannot displace it.

70 Chromosome number

What would be the number of chromosomes in an animal cell whose sperm has 8 chromosomes?

- A. 4 chromosomes
- B. 16 chromosomes ✓ **Correct answer**
- C. 24 chromosomes
- D. 32 chromosomes

A. wrong: this is half the haploid number, not the diploid number.

B. correct: sperm are haploid (n = 8), so the diploid body cell has 2n = 16 chromosomes.

C. wrong: this is 3n, not the diploid number.

D. wrong: this is 4n, not the diploid number.

Question 71 Golgi apparatus

Which of the following best describes the Golgi apparatus?

- A. Site of energy production
- B. Packing and modification center of the cell ✓ **Correct answer**
- C. Storage of genetic material
- D. Site of protein synthesis

A. wrong: energy production is the mitochondria's job.

B. correct: the Golgi receives proteins from the endoplasmic reticulum, modifies them and packages them into vesicles.

C. wrong: genetic material is stored in the nucleus.

D. wrong: protein synthesis happens on ribosomes.

72 Natural selection

The offsprings of better-adapted individuals are expected to make up a larger proportion of the next generation. The most likely explanation is:

- A. Mutation
- B. Inheritance of Acquired characters
- C. Natural selection ✓ **Correct answer**
- D. Genetic drift

A. wrong: mutation creates new variation but does not by itself increase the share of better-adapted offspring.

B. wrong: this is Lamarck's (discredited) idea, not the explanation for differential reproduction.

C. correct: better-adapted individuals leave more offspring, so their traits spread through the next generation.

D. wrong: genetic drift is random change in allele frequency, not the spread of advantageous traits.

Question 73 Shivering control

Which body system is directly responsible for initiating shivering?

- A. Respiratory system
- B. Circulatory system
- C. Nervous system ✓ **Correct answer**
- D. Digestive system

A. wrong: the respiratory system exchanges gases; it does not start shivering.

B. wrong: blood vessels constrict in the cold, but the shivering response itself is triggered by the nervous system.

e hypothalamus detects the temperature fall and sends nerve impulses that make skeletal muscles shiver.

D. wrong: the digestive system plays no part in initiating shivering.

Question 74 Enterokinase

If enterokinase is absent in small intestine, which digestive enzyme remains inactive?

- A. Pepsinogen
- B. Trypsinogen ✓ **Correct answer**
- C. Amylase
- D. Lipase

A. wrong: pepsinogen is activated by stomach acid, not by enterokinase.

B. correct: enterokinase (enteropeptidase) converts trypsinogen into active trypsin in the small intestine.

C. wrong: amylase is secreted already active.

D. wrong: lipase is secreted already active.

Question 75 Neurotransmitter outside the brain

Which of the following neurotransmitters works outside the brain?

- A. Dopamine
- B. Serotonin
- C. Acetylcholine ✓ **Correct answer**
- D. Melatonin

A. wrong: dopamine acts mainly in the brain's reward and motor pathways.

B. wrong: serotonin acts mainly in the brain and in the gut, but the standard textbook answer for the transmitter at the neuromuscular junction (outside the brain) is

C. correct: acetylcholine is the transmitter at the neuromuscular junction and in the parasympathetic nervous system, acting outside the brain.

D. wrong: melatonin is a hormone of the pineal gland, not a neurotransmitter acting outside the brain.

Question 76 Fate of ammonia

Fate of ammonia released from amino acid during deamination in liver is:

- A. Carbon cycle
- B. Glycolysis
- C. Urea cycle ✓ **Correct answer**
- D. Kreb's cycle

A. wrong: the carbon cycle is an ecological process, not the fate of ammonia.

B. wrong: glycolysis breaks down glucose; it does not process ammonia.

C. correct: ammonia from deamination is converted into urea in the liver by the ornithine (urea) cycle, and urea is then excreted by the kidneys.

D. wrong: the Krebs cycle oxidises acetyl-CoA; it does not dispose of ammonia.

Question 77 Lacteal

Villi contains a lymph capillary called:

- A. Microvilli
- B. Brush border
- C. Lacteal ✓ **Correct answer**
- D. Lymph node

A. wrong: microvilli are tiny projections on the villus surface that increase absorptive area.

e brush border is the layer of microvilli on the villus surface.

C. correct: each villus contains a central lymph capillary (lacteal) that absorbs fats and carries them into the lymph.

D. wrong: lymph nodes are separate filtering organs, not part of a villus.

Question 78 Translation

Translation is:

- A. nucleus → mRNA → ribosome ✓ **Correct answer**
- B. nucleus → tRNA → ribosome
- C. nucleus → mRNA → ER
- D. nucleus → tRNA → ER

A. correct: mRNA is transcribed in the nucleus and travels to a ribosome, where it is translated into a polypeptide.

B. wrong: tRNA carries amino acids to the ribosome; it is not the message that is translated.

C. wrong: translation happens at the ribosome (on the rough ER for secreted proteins), but the flow is nucleus → mRNA → ribosome.

D. wrong: neither tRNA nor the ER is the message pathway of translation.

Question 79 Least-water nitrogenous waste

Which nitrogenous waste requires the least amount of water per gram of its excretion?

- A. Ammonia
- B. Urea
- C. Uric acid ✓ **Correct answer**
- D. Creatinine

ammonia is highly toxic and needs the most water to dilute it.

B. wrong: urea needs a moderate amount of water — more than uric acid.

C. correct: uric acid is almost insoluble and is excreted as a semi-solid, so it needs the least water of all.

D. wrong: creatinine is a minor waste product and needs more water than uric acid.

Question 80 Kidney stones

Kidney stones are mainly formed due to:

- A. Lower filtration of blood at Bowman's Capsule
- B. Protein breakdown in stomach
- C. Excessive glucose levels in blood
- D. High level of circulating calcium in blood ✓ **Correct answer**

A. wrong: reduced filtration does not cause stones; stones form from substances precipitating out of the urine.

B. wrong: protein digestion in the stomach has nothing to do with kidney stones.

C. wrong: high blood glucose causes diabetes and its complications, not kidney stones.

D. correct: most kidney stones are calcium oxalate or calcium phosphate, and excess circulating calcium promotes their formation.

Question 81 Capsomere

_____ is a repeated protein unit that makes the viral protein coat.

- A. Nucleic acid
- B. Capsomere ✓ **Correct answer**
- C. Core
- D. Envelop

cleic acid is the viral genome inside the coat, not the coat itself.

B. correct: the viral capsid (protein coat) is built from repeating protein subunits called capsomeres.

C. wrong: the core is the inner part of the virus containing the genome.

D. wrong: the envelope is an outer lipid membrane that some viruses have around the capsid.

Question 82 2-Butene isomerism

Which type of isomerism is exhibited by 2-Butene?

- A. Tautomerism
- B. Geometric isomerism ✓ **Correct answer**
- C. Functional group isomerism
- D. Metamerism

A. wrong: tautomerism involves a hydrogen shift (as in keto–enol), which 2-butene does not show.

B. correct: the C=C double bond in 2-butene cannot rotate, so cis-2-butene and trans-2-butene exist.

C. wrong: 2-butene has no isomer with a different functional group among the options.

D. wrong: metamerism involves different alkyl groups on either side of a functional group and does not apply here.

Question 83 Nylon-6,6 monomers

Nylon-6,6 is made from two monomers each of which contains:

- A. 6 carbon atoms ✓ **Correct answer**
- B. 6 amino groups

trogen atoms

- D. 6 carboxylic acid groups

A. correct: nylon-6,6 is made from hexamethylenediamine (6 carbons) and adipic acid (6 carbons) — hence the "6,6".

B. wrong: hexamethylenediamine has only 2 amino groups.

C. wrong: hexamethylenediamine has 2 nitrogen atoms; adipic acid has none.

D. wrong: adipic acid has only 2 carboxylic acid groups.

Question 84 Ionic vs molecular crystal

A student observes that solid substance "X" does not conduct electricity but conducts when melted, while substance "Y" does not conduct electricity in any state. What is the most appropriate classification of "X" and "Y"?

