SZABMU MDCAT 2025, Paper 2 (Federal / AJK / GB) · Solved Past Paper

Body: Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU) · **Post:** MDCAT 2025, Paper 2 — Federal / AJK / GB · **Year:** 2025 · **Questions:** 180 in the original paper — **179 solved and verified** · **1 excluded as defective** · **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.

> **About this paper:** the original paper held 180 questions. The transcription it was solved from repeats three questions verbatim (Q60/Q62, Q61/Q63, Q67/Q73); each is served once here. One question (Q52) is excluded as defective — three of its options are all recognised symptoms of chronic renal failure, so it has no unique answer — and is not shown below. The excluded question is listed in the paper JSON.

Source note: Push pass 8 Nov 2026, decided by assistant under the owner's 8 Nov 2026 delegation (verification standard 8 Nov 15:44 — one confirming source is FINAL): all 13 SINGLE-SOURCE items promoted to VERIFIED (Q13, Q25, Q31, Q32, Q39, Q41, Q43, Q59, Q94, Q136 kept; Q84 C → D; Q137 A kept; Q141 C → D) and all 7 DISPUTED items resolved (Q75 A kept, Q87 A → C, Q93 D kept, Q102 A → D, Q138 A → C, Q142 B → A as VERIFIED; Q52 DEFECTIVE-excluded). TRUE TOTAL 180 distinct questions: the file's 183 headings include three verbatim repeats (Q60/Q62, Q61/Q63, Q67/Q73) kept as printed in the file and served once here. Q146's option set was corrected to the Code-2 PDF Q177 facsimile set (37k Q98 precedent) because the transcribed set contained no correct option. The paper remains the property of SZABMU / PMDC.

1 Biology

Which of the following hormones in the body of animal is lipid-based in nature?

- A. Insulin
- B. FSH
- C. Oxytocin
- D. Aldosterone ✓ **Correct answer**

A. Insulin is a peptide (protein) hormone made of amino-acid chains; it is water-soluble, not lipid-based.

B. Follicle-stimulating hormone is a glycoprotein (protein + sugar) hormone from the pituitary; it is water-soluble, not lipid-based.

C. Oxytocin is a small peptide hormone; it dissolves in water, not in lipid.

D. Aldosterone is a steroid hormone built from cholesterol, so it is lipid-soluble and passes through cell membranes; correct.

Question 2 Biology

Which of the following base pairing maintains the constant diameter of the DNA double helix as per Watson and Crick's model?

- A. Purine - Purine
- B. Pyrimidine - Pyrimidine
- C. Purine - Pyrimidine ✓ **Correct answer**
- D. Sugar-Phosphate

A. Two large double-ring bases would be too wide and would bulge the helix, changing its diameter.

B. Two small single-ring bases would be too narrow and would pinch the helix.

C. Every base pair joins one large purine (A or G) to one small pyrimidine (T or C), so every

same width and the helix keeps a constant diameter; correct.

D. The sugar–phosphate backbone forms the outside rails of the helix; it does not pair across the helix and does not set its width.

Question 3 Biology

Which muscle type is under conscious control and is multinucleated?

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

A. Smooth muscle is involuntary (it works without conscious control, e.g. in the gut wall) and its cells have a single nucleus.

B. Skeletal muscle is the voluntary muscle that moves the skeleton, and its long fibres are multinucleated; correct.

C. Cardiac muscle is involuntary (the heart beats without conscious control) and its cells are typically single-nucleated.

D. Visceral muscle is another name for smooth muscle in the organs; it is involuntary and single-nucleated, not the answer.

Question 4 Biology

Which of the following connective tissue is completely avascular and heals slowly?

- A. Bone
- B. Cartilage ✓ **Correct answer**
- C. Adipose tissue
- D. Areolar tissue

A. Bone is richly supplied with blood vessels, which is why fractures can heal well; it is not

B. Cartilage has no blood vessels of its own, so its cells receive nutrients only slowly by diffusion and it heals very slowly; correct.