- A. X is a molecular crystal, Y is an ionic crystal
- B. X is an ionic crystal; Y is a molecular crystal ✓ **Correct answer**
- C. Both X and Y are ionic crystals
- D. Both X and Y are molecular crystals

A. wrong: this is the reverse of the observed behaviour.

B. correct: ionic crystals do not conduct when solid (ions are fixed) but conduct when molten (ions are free to move); molecular crystals do not conduct in either state because they contain no free ions.

C. wrong: if Y were ionic it would conduct when melted.

D. wrong: if X were molecular it would not conduct even when melted.

Question 85 Solubility product of AgBr

The solubility of AgBr is 7.1×10^{-7} M. This dissolved AgBr produces equal moles of Ag^+

n the solubility product of this equilibrium reaction would be:

- A. 5.041×10^{-13} ✓ **Correct answer**
- B. $4.941 \times 10^{+13}$
- C. 7.1×10^{-7}
- D. 14.082×10^{-14}

A. correct: $K_{sp} = [Ag^+][Br^-] = s^2 = (7.1 \times 10^{-7})^2 = 50.41 \times 10^{-14} = 5.041 \times 10^{-13}$.

B. wrong: the exponent is negative, not positive, and the value is wrong.

C. wrong: this is the solubility s, not the solubility product s^2.

D. wrong: this is $2 \times 7.1 \times 10^{-7} \times 10^{-7} = 14.2 \times 10^{-14}$, i.e. $2s^2$, not s^2.

Question 86 Solvent in aqueous methanol

What is the solvent in an aqueous solution of methanol?

- A. HCl
- B. Water ✓ **Correct answer**
- C. Methanol
- D. NaOH

A. wrong: HCl is not present in an aqueous methanol solution.

B. correct: in an aqueous solution the solvent is water and the solute is methanol.

C. wrong: methanol is the solute here, not the solvent.

D. wrong: NaOH is not present in an aqueous methanol solution.

Question 87 Amorphous solid

Which one of the following is the best example of an amorphous solid?

- A. Diamond

ss ✓ **Correct answer**

- C. Sodium chloride
- D. Potassium Bromide

A. wrong: diamond is a crystalline solid with a regular covalent lattice.

B. correct: glass has no regular crystal lattice; it is a supercooled liquid and the classic amorphous solid.

C. wrong: sodium chloride is a crystalline ionic solid.

D. wrong: potassium bromide is a crystalline ionic solid.

Question 88 PVC starting material

The starting material for the preparation of PVC is:

- A. Ethylene
- B. Acetylene ✓ **Correct answer**
- C. Vinyl alcohol
- D. Methylene

A. wrong: ethylene gives polyethylene, and the modern route to vinyl chloride uses ethylene, but the FSc textbook's starting material for PVC is acetylene (acetylene + HCl → vinyl chloride).

B. correct: per the FSc textbook, vinyl chloride (the monomer for PVC) is obtained from acetylene.

C. wrong: vinyl alcohol is unstable and is not the starting material for PVC.

D. wrong: methylene (CH_2) is a carbene intermediate, not the PVC starting material.

Question 89 Acetyl chloride reagent

Acetic acid is converted into acetyl chloride using which reagent?

nyl chloride ✓ **Correct answer**

- B. chlorine
- C. sodium chloride
- D. phosphorous trioxide

A. correct: $CH_3COOH + SOCl_2 \rightarrow CH_3COCl + SO_2 + HCl$; thionyl chloride is the standard reagent for this conversion.

B. wrong: chlorine does not convert a carboxylic acid into an acid chloride.

C. wrong: sodium chloride is inert in this reaction.

D. wrong: phosphorus trichloride (PCl_3) can also make acid chlorides, but the option as printed (phosphorous trioxide) is not the reagent; thionyl chloride is the keyed reagent.

Question 90 $NaBH_4$ reduction of 2-oxo-pentanal

Which of the following product will be formed when 2-oxo-pentanal is treated with $NaBH_4$?

- A. $CH_3CH(OH)CH_2CH_2OH$
- B. $CH_2CH_2CH_2CH_2CH_2OH$
- C. $CH_3CH(OH)CHCH(OH)CH_3$
- D. $CH_3CH_2CH_2CH(OH)CH_2(OH)$ ✓ **Correct answer**

A. wrong: this would be the product if the aldehyde were reduced but the ketone were not, with the wrong carbon count (it is a 4-carbon chain, not 5).

B. wrong: this is pentan-1-ol, which would require reducing the aldehyde and removing the ketone oxygen entirely; $NaBH_4$ does not do that.

C. wrong: this is pentane-2,4-diol, which has the wrong carbon skeleton (the carbonyls of 2-oxo-pentanal are at C-1 and C-2).

D. correct: $NaBH_4$ reduces both the aldehyde (C-1) and the ketone (C-2) to alcohols, giving

diol: $CH_3CH_2CH_2CH(OH)CH_2(OH)$.

Question 91 Avogadro's law volume

At a constant temperature and pressure, a 2.0 L container holds 0.5 moles of Nitrogen gas (N2). If an additional 1.0 mole of Nitrogen is pumped into the container without changing the temperature or pressure, what will be the new volume of the container?

- A. 3.0 L
- B. 4.0 L
- C. 6.0 L ✓ **Correct answer**
- D. 8.0 L

A. wrong: this would be the volume if only 0.5 more moles were added (total 1.0 mol).

B. wrong: this would be the volume if the total were 1.0 mol at double the original volume per mole, which does not match the numbers.

C. correct: by Avogadro's law $V \propto n$, so the new volume = 2.0 L × (1.5 mol / 0.5 mol) = 6.0 L.

D. wrong: this would require 2.0 moles total (4 times the original amount).

Question 92 Gas constant in $dm^3 \cdot torr$

The value of ideal gas constant in $dm^3.torr.\ K^{-1}.mol^{-1}$ is:

- A. 0.0821
- B. 1.98722
- C. 8.3143
- D. 62.364 ✓ **Correct answer**

A. wrong: this is R in $dm^3 \cdot atm \cdot K^{-1} \cdot mol^{-1}$.

B. wrong: this is R in $cal \cdot K^{-1} \cdot mol^{-1}$.

C. wrong: this is R in $J \cdot K^{-1} \cdot mol^{-1}$.

= 62.364 dm³ torr K⁻¹ mol⁻¹.

Question 93 Unpaired electrons in Fe^{2+}

How many unpaired electrons are there in Fe^{++}(Z=26)?

- A. 6
- B. 4 ✓ **Correct answer**
- C. 3
- D. 2

A. wrong: Fe^{2+} has 6 d-electrons, but two of them pair up, so only 4 are unpaired.

B. correct: Fe^{2+} is $[Ar]3d^6$; in the high-spin arrangement four of the six 3d electrons are unpaired.

C. wrong: this is not the number of unpaired 3d electrons in Fe^{2+}.

D. wrong: this would be the number for a low-spin d^6 complex, not for free Fe^{2+}.

Question 94 Cobalt block

An element X having atomic number "Z=27" belongs to which block of periodic table?

- A. s-block
- B. p-block
- C. d-block ✓ **Correct answer**
- D. f-block

A. wrong: s-block elements fill the s orbital last; cobalt fills the d orbital.

B. wrong: p-block elements fill the p orbital last.

C. correct: cobalt (Z = 27) has the configuration $[Ar]3d^74s^2$, so it is a d-block (transition) element.

D. wrong: f-block elements fill the f orbital last (lanthanides and actinides).

95 Cyclic process work

A thermodynamic system goes through a cyclic process which absorbs 1200 J heat and ejects 700 J heat. Which statement correctly describes this?

- A. The ΔE of a system increases by 500 J
- B. The ΔE of a system decreases by 500 J
- C. The system performs net work of 500 J ✓ **Correct answer**
- D. The surroundings perform net work of 500 J

A. wrong: in a cyclic process the system returns to its initial state, so ΔE = 0.

B. wrong: for the same reason, ΔE = 0 in a cyclic process.

C. correct: net heat absorbed = 1200 − 700 = 500 J, and in a cycle W = Q(net) = 500 J done by the system. (The paper prints "network" for "net work" in this option; the meaning is the same.)

D. wrong: the work is done by the system, not by the surroundings.

Question 96 Largest ionic radius in Period 3

Which of the following elements from Period 3 of Periodic table, has the largest ionic radius when forms a stable ion?

- A. Sodium
- B. Silicon
- C. Phosphorous ✓ **Correct answer**
- D. Chlorine

A. wrong: Na^{+} loses its outer electron and becomes much smaller than the neutral atom.

B. wrong: silicon does not form a stable simple ion in this context; Si^{4+} would be very small.

C. correct: the keyed answer is phosphorus, which forms the P^{3-} ion; the phosphide ion is the largest of the Period 3 stable ions in the paper's scheme (the anion gains electrons

rger than the neutral atom).

D. wrong: Cl^- is large, but the paper's key records phosphorus (P^{3-}) as the largest ionic radius in this set.

Question 97 Noble gas interactions

Which type of interaction is primarily responsible for holding molecules together in noble gases?

- A. Covalent bond
- B. Electrostatic forces of attraction
- C. Hydrogen bonding
- D. London dispersion forces ✓ **Correct answer**

A. wrong: noble gas atoms do not share electrons with each other.

B. wrong: this is too vague; the specific weak attraction between noble gas atoms is the London dispersion force.

C. wrong: noble gases contain no hydrogen and form no hydrogen bonds.

D. correct: instantaneous dipoles in noble gas atoms create weak London dispersion attractions, which is why they can be liquefied.

Question 98 Diethyl ether preparation

The reaction between ethyl chloride and dry silver oxide on heating yields:

- A. dimethyl ether
- B. diethyl ether ✓ **Correct answer**
- C. ethanoic acid
- D. ethanal

A. wrong: dimethyl ether comes from methyl chloride, not ethyl chloride.

$C_2H_5Cl + Ag_2O \rightarrow C_2H_5OC_2H_5 + 2AgCl$; this is Williamson's ether synthesis.

C. wrong: ethanoic acid is not formed from ethyl chloride and silver oxide.

D. wrong: ethanal is an aldehyde, not the ether product of this reaction.

Question 99 Phenol with bromine water

Phenol gives which colored precipitate with aqueous Br_2?

- A. red ppt
- B. white ppt ✓ **Correct answer**
- C. blue ppt
- D. orange ppt

A. wrong: phenol does not give a red precipitate with bromine water.

B. correct: phenol reacts with bromine water to give a white precipitate of 2,4,6-tribromophenol.

C. wrong: no blue precipitate is formed.

D. wrong: the orange colour is that of bromine water itself, not the precipitate.

Question 100 Pfund series

Pfund Series of spectral lines are produced forming the spectrum of hydrogen atom when electron jumps down to_____ orbit.

- A. 2nd
- B. 3rd
- C. 4th
- D. 5th ✓ **Correct answer**

A. wrong: the Balmer series ends at n = 2.

B. wrong: the Paschen series ends at n = 3.

e Brackett series ends at n = 4.

D. correct: the Pfund series is the set of lines produced when the electron falls to the 5th orbit (n = 5).

Question 101 Hydride ion configuration

The electronic configuration of H^- is:

- A. $1s^0$
- B. $1s^1$
- C. $1s^2$ ✓ **Correct answer**
- D. $1s^2,2s^1$

A. wrong: H^- has two electrons, not zero.

B. wrong: this is the configuration of a neutral hydrogen atom.

C. correct: the hydride ion has gained one electron, so it has two electrons in the 1s orbital.

D. wrong: this would be three electrons (lithium's configuration), not two.

Question 102 Grignard reagent with CO_2

Carboxylic acid can be formed by reaction of Grignard reagent with:

- A. Carbonate
- B. Carbon dioxide ✓ **Correct answer**
- C. Aldehyde
- D. Carbon mono oxide

A. wrong: a carbonate salt does not react with a Grignard reagent to give a carboxylic acid.

B. correct: RMgX + CO_2 → RCOOH (after hydrolysis); the Grignard reagent adds to carbon

ve a carboxylic acid with one extra carbon.

C. wrong: a Grignard reagent with an aldehyde gives a secondary alcohol, not a carboxylic acid.

D. wrong: carbon monoxide does not give a carboxylic acid with a Grignard reagent.

Question 103 Quantum numbers n=4, l=0

An electron having following set of values lies in: n = 4, l= 0, m = 0 & s = -1/2

- A. 4s ✓ **Correct answer**
- B. 4p
- C. 5s
- D. 5p

A. correct: n = 4 and l = 0 means the 4s subshell (l = 0 is s).

B. wrong: 4p would require l = 1.

C. wrong: 5s would require n = 5.

D. wrong: 5p would require n = 5 and l = 1.

Question 104 Ideal gas behaviour

At which condition real gases show ideal behavior?

- A. 100°C and 10 atm
- B. 1000°C and 20 atm
- C. 1000°C and 1 atm ✓ **Correct answer**
- D. 10°C and 100 atm

A. wrong: the pressure is too high and the temperature too low for ideal behaviour.

B. wrong: the temperature is high but the pressure is also high, so the gas deviates from ideal behaviour.

al gases behave most ideally at high temperature and low pressure, when the molecules are far apart and intermolecular forces are negligible.

D. wrong: low temperature and very high pressure give the greatest deviation from ideal behaviour.

Question 105 Crystalline solid

Which of the following statements describes a crystalline solid?

- A. Particles are randomly arranged with no repeating pattern
- B. Particles are arranged in a long-range, repeating 3D pattern ✓ **Correct answer**
- C. It softens gradually over a range of temperatures
- D. It has no definite shape or melting point

A. wrong: this describes an amorphous solid.

B. correct: this is the definition of a crystalline solid.

C. wrong: this is how an amorphous solid behaves; a crystalline solid has a sharp melting point.

D. wrong: crystalline solids have a definite shape and a sharp melting point.

Question 106 Percentage yield of CaO

The actual amount of CaO obtained on thermal decomposition of 25g of $CaCO_3$ is 12g. What is the approximate percentage yield? (Molar mass of $CaCO_3$ = 100, Molar mass of CaO = 56) $CaCO_3 \rightarrow CaO + CO_2$

- A. 50 %
- B. 60 %
- C. 86 % ✓ **Correct answer**
- D. 90 %

A. wrong: the theoretical yield is 14 g, and 12/14 is about 86%, not 50%.

/14 is about 86%, not 60%.

C. correct: 25 g $CaCO_3$ = 0.25 mol, giving 0.25 mol CaO = 14 g theoretical; % yield = 12/14 × 100 ≈ 86%.

D. wrong: 12/14 is about 86%, not 90%.

Question 107 Percentage yield

If actual yield and theoretical yield are 20g and 25g respectively, what will be the % yield?

- A. 60%
- B. 70%
- C. 80% ✓ **Correct answer**
- D. 85%

A. wrong: 20/25 is 0.8, not 0.6.

B. wrong: 20/25 is 0.8, not 0.7.

C. correct: % yield = (actual/theoretical) × 100 = 20/25 × 100 = 80%.

D. wrong: 20/25 is 0.8, not 0.85.

Question 108 Gas volume change

The new volume when pressure is halved while temperature and number of moles are doubled will be:

- A. Doubled
- B. Quadrupled
- C. Sextupled
- D. Octupled ✓ **Correct answer**

A. wrong: this accounts for only one of the three changes.

B. wrong: this accounts for only two of the three changes.

combination of these changes gives a factor of six.

D. correct: V = nRT/P, so the new volume = (2n × R × 2T) / (P/2) = 8 × (nRT/P) = 8 times the original volume.

Question 109 E1 rate dependence

Rate of reaction in E_1 depends on the:

- A. R-X only ✓ **Correct answer**
- B. Base only
- C. Nucleophile only
- D. Both base and R-X

A. correct: E1 is a unimolecular elimination; its rate-determining step is the ionisation of the alkyl halide, so the rate depends only on [R-X].

B. wrong: the base is not involved in the rate-determining step of E1.

C. wrong: the nucleophile is not involved in the rate-determining step.

D. wrong: that would be the E2 rate law, not E1.

Question 110 Third-order rate

For 3rd order reaction rate=$k[A][B]^2$ when concentration of both reactant is doubled the new rate becomes:

- A. halved
- B. doubled
- C. quadrupled
- D. octupled ✓ **Correct answer**

A. wrong: doubling concentrations increases the rate, it does not halve it.

B. wrong: the rate depends on $[A]^1[B]^2$, so doubling both gives $2 \times 2^2 = 8$.

s would be the result if only [B] were doubled.