C. Fat tissue is well supplied with blood vessels; it is not avascular.

D. Areolar (loose) connective tissue is highly vascular, carrying vessels and nerves to the organs it supports.

Question 5 Biology

Cardiac muscles are different from skeletal muscles because they:

- A. Lack striations
- B. Are voluntary and multinucleated
- C. Are involuntary and multinucleated
- D. Are striated but involuntary ✓ **Correct answer**

A. Cardiac muscle IS striated, like skeletal muscle, with visible banding from its sarcomeres; it does not lack striations.

B. Cardiac muscle is involuntary, and its cells are normally single-nucleated; this describes neither cardiac nor the difference asked for.

C. Involuntary is right, but cardiac cells are typically uninucleate (one nucleus, sometimes two), not multinucleated like skeletal fibres.

D. Cardiac muscle shares striations with skeletal muscle but, unlike it, works involuntarily under the heart's own control; correct.

Question 6 Biology

Which organelle give rise to primary lysosomes through budding in eukaryotic cells?

- A. Smooth endoplasmic reticulum (SER)

gh endoplasmic reticulum (RER)

- C. Plasma membrane
- D. Golgi cisternae ✓ **Correct answer**

A. The SER makes lipids and detoxifies substances; it does not bud off primary lysosomes.

B. The RER synthesises the lysosomal enzymes, but the vesicles that become lysosomes bud from the Golgi, not from the RER itself.

C. The plasma membrane can take material IN by endocytosis, but primary lysosomes are not formed by budding from it.

D. Lysosomal enzymes arriving from the ER are sorted and packaged in the Golgi, and primary lysosomes bud off from the Golgi cisternae; correct.

Question 7 Biology

A mutation prevents proper disulphide bond formation in a fibrous protein, causing brittle nails and slow hair growth. Which of the following proteinaceous substance would be affected?

- A. Elastin
- B. Actin
- C. Keratin ✓ **Correct answer**
- D. Collagen

A. Elastin gives stretch to skin and vessels and is cross-linked differently; it is not the protein of hair and nails.

B. Actin is a globular contractile protein of muscle and the cytoskeleton, not a fibrous hair/nail protein.

C. Keratin is the fibrous protein of hair and nails, rich in cysteine, whose disulphide bonds give it strength; breaking those bonds makes hair and nails brittle; correct.

s the fibrous protein of tendon, skin and bone, strengthened mainly by other cross-links; it is not the hair/nail protein.

Question 8 Biology

In muscle fibers, T-tubules are extension of the sarcolemma that penetrate into the cell's interior. What is their main function during muscle contraction?

- A. Unblock actin's binding sites.
- B. Conduct nerve impulses deep into the muscle cell. ✓ **Correct answer**
- C. Synthesize glycogen in the sarcoplasm.
- D. Store calcium ions within the sarcoplasmic reticulum.

A. The binding sites are uncovered when calcium binds troponin and tropomyosin shifts; the T-tubules do not do this directly.

B. T-tubules carry the action potential from the surface deep into the fibre so that calcium is released everywhere at once and the whole fibre contracts together; correct.

C. Glycogen is made by enzymes in the sarcoplasm, not by T-tubules.

D. Calcium is stored in the sarcoplasmic reticulum itself; the T-tubules only signal it to release calcium, they do not store it.

Question 9 Biology

Polysaccharides such as starch and glycogen are mainly used for:

- A. Structural framework only
- B. Short-term and long-term energy storage ✓ **Correct answer**
- C. Enzyme catalysis
- D. Ready source of energy

A. That is the job of cellulose (in plants) and chitin, not of starch and glycogen; starch and glycogen are storage molecules.

is the animal store, drawn on quickly, and starch is the plant store, kept for longer; both are energy reserves; correct.

C. Enzymes are proteins (and some RNAs), not polysaccharides; starch and glycogen catalyse nothing.

D. The ready, immediate fuel is glucose, a monosaccharide; starch and glycogen must first be broken down to glucose before they yield energy.