D. correct: new rate = $k(2[A])(2[B])^2 = 8k[A][B]^2$, i.e. eight times the original rate.

Question 111 Grignard reagent with methanal

Grignard's reagent is treated with methanal to produce:

- A. Phenol
- B. Primary alcohol ✓ **Correct answer**
- C. Propanoic acid
- D. Ketone

A. wrong: phenol is not formed from a Grignard reagent and methanal.

B. correct: a Grignard reagent adds to formaldehyde (methanal) to give a primary alcohol after hydrolysis.

C. wrong: propanoic acid is formed from a Grignard reagent and carbon dioxide, not methanal.

D. wrong: ketones are formed from Grignard reagents with nitriles or with esters (two equivalents), not with methanal.

Question 112 Electron probability maximum

Probability of finding an electron is maximum in:

- A. Orbit
- B. Orbital ✓ **Correct answer**
- C. Degenerate orbit
- D. Nodes

A. wrong: an orbit is a fixed circular path of the old Bohr model; the probability of finding an electron is described by an orbital.

n orbital is the region of space where the probability of finding an electron is maximum.

C. wrong: degenerate orbitals are orbitals of equal energy, not the region of maximum probability.

D. wrong: a node is a region where the probability of finding an electron is zero.

Question 113 Alkyne hydration exception

All alkynes give ketones on hydration EXCEPT:

- A. Acetylene ✓ **Correct answer**
- B. Propyne
- C. Butyne
- D. Pentyne

A. correct: hydration of acetylene (ethyne) gives acetaldehyde (an aldehyde), while all other terminal and internal alkynes give ketones.

B. wrong: hydration of propyne gives acetone (a ketone).

C. wrong: hydration of butyne gives a ketone.

D. wrong: hydration of pentyne gives a ketone.

Question 114 Benzene stability

Benzene is stable because of:

- A. containing single bond
- B. presence of delocalization of π electron ✓ **Correct answer**
- C. containing sp^3 hybridized carbon
- D. isolated double bonds

A. wrong: benzene contains both single and double bonds; a single bond alone does not

ability.

B. correct: the six π electrons are delocalised over the whole ring, giving benzene its extra (resonance) stability.

C. wrong: benzene carbons are sp^2 hybridised, not sp^3.

D. wrong: benzene's double bonds are conjugated, not isolated; isolated double bonds would make it reactive like an alkene.

Question 115 Lattice energy across a period

The value of lattice energy across the period in the periodic table:

- A. Increases ✓ **Correct answer**
- B. Decreases
- C. Remains same
- D. Changes randomly

A. correct: across a period the ionic charge generally rises and ionic size falls, so the lattice energy (which depends on charge/size) increases.

B. wrong: lattice energy increases across a period, it does not decrease.

C. wrong: lattice energy changes systematically across a period.

D. wrong: the change is systematic, not random.

Question 116 Primary alcohol to carboxylic acid

Primary alcohol can be converted into carboxylic acid by:

- A. CH_3COOH/P_2O_5
- B. NH_3
- C. CH_3OH
- D. $H_2SO_4/K_2Cr_2O_7$ ✓ **Correct answer**

etic acid with phosphorus pentoxide does not oxidise a primary alcohol to a carboxylic acid.

B. wrong: ammonia does not oxidise alcohols.

C. wrong: methanol is itself an alcohol, not an oxidising agent.

D. correct: acidified potassium dichromate is a strong oxidising agent that oxidises a primary alcohol all the way to the carboxylic acid.

Question 117 Transition element

Select the true statement for a transition element.

- A. All are hard and weak metals with low melting point
- B. All are hard and strong metals with high melting point ✓ **Correct answer**
- C. All are soft and strong metals with high melting point
- D. All are soft and weak metals with low melting point

A. wrong: transition metals are strong, not weak, and have high melting points.

B. correct: transition metals are generally hard, strong and high-melting because of strong metallic bonding involving d electrons.

C. wrong: transition metals are hard, not soft.

D. wrong: this describes alkali metals, not transition metals.

Question 118 Iodoform test

Which of the following tests is used for distinguishing methyl ketones from other ketones?

- A. Silver mirror test
- B. Silver nitrate test
- C. Iodoform test ✓ **Correct answer**

A. wrong: the Tollens (silver mirror) test distinguishes aldehydes from ketones, not methyl ketones from other ketones.

B. wrong: silver nitrate tests for halide ions, not for methyl ketones.

C. correct: methyl ketones (and ethanol) give a yellow precipitate of iodoform with I_2/NaOH, while other ketones do not.

D. wrong: the Lucas test distinguishes primary, secondary and tertiary alcohols.

Question 119 Gas volume at STP

9.03×10^{23} molecules of an ideal gas at STP will have volume of:

- A. 11.2 dm^3
- B. 22.4 dm^3
- C. 33.6 dm^3 ✓ **Correct answer**
- D. 44.8 dm^3

A. wrong: this is the volume of 0.5 mol at STP.

B. wrong: this is the volume of 1 mol (6.02×10^{23} molecules) at STP.

C. correct: 9.03×10^{23} molecules = 1.5 mol, and $1.5 \times 22.4\ dm^3 = 33.6\ dm^3$.

D. wrong: this is the volume of 2 mol at STP.

Question 120 Zero-order rate

Rate = $k[A]^0[B]$ If we double the concentration of A and B, the rate of reaction becomes:

- A. remains the same
- B. gets doubled ✓ **Correct answer**
- C. gets tripled
- D. gets halved

The rate depends on [B]^1, so doubling B changes the rate.

B. correct: the rate = k[A]^0[B] = k[B], so doubling [B] doubles the rate (doubling [A] has no effect because its order is zero).

C. wrong: no combination of these changes gives a factor of three.

D. wrong: doubling concentrations cannot halve the rate here.

Question 121 Oxidation numbers in NH_4NO_3

The oxidation number of both nitrogen atoms in NH_4NO_3 is/are:

- A. +4 and -4
- B. -3 and +5 ✓ **Correct answer**
- C. -4 and +6
- D. -4 and +5

A. wrong: neither nitrogen in ammonium nitrate has these oxidation numbers.

B. correct: in NH_4^+ the nitrogen is −3, and in NO_3^- the nitrogen is +5.

C. wrong: nitrogen does not take these oxidation numbers here.

D. wrong: the ammonium nitrogen is −3, not −4.

Question 122 Subshell electron capacity

The maximum number of electrons a subshell with azimuthal quantum number (ℓ) can accommodate is calculated by:

- A. ℓ +1
- B. 2ℓ +1
- C. 2(2ℓ +1) ✓ **Correct answer**
- D. 2ℓ +2

A. wrong: this is not the electron capacity of a subshell.

This is the number of orbitals in the subshell, not the number of electrons.

C. correct: a subshell has $(2\ell+1)$ orbitals, each holding 2 electrons, so its maximum capacity is $2(2\ell+1)$.

D. wrong: this is not the electron capacity of a subshell.

Question 123 Galvanic cell oxidation

In galvanic cell oxidation occurs on:

- A. Cathode
- B. Anode ✓ **Correct answer**
- C. Salt bridge
- D. Electrolyte

A. wrong: reduction occurs at the cathode.

B. correct: oxidation always occurs at the anode, in both galvanic and electrolytic cells.

C. wrong: the salt bridge maintains electrical neutrality; no redox reaction occurs there.

D. wrong: the electrolyte is the conducting medium, not the site of oxidation.

Question 124 Oxidation number of Cl in $HClO_3$

The oxidation number of Cl in $HClO_3$ is:

- A. 1-
- B. 5-
- C. 1+
- D. 5+ ✓ **Correct answer**

A. wrong: this is the oxidation number of chlorine in HCl, not in chloric acid.

B. wrong: chlorine cannot have a negative oxidation number of -5.

s is the oxidation number of chlorine in hypochlorous acid (HClO).

D. correct: in $HClO_3$, H is +1 and each O is −2, so Cl must be +5 for the molecule to be neutral.

Question 125 Mass of 0.5 mol $CaCO_3$

What will be the mass of 0.5 moles of $CaCO_3$?

- A. 50 g ✓ **Correct answer**
- B. 55 g
- C. 45 g
- D. 60 g

A. correct: the molar mass of $CaCO_3$ is 100 g/mol, so 0.5 mol × 100 g/mol = 50 g.

B. wrong: this would be the mass of 0.55 mol.

C. wrong: this would be the mass of 0.45 mol.

D. wrong: this would be the mass of 0.6 mol.

Question 126 Surface area and dissolution

Sara dissolved 5 g each of crushed and large sized crystal of copper sulphate in two separate test tubes containing 10 mL water. After 5 minutes of stirring, she observed that the test tube containing crushed copper sulphate had dissolved in water while the test tube containing the large sized crystal still showed undissolved form. The reason for FASTER dissolution is that the crushed copper sulphate:

- A. are more in density
- B. have greater surface area ✓ **Correct answer**
- C. are low in density
- D. have smaller surface area

A. wrong: crushing does not change the density of copper sulphate.

ushed crystals expose a much larger total surface area to the water, so dissolution is faster.

C. wrong: crushing does not change the density.

D. wrong: crushing increases the surface area; it does not reduce it.

Question 127 Projectile maximum range

For a projectile, the angle of projection for maximum horizontal range is:

- A. 22.5^0
- B. 30^0
- C. 45^0 ✓ **Correct answer**
- D. 60^0

A. wrong: at 22.5° the range is less than the maximum.

B. wrong: at 30° the range is less than the maximum.

C. correct: range $R = v^2\sin2\theta/g$ is maximum when $\sin2\theta = 1$, i.e. $2\theta = 90°$, so $\theta = 45°$.

D. wrong: at 60° the range equals that at 30°, which is less than the maximum.

Question 128 Speed of sound on a rainy day

The speed of sound is faster on a rainy day because:

- A. mass of moist air is more than the dry air
- B. density of moist air is less than the dry air ✓ **Correct answer**
- C. temperature of the medium remains the same
- D. medium of propagation of sound remains the same

A. wrong: water vapour is lighter than nitrogen and oxygen, so moist air is less dense, not more massive per unit volume.

B. correct: moist air is less dense than dry air, and the speed of sound varies as $1/\sqrt{\rho}$, so

C. wrong: the temperature is not what makes sound faster on a rainy day; the lower density does.

D. wrong: the medium does change (dry air becomes moist air), and that change is the cause.

Question 129 Potential midway between opposite charges

Two opposite point charges, each of magnitude Q are separated by a distance s. The electric potential at a point mid-way between them is:

- A. q
- B. -kq/s
- C. infinity
- D. zero ✓ **Correct answer**

A. wrong: the potential is not equal to the charge; the two potentials cancel.

B. wrong: this is not the value at the midpoint; the +Q and −Q potentials are equal and opposite there.

C. wrong: the potential is finite at the midpoint, which is at a finite distance from both charges.

D. correct: at the midpoint $V = kQ/(s/2) + k(-Q)/(s/2) = 0$, because the equal and opposite potentials cancel.

Question 130 Fan angular velocity

A fan rotates uniformly at the rate of 2 rev/s. Its angular velocity in SI units will be:

- A. 2π rev/s
- B. 4π rev/min
- C. π/2 rad/s

A. wrong: this is the angular velocity in revolutions per second expressed as 2π, not the value in rad/s.

B. wrong: this mixes the number 4π with the wrong unit (rev/min instead of rad/s).

C. wrong: this is a quarter of the correct value.

D. correct: ω = 2πf = 2π × 2 = 4π rad/s; the SI unit of angular velocity is rad/s.

Question 131 AC to DC conversion

The process of conversion of alternating current into direct current is known as:

- A. modulation
- B. polarisation
- C. rectification ✓ **Correct answer**
- D. quantisation

A. wrong: modulation varies a carrier wave to carry a signal.

B. wrong: polarisation is the restriction of a wave's oscillations to one plane.

C. correct: rectification converts alternating current into direct current, usually with diodes.

D. wrong: quantisation is the division of a quantity into discrete values.

Question 132 Standing wave frequency

If the speed of a standing wave in a string is 2 m/s and its wavelength is 0.25 m, then the frequency of the standing wave will be:

- A. 0.125 Hz
- B. 2.0 Hz
- C. 4.0 Hz

Hz ✓ **Correct answer**

A. wrong: this is λ/v, the inverse of the correct calculation.

B. wrong: this is the wave speed, not the frequency.

C. wrong: this is half the correct frequency.

D. correct: f = v/λ = 2/0.25 = 8 Hz.

Question 133 Wave speed definition

The distance traveled by a wave in unit time is termed as:

- A. Wavelength
- B. Amplitude
- C. Displacement
- D. Wave speed ✓ **Correct answer**

A. wrong: wavelength is the distance between two successive points in phase, not the distance travelled per unit time.

B. wrong: amplitude is the maximum displacement from the mean position.

C. wrong: displacement is the distance of a particle from its mean position.

D. correct: wave speed is the distance the wave travels in unit time (v = fλ).

Question 134 Wave frequency

The frequency of a wave having wavelength 0.5m while passing a point with speed of 4 m/s is:

- A. 2 Hz
- B. 4 Hz
- C. 6 Hz
- D. 8 Hz ✓ **Correct answer**

is is λ × v divided by 4, not f = v/λ.

B. wrong: this is the wave speed, not the frequency.

C. wrong: no combination of these numbers gives 6 Hz.

D. correct: f = v/λ = 4/0.5 = 8 Hz.

Question 135 Transverse waves in a slinky

If particles of a slinky spring are moving perpendicularly to the propagation of the waves, then waves in the slinky spring will be:

- A. matter waves
- B. electromagnetic waves
- C. transverse waves ✓ **Correct answer**
- D. longitudinal waves

A. wrong: matter waves are associated with moving particles in quantum mechanics, not with slinky vibrations.

B. wrong: electromagnetic waves need no medium; a slinky carries mechanical waves.

C. correct: when the particles vibrate perpendicular to the direction the wave travels, the wave is transverse.

D. wrong: in a longitudinal wave the particles vibrate parallel to the direction of propagation.

Question 136 J/mol·K quantity

The quantity measured in J/mol.K is

- A. Specific heat
- B. Thermal conductivity
- C. Molar specific heat ✓ **Correct answer**

A. wrong: specific heat is measured in J/kg·K (per unit mass), not per mole.

B. wrong: thermal conductivity is measured in W/m·K.

C. correct: molar specific heat is the heat per mole per kelvin, measured in J/mol·K.

D. wrong: latent heat is measured in J/kg (or J/mol), not in J/mol·K.

Question 137 Velocity-time graph for constant acceleration

When a car is moving with constant acceleration, the shape of velocity time graph is:

- A. Parabola
- B. Incline curve
- C. Straight line ✓ **Correct answer**
- D. Decline curve

A. wrong: a parabola is the shape of the displacement–time graph under constant acceleration, not the velocity–time graph.

B. wrong: the velocity–time graph under constant acceleration is a straight line, not a curve.

C. correct: with constant acceleration the velocity changes at a constant rate, so v = u + at gives a straight line.

D. wrong: the graph is a straight line; it only declines if the acceleration is negative, and it is still straight.

Question 138 Rate of change of momentum

Time rate of change of momentum of a body equals the:

- A. Impulse
- B. Force ✓ **Correct answer**

- D. Velocity

A. wrong: impulse is the change in momentum (F × t), not its rate of change.

B. correct: Newton's second law states F = dp/dt, so the rate of change of momentum equals the force.

C. wrong: torque is the rate of change of angular momentum.

D. wrong: velocity is the rate of change of displacement, not of momentum.

Question 139 Slope of displacement-time tangent

In a displacement-time graph, the slope of the tangent drawn at a specific point on the curve indicates the object's

- A. Average velocity over entire graph
- B. Instantaneous velocity at that point ✓ **Correct answer**
- C. Instantaneous velocity at the starting point
- D. Instantaneous velocity at the final point

A. wrong: the average velocity is the slope of the chord joining the start and end points, not the tangent at one point.

B. correct: the tangent's slope at a point gives the velocity at that instant.

C. wrong: the tangent at one point gives the velocity at that point only, not at the start.

D. wrong: the tangent at one point gives the velocity at that point only, not at the end.

Question 140 Lenz's law

Which of the following statements explains by Lenz's law of electromagnetic induction?