Question 10 Biology

In chromosome, positively charged histone proteins are organized with negatively charged DNA. The positive charges of histone are due to an abundance of basic amino acids:

- A. arginine and alanine
- B. arginine and lysine ✓ **Correct answer**
- C. lysine and alanine
- D. phenylalanine and arginine

A. Arginine is basic, but alanine is a neutral, non-polar amino acid with no positive side chain.

B. Both are basic amino acids whose side chains carry a positive charge at cell pH, and histones are rich in exactly these two; their positive charges grip the negative DNA backbone; correct.

C. Lysine is basic, but alanine contributes no positive charge.

D. Phenylalanine is a neutral aromatic amino acid, not basic; only the arginine half is right.

Question 11 Biology

Envelope in a virus is derived from

- A. Host cell ribosomes

t cell membrane ✓ **Correct answer**

- C. Viral capsid proteins
- D. Viral genome replication

A. Ribosomes make proteins; they supply no membrane lipid for an envelope.

B. When an enveloped virus buds out of its host cell it wraps itself in a piece of the host's membrane (plasma membrane or an internal membrane), studded with viral proteins; correct.

C. Capsid proteins form the protein shell around the genome; they are not the lipid envelope.

D. Copying the genome produces nucleic acid, not a membrane envelope.

Question 12 Biology

Myelin sheath acts as;

- A. Protector
- B. Insulator ✓ **Correct answer**
- C. Sensor
- D. Supporter

A. Myelin does shield the axon to a degree, but protection is not its defining electrical role.

B. The fatty myelin sheath electrically insulates the axon so the impulse jumps from node to node (saltatory conduction) much faster; correct.

C. Myelin senses nothing; sensory receptors, not myelin, detect stimuli.

D. Glial cells do support neurons, but the sheath's specific action on the impulse is insulation, not mechanical support.

13 Biology

DNA/RNA probes are most commonly used as:

- A. diagnostic tools of infectious diseases ✓ **Correct answer**
- B. carrier in gene cloning experiments
- C. cementing material in somatic cell hybridization
- D. carrier or vector in gene therapy

A. A labelled probe binds its matching pathogen sequence, so probes are used to detect infections and genetic markers in diagnosis; correct on the textbook's "most commonly" convention.

B. Cloning uses vectors such as plasmids, not probes; a probe only detects, it does not carry DNA into cells.

C. Fusing cells uses agents such as polyethylene glycol, not nucleic-acid probes.

D. Gene therapy uses vectors (e.g. viruses) to deliver genes; probes deliver nothing. CAVEAT (retained, 8 Nov 2026): "most commonly" is a usage convention — probes are also routine research tools — so the answer rests on the textbook's framing, not on a derivation.

Question 14 Biology

The event that occurs first during skeletal muscle contraction?

- A. Cross-bridge formation
- B. Release of calcium from sarcoplasmic reticulum ✓ **Correct answer**
- C. Power stroke
- D. Myosin head binds to ATP

A. Cross-bridges form only AFTER calcium has uncovered the actin binding sites, so this comes later.

B. The action potential travelling down the T-tubules triggers calcium release, the first of

ents in the contraction sequence; correct.

C. The power stroke happens after a cross-bridge has formed, so it is later still.

D. ATP binding detaches the myosin head and re-cocks it; it happens repeatedly through the cycle, but the contraction sequence as listed is started by calcium release.

Question 15 Biology

When genes are linked, they tend to:

- A. Segregate randomly
- B. Cross over every time
- C. Stay together during inheritance ✓ **Correct answer**
- D. Be inherited separately

A. Random, independent segregation is what UNLINKED genes on different chromosomes do, not linked genes.

B. Crossing over between linked genes happens only sometimes; the closer the genes, the rarer it is — never every time.

C. Linked genes sit close together on the same chromosome and are usually passed on together unless crossing over separates them; correct.

D. That is independent assortment, the opposite of linkage.

Question 16 Biology

According to Morgan's experiment, which of the following is essential for detecting gene linkage accurately?

- A. Large number of progeny ✓ **Correct answer**
- B. Small sample size
- C. Use of male flies only
- D. Mutation induction

ants between linked genes are rare, so only a large count of offspring lets the recombination frequency — and hence linkage — be measured reliably; correct.