- A. The production of induced e.m.f.
- B. The magnitude of induced e.m.f.

direction of induced e.m.f. ✓ **Correct answer**

- D. The strength of induced e.m.f.

A. wrong: the production of induced emf is described by Faraday's law, not Lenz's law.

B. wrong: the magnitude is given by Faraday's law (emf = −N dΦ/dt), not Lenz's law.

C. correct: Lenz's law states that the induced current flows in the direction that opposes the change producing it — it gives the direction of the induced emf.

D. wrong: the strength (magnitude) is given by Faraday's law.

Question 141 Simple harmonic motion

When a particle executes simple harmonic motion, the quantity $4\pi^2f^2$ is equal to :

- A. gl
- B. g/l ✓ **Correct answer**
- C. l/g
- D. √g/l

A. wrong: $4\pi^2f^2$ has dimensions of $1/\text{time}^2$, while gl has dimensions of $\text{length}^2/\text{time}^2$.

B. correct: for a simple pendulum, $f = (1/2\pi)\sqrt{(g/l)}$, so $4\pi^2f^2 = g/l$.

C. wrong: this is the reciprocal of the correct quantity (it has dimensions of time^2).

D. wrong: $4\pi^2f^2$ equals g/l, not its square root.

Question 142 Half-life

At a certain time, 50% of a radioactive sample remains undecayed. After 10 seconds, only 12.5% of the sample remains. The half-life of the substance is:

- A. 2.5 s
- B. 3.3 s
- C. 5 s ✓ **Correct answer**

A. wrong: with a 2.5 s half-life, the sample would fall to 12.5% in 7.5 s, not 10 s.

B. wrong: no whole number of 3.3 s half-lives takes 50% to 12.5% in 10 s.

C. correct: 50% → 25% → 12.5% is two half-lives in 10 s, so one half-life is 5 s.

D. wrong: one half-life of 10 s would leave 25% after 10 s, not 12.5%.

Question 143 Induced emf in a moving coil

A conducting coil with its plane perpendicular to a uniform magnetic field is moved at constant speed in the field region, the induced emf in the coil is:

- A. zero
- B. constant ✓ **Correct answer**
- C. increasing
- D. decreasing

A. also defensible: if the coil stays wholly inside the uniform field, the magnetic flux through it does not change, so the induced emf is zero; the key page's own solved section gives this as its headline answer while noting that UHS marked (b).

B. the official key's answer: taken as a coil entering or leaving the field at constant speed, the flux changes at a steady rate, so the induced emf is constant.

C. wrong: under either reading the emf is not increasing; it is either zero or constant.

D. wrong: under either reading the emf is not decreasing. PICK-ONE (decided by assistant under owner's 8 Nov 2026 delegation): the stem does not say whether the coil stays inside the field or crosses its edge, so both A and B are defensible readings; the official Key D records B and B is served.

144 Potential difference

The work done between two points per unit positive charge against the electric field due to a source charge is called as:

- A. Electric Power
- B. Electric Potential difference ✓ **Correct answer**
- C. Electric flux
- D. Electric field Intensity

A. wrong: electric power is the rate of doing electrical work (VI), not work per unit charge.

B. correct: potential difference ΔV = W/q is the work done per unit positive charge in moving it between two points against the field.

C. wrong: electric flux is the number of field lines passing through a surface.

D. wrong: electric field intensity is the force per unit charge (E = F/q).

Question 145 Neon spectral lines

In the atomic spectrum of neon each line represents:

- A. A different atom
- B. A different element
- C. A photon with specific energy ✓ **Correct answer**
- D. An atom splitting

A. wrong: all the lines come from neon atoms; they do not represent different atoms.

B. wrong: the spectrum is of neon alone.

C. correct: each spectral line comes from an electron transition between two energy levels, emitting a photon of one definite energy (E = hf).

D. wrong: spectral lines do not represent atoms splitting.

146 Spray bottle

In a spray bottle, pressing the nozzle causes fast air flow, which:

- A. creates high pressure to lift the liquid
- B. creates low pressure to lift the liquid ✓ **Correct answer**
- C. increases pressure at the tube opening
- D. reduces liquids surface tension

A. wrong: fast-moving air has low pressure, not high pressure.

B. correct: by Bernoulli's principle, fast-moving air has low pressure, so atmospheric pressure on the liquid pushes it up the tube.

C. wrong: the pressure at the tube opening falls, not rises.

D. wrong: the fast air flow does not act by reducing surface tension.

Question 147 Force and acceleration

A force of 10 N acts on a body of mass 2 kg. The acceleration produced is:

- A. 5 m/s^2 ✓ **Correct answer**
- B. 10 m/s^2
- C. 20 m/s^2
- D. 0.2 m/s^2

A. correct: $a = F/m = 10/2 = 5\ m/s^2$.

B. wrong: this is the force divided by 1 kg, not by 2 kg.

C. wrong: this is F × m, not F/m.

D. wrong: this is m/F, the inverse of the correct calculation.

148 Gravitational potential energy ratio

Two identical masses are placed at heights h and 2h, the ratio of gravitational potential energies will be:

- A. 1:2 ✓ **Correct answer**
- B. 2:1
- C. equal
- D. dependent on mass

A. correct: P.E. = mgh, so for equal masses $P.E._1 : P.E._2 = h : 2h = 1 : 2$.

B. wrong: this is the inverse ratio.

C. wrong: the masses are at different heights, so their potential energies differ.

D. wrong: the masses are identical, so the ratio depends only on the heights.

Question 149 Scalar product of parallel vectors

The scalar product of two parallel vectors is equal to:

- A. Zero
- B. Square of the magnitude
- C. Product of their magnitude ✓ **Correct answer**
- D. Sum of their magnitude

A. wrong: the scalar product of parallel vectors is maximum, not zero (zero is the result for perpendicular vectors).

B. wrong: this would be true only if the two vectors had the same magnitude.

C. correct: $A \cdot B = AB \cos \theta$; for parallel vectors $\theta = 0°$, $\cos 0° = 1$, so $A \cdot B = AB$.

D. wrong: the scalar product is a product, not a sum.

150 Volume flow rate

The volume flow rate is equal to:

- A. mv
- B. Av ✓ **Correct answer**
- C. Aρ
- D. vρ

A. wrong: mv is momentum, not volume flow rate.

B. correct: volume flow rate is the volume of fluid passing per second, equal to cross-sectional area × speed (Av), in m^3/s.

C. wrong: area × density has no meaning as a flow rate.

D. wrong: speed × density is mass flow rate per unit area, not volume flow rate.

Question 151 Work at the cost of internal energy

In which process the work is done on the cost of internal energy?

- A. Isochoric process
- B. Isobaric process
- C. Isothermal process
- D. Adiabatic process ✓ **Correct answer**

A. wrong: in an isochoric process the volume is constant, so no work is done at all.

B. wrong: in an isobaric process the work is done at the cost of heat supplied, not of internal energy.

C. wrong: in an isothermal process the internal energy stays constant and the work is done by heat absorbed.

D. correct: in an adiabatic process Q = 0, so $\Delta U = -W$; any work done by the gas comes from its internal energy.

152 Isothermal internal energy

In an isothermal process internal energy of the system:

- A. Decreases
- B. Increases
- C. Remain the same ✓ **Correct answer**
- D. Becomes zero

A. wrong: the internal energy of an ideal gas depends only on temperature, which is constant here.

B. wrong: for the same reason, the internal energy cannot increase.

C. correct: internal energy of an ideal gas depends only on temperature; temperature stays constant in an isothermal process, so $\Delta U = 0$.

D. wrong: the internal energy stays at its original value; it does not become zero.

Question 153 Adiabatic expansion

A gas expands adiabatically and does 10 J of work then the change in internal energy is:

- A. 10J
- B. -10J ✓ **Correct answer**
- C. 20J
- D. 0J

A. wrong: this has the wrong sign; the internal energy falls when the gas does work adiabatically.

B. correct: adiabatic means $Q = 0$, so $\Delta U = Q - W = 0 - 10 = -10$ J.

C. wrong: no combination of the numbers gives 20 J.

D. wrong: the internal energy changes by -10 J; it is not unchanged.

154 Continuity equation

The equation of continuity Av = constant. The constant shows:

- A. volume of fluid
- B. mass the of fluid
- C. density the of fluid
- D. volume flow rate ✓ **Correct answer**

A. wrong: Av is a rate (volume per second), not a volume.

B. wrong: Av has units m^3/s; mass flow rate would be Aρv.

C. wrong: density does not appear in Av.

D. correct: Av has units $m^2 \times m/s = m^3/s$, the volume of fluid flowing per second.

Question 155 Ideal transformer

The quantity that remains constant in an ideal transformer is:

- A. Voltage
- B. Current
- C. Power ✓ **Correct answer**
- D. Heat

A. wrong: a transformer changes the voltage; that is its purpose.

B. wrong: the current changes in inverse proportion to the voltage.

C. correct: an ideal transformer has no losses, so input power equals output power ($V_pI_p = V_sI_s$) while voltage and current change.

D. wrong: an ideal transformer produces no heat; heat is a loss in a real transformer.

156 First law of thermodynamics

First law of thermodynamics states that:

- A. ΔQ = ΔU + ΔW ✓ **Correct answer**
- B. ΔQ = ΔU − ΔW
- C. ΔU = ΔQ + ΔW
- D. ΔW = ΔU + ΔQ

A. correct: heat supplied to a system goes to raising its internal energy and doing work; this is the FSc physics form of the first law, and the key page's solved section confirms it.

B. wrong: with the physics sign convention (W = work done BY the system) the minus sign is incorrect; note that B and C below are algebraically the same equation in the chemistry sign convention (work done ON the system), which is not the convention the paper uses.

C. wrong: this is the chemistry sign convention (W = work done ON the system); the FSc physics convention is A.

D. wrong: this rearrangement is not the first law in either convention.

Question 157 Bullet piercing a target

A bullet fired from gun pierces a target due to:

- A. Mechanical energy
- B. Heat energy
- C. Kinetic energy ✓ **Correct answer**
- D. Potential energy

A. wrong: mechanical energy is the general term; the specific energy that does the piercing is the bullet's kinetic energy.

B. wrong: the bullet is not hot enough for heat to pierce the target.

C. correct: a fired bullet moves at high speed, and its kinetic energy (½mv^2) does the work

ne target.

D. wrong: a fired bullet's energy is kinetic, not potential.

Question 158 Wavelength

If 10 waves pass through a denser medium in 1 second with a speed of 10 m/sec, then the wavelength of the wave will be:

- A. 0.1 m
- B. 1 m ✓ **Correct answer**
- C. 10 m
- D. 100 m

A. wrong: this is 1/f, not v/f.

B. correct: f = 10 Hz, so λ = v/f = 10/10 = 1 m.

C. wrong: this is the wave speed, not the wavelength.

D. wrong: this is v × f, not v/f.

Question 159 Node point

The place where compressions of a sound wave combine with the rarefactions of another sound wave and cancel each other is called a:

- A. dead beat
- B. null point
- C. zero point
- D. node point ✓ **Correct answer**

A. wrong: "dead beat" is not the standard wave term for a point of cancellation; the key page's solved section explicitly corrects this to node point.

B. wrong: "null point" is a loose descriptive phrase, not the standard term for a point of no

a standing wave.

C. wrong: this is not the standard term.

D. correct: where a compression meets a rarefaction, destructive interference gives zero displacement; such a point of no vibration is a node.

Question 160 Steady current

What is the reason for the steady current flow in a circuit?

- A. Presence of very large resistance
- B. Presence of a constant voltage source in circuit ✓ **Correct answer**
- C. presence of switch in circuit
- D. Presence of ammeter in circuit

A. wrong: a large resistance reduces the current; it does not make it steady.

B. correct: a constant voltage source (e.g. a battery) keeps a steady potential difference across the circuit, which drives a steady current.

C. wrong: a switch only opens or closes the circuit; it does not make the current steady.

D. wrong: an ammeter only measures the current; it does not cause it to be steady.

Question 161 Cobalt-60 use

Cobalt-60, a radioisotope, is used in hospitals:

- A. for X-rays image
- B. to damage the cancer cells ✓ **Correct answer**
- C. to damage the healthy cells
- D. for surgical equipment sterilization

A. wrong: cobalt-60 is not used for X-ray imaging; X-ray machines produce their own X-rays.

cobalt-60 emits gamma rays that are used in radiotherapy to destroy cancer cells.

C. wrong: damaging healthy cells is an unwanted side effect, not the purpose of the treatment.

D. wrong: cobalt-60 gamma rays are used for sterilisation in industry, but the hospital use asked for is cancer treatment.

Question 162 Random nature of radioactive decay

What is meant by random nature of radioactive decay of a substance?

- A. We cannot control the decay rate
- B. Probability of decay of every unstable nucleus is constant ✓ **Correct answer**
- C. We can locate every next decaying nuclei
- D. We can speed up the decay process

A. wrong: this is a consequence of the random nature, not its meaning; the keyed answer is the constant probability.

B. correct: random decay means each unstable nucleus has the same constant chance of decaying per unit time, so we cannot predict which nucleus will decay next.

C. wrong: this is the opposite of randomness.

D. wrong: the decay rate cannot be changed by external means.

Question 163 Contentious

He was known for resolving contentious matters. The underlined word in the context means:

- A. Disputed ✓ **Correct answer**
- B. Secretive
- C. Unethical

A. correct: "contentious" means causing argument or disagreement, i.e. disputed.

B. wrong: contentious has nothing to do with secrecy.

C. wrong: a contentious matter is disputed, not necessarily unethical.

D. wrong: contentious has nothing to do with privacy.

Question 164 Adverb of place

Identify which type of an adverb is used in the following sentence? "The cat chased the rat everywhere".

- A. adverb of time
- B. adverb of manner
- C. adverb of frequency
- D. adverb of place ✓ **Correct answer**

A. wrong: "everywhere" does not say when the action happened.

B. wrong: "everywhere" does not say how the action happened.

C. wrong: "everywhere" does not say how often the action happened.

D. correct: "everywhere" tells where the action happened, so it is an adverb of place.

Question 165 Correct punctuation

Which of the following sentences is correctly punctuated?

- A. I love Pakistan! ✓ **Correct answer**
- B. Wow. That's amazing
- C. Lets eat. Grandma.
- D. He's not coming, is he

This sentence is complete and correctly punctuated with an exclamation mark.

B. wrong: "That's amazing" needs an exclamation mark, and "Wow." should be "Wow!".

C. wrong: it should be "Let's eat, Grandma." (apostrophe in "Let's" and a comma before "Grandma").

D. wrong: a question tag needs a question mark at the end ("is he?").

Question 166 Head of the table

The captain stood at the head of the table during the meeting. What does "head" most likely mean?

- A. A body part
- B. A leader or position of authority ✓ **Correct answer**
- C. The front part of something
- D. A senior person

A. wrong: "head" here is used figuratively, not as a body part.

B. correct: the head of the table is the seat of authority, where the person leading the meeting sits.

C. wrong: this is too vague; the idiom means the position of authority.

D. wrong: the captain may be senior, but "head of the table" means the seat of authority, not merely seniority.

Question 167 Direct speech

What is the correct direct speech form of the sentence: He claimed that he could speak French fluently.

- A. He claimed, "I can speak French fluently." ✓ **Correct answer**
- B. He claimed, "I am speaking French fluently."

claimed, "I speak French fluently."

- D. He claimed, "I was speaking French fluently."

A. correct: in indirect speech "can" changes to "could", so in direct speech "could" goes back to "can" and "he" becomes "I".

B. wrong: "am speaking" does not correspond to "could speak".

C. wrong: "speak" (simple present) would become "spoke" in indirect speech, not "could speak".

D. wrong: "was speaking" would become "had been speaking" in indirect speech, not "could speak".

Question 168 Indirect speech

The student said, "I am taking extra classes so that I can improve my grades before the finals." The most appropriate indirect form of the given sentence is:

- A. The student said that he was taking extra classes so that he can improve his grades before the finals.
- B. The student said that he had taken extra classes so that he can improve his grades before the finals.
- C. The student said that he had been taking extra classes so that he could improve his grades before the finals.
- D. The student said that he was taking extra classes so that he could improve his grades before the finals. ✓ **Correct answer**

A. wrong: with a past reporting verb, "can" must change to "could"; leaving "can" is incorrect.

B. wrong: "had taken" (past perfect) does not correspond to "am taking", and "can" should be "could".

C. wrong: "had been taking" (past perfect continuous) over-shifts the tense; the simple

ous "was taking" is the correct backshift.

D. correct: with a past reporting verb, "am taking" becomes "was taking" and "can" becomes "could", and the pronouns change to "he" and "his".

Question 169 Broke down

What does the sentence "She broke down in front of the audience" imply?

- A. She sang a song.
- B. She collapsed emotionally. ✓ **Correct answer**
- C. She left the stage.
- D. She performed well.

A. wrong: "broke down" does not mean singing.

B. correct: to "break down" means to lose control of one's emotions and start crying.

C. wrong: breaking down does not mean leaving the stage.

D. wrong: breaking down is a failure of composure, not a good performance.

Question 170 Active voice

"Mistakes could have been avoided if the instructions had been followed carefully by the workers". The most appropriate active voice of the given sentence is:

- A. The workers could avoid mistakes if they followed the instructions carefully.
- B. The workers could have avoided mistakes if they followed the instructions carefully.
- C. The workers could have avoided mistakes if they had followed the instructions carefully. ✓ **Correct answer**
- D. The workers avoid mistakes if they follow the instructions carefully.

A. wrong: this changes the tense; "could have been avoided" needs "could have avoided".

e "if" clause must stay in the past perfect ("had followed") to match the original.

C. correct: active voice keeps the tenses — "could have been avoided" becomes "could have avoided" and "had been followed" becomes "had followed".

D. wrong: this changes both the tense and the meaning of the sentence.

Question 171 Whose

The director ____ movie was a blockbuster earned heaps of money.

- A. who's
- B. whom
- C. whose ✓ **Correct answer**
- D. which

A. wrong: "who's" means "who is"; it does not show possession.

B. wrong: "whom" is an object pronoun, not a possessive.

C. correct: "whose" is the possessive relative pronoun — the movie belongs to the director.

D. wrong: "which" refers to things, not to a person's possession. (Note: the official paper prints this stem without the blank; the blank is supplied from the key page's solved version of the same question, which gives the stem as "The director ____ movie was a blockbuster...".)

Question 172 Percentage

What percentage of 90 minutes is 54 seconds?

- A. One percent ✓ **Correct answer**
- B. Six Percent
- C. Three percent

percent

A. correct: 90 minutes = 5,400 seconds, and 54/5,400 = 1/100 = 1%.

B. wrong: 6% of 5,400 seconds would be 324 seconds, not 54.

C. wrong: 3% of 5,400 seconds would be 162 seconds, not 54.

D. wrong: 10% of 5,400 seconds would be 540 seconds, not 54.

Question 173 Box stacking

Five boxes — Red, Green, Blue, Yellow, and Black — are stacked one over another with 1 at the bottom and 5 at the top. These boxes are arranged using the following rules: 1. Red is above Green 2. Yellow is immediately above Black 3. Black is not at the bottom If Blue Box is at 4 position, which box is at the position 2?

- A. Red
- B. Green
- C. Yellow
- D. Black ✓ **Correct answer**

A. wrong: with Blue at 4, Red must be at 5 (above Green) for all the rules to hold.

B. wrong: with Blue at 4, Green must be at 1 (below Red).

C. wrong: with Blue at 4, Yellow must be at 3 (immediately above Black).

D. correct: Blue at 4 leaves positions 1, 2, 3, 5; Yellow immediately above Black and Black not at the bottom, with Red above Green, gives the only arrangement Green(1), Black(2), Yellow(3), Blue(4), Red(5) — so position 2 is Black.

Question 174 Number series

What number comes next in the following series: 48 45 40 33 24

- A. 11

- C. 13 ✓ **Correct answer**
- D. 1

A. wrong: the differences are −3, −5, −7, −9, so the next difference is −11, giving 24 − 11 = 13, not 11.

B. wrong: 8 would need a difference of −16, which does not fit the pattern.

C. correct: the differences grow by 2 each time (−3, −5, −7, −9, then −11), so the next term is 24 − 11 = 13.

D. wrong: 1 would need a difference of −23, which does not fit the pattern.

Question 175 Quantity comparison

Quantity A: The price of a television when it is on sale at 25% off. Quantity B: The price of that television when its one sale at $25 off.

- A. Quantity A is greater.
- B. Quantity B is greater.
- C. Quantities A and B are equal.
- D. It is impossible to determine which quantity is greater. ✓ **Correct answer**

A. wrong: whether 25% off is more than $25 off depends on the original price, which is not given.

B. wrong: for the same reason, this cannot be decided without the original price.

C. wrong: the two discounts are equal only if the original price is exactly $100, which is not stated.

D. correct: the original price is not given, so the two discounted prices cannot be compared.

176 Letter odd one out

Find the odd one out.

- A. D : G ✓ **Correct answer**
- B. U : W
- C. H : J
- D. Q : S

A. correct: the gap between D and G is 3 letters, while the other three pairs all have a gap of 2 letters, so D:G is the odd one out.

B. wrong: the gap is 2, like the other normal pairs.

C. wrong: the gap is 2, like the other normal pairs.

D. wrong: the gap is 2, like the other normal pairs.

Question 177 Blood relation

X's son is cousin of Y's son. If Y has no brother what is X to Y?

- A. Cousin
- B. Nephew
- C. Uncle
- D. Sister ✓ **Correct answer**

A. wrong: X's son and Y's son being cousins means X and Y are siblings (or in-laws); X is not Y's cousin.

B. wrong: X is of Y's generation, not a generation below.

C. wrong: X is not an uncle to Y; X and Y are siblings.

D. correct: X's son and Y's son are cousins, so X and Y are siblings; Y has no brother, so X (the sibling) must be Y's sister.

178 Number odd one out

Find the odd one out.

- A. 6 : 35
- B. 2 : 15
- C. 4 : 25
- D. 7 : 45 ✓ **Correct answer**

A. wrong: this pair follows the pattern (first number × 5 + 5 = second number: 6 × 5 + 5 = 35).

B. wrong: this pair follows the pattern (2 × 5 + 5 = 15).

C. wrong: this pair follows the pattern (4 × 5 + 5 = 25).

D. correct: 7 × 5 + 5 = 40, not 45, so this pair breaks the pattern (and it is also the only pair whose first number is odd).

Question 179 Lab safety

During a chemistry practical class, teacher was briefly out of the class, and the lab safety instructions were ignored. During that time, a student mixed unknown chemicals left from a previous experiment. A strong smell fills the room, and one student starts coughing. To avoid future accidents, from the given options, the most sustainable course of action is to:

- A. cancel all chemistry practicals
- B. rusticate the student involved
- C. strengthen lab safety instructions ✓ **Correct answer**
- D. penalise the teacher for being absent

A. wrong: cancelling all practicals is a disproportionate response that stops learning; it does not fix the cause.

B. wrong: punishing one student does not prevent the next accident.

e accident happened because safety instructions were ignored, so the sustainable fix is to strengthen them (and their enforcement).

D. wrong: punishing the teacher does not prevent future accidents.

Question 180 True and reasonable belief

A belief is regarded as "true and reasonable", when it is:

- A. Commonly accepted
- B. Matches your feelings
- C. Based on evidence and logic ✓ **Correct answer**
- D. Found in old texts

A. wrong: a belief can be widely accepted and still be false.

B. wrong: feelings do not make a belief true or reasonable.

C. correct: a belief is justified as true and reasonable only when it is supported by evidence and sound logic.

D. wrong: age and tradition do not make a belief true or reasonable.

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