B. A small sample could miss the rare recombinants entirely and give a false picture.

C. Morgan used both sexes in his crosses; restricting to males would throw away half the evidence and, in Drosophila, males show no crossing over.

D. No new mutations need to be induced; Morgan tracked existing inherited traits (eye colour, wing shape) already present in his flies.

Question 17 Biology

The end of skeletal muscle attached with moveable bone is:

- A. Insertion ✓ **Correct answer**
- B. Origin
- C. Tendons
- D. Belly

A. The insertion is the attachment on the bone that moves when the muscle contracts; correct.

B. The origin is the attachment on the more fixed, less movable bone.

C. Tendons are the tough cords that attach muscle to bone, not the name of the movable end itself.

D. The belly is the fleshy middle part of the muscle, not an attachment end.

Question 18 Biology

Which of the following is common between aldosterone, sex hormone and cortisone ?

- A. They are peptides
- B. They are Phospholipids

y are steroids ✓ **Correct answer**

- D. They are glycoproteins

A. Peptide hormones are chains of amino acids (e.g. insulin); none of these three is a peptide.

B. Phospholipids build membranes; they are not hormones.

C. Aldosterone, the sex hormones and cortisone are all built from cholesterol on the same four-ring steroid frame; correct.

D. Glycoproteins are proteins carrying sugar chains (e.g. FSH); none of these three is one.

Question 19 Biology

Which one of the following organism is uricotolic with reference to excretion of nitrogenous compound?

- A. Human
- B. freshwater Fish
- C. Snake ✓ **Correct answer**
- D. Frog

A. Humans excrete urea and are ureotelic, not uricotelic.

B. Freshwater fish excrete ammonia directly into the water and are ammonotelic.

C. Snakes, like other reptiles and birds, excrete nitrogen mainly as almost water-free uric acid and are uricotelic; correct.

D. Adult frogs excrete urea and are ureotelic (their tadpoles are ammonotelic). (The stem prints "uricotolic"; the standard spelling is "uricotelic".)

Question 20 Biology

Ureotelism (removal of nitrogenous waste in the form of urea) is an adaptation to the:

| weather

- B. less availability of water ✓ **Correct answer**
- C. flooded environmental conditions
- D. food shortage

A. Temperature does not drive the choice of nitrogenous waste; water availability does.

B. Urea is far less toxic than ammonia and needs much less water to flush away, so excreting urea suits land animals with limited water; correct.

C. Abundant water favours ammonia excretion (ammonotelism), not urea.

D. The waste product depends on water and toxicity, not on how much food is available.

Question 21 Biology

All of the following are the characteristics of limbic system EXCEPT:

- A. Produce most basic and primitive emotions and drives
- B. formation of memories
- C. Consists of hypothalamus, amygdala and hippocampus
- D. controls reflex movement of eyes ✓ **Correct answer**

A. True of the limbic system: it generates basic emotions and drives such as fear, pleasure and hunger.

B. True: the hippocampus, a limbic structure, is central to forming memories.

C. True: these are core limbic structures.

D. NOT a limbic function; reflex eye movements are controlled by the midbrain (superior colliculus and related centres), so this is the exception; correct.

Question 22 Biology

Sensory input from auditory and visual pathways, skin and within the body is received by

distributed to

- A. Hypothalamus: Cerebellum
- B. Thalamus: cerebrum ✓ **Correct answer**
- C. Cerebrum: rest of the brain
- D. Cerebellum: rest of the brain

A. The hypothalamus regulates homeostasis and hormones, not general sensory relay, and the cerebellum coordinates movement rather than receiving relayed sensation.

B. The thalamus is the brain's main sensory relay station: it receives almost all incoming sensory input and passes it on to the cerebral cortex for processing; correct.

C. The cerebrum is the destination of relayed sensation, not the relay station itself.

D. The cerebellum receives proprioceptive and motor information for coordination; it is not the general sensory relay.

Question 23 Biology

According to the Lamarck theory of evolution, the organ that has not been used in several generations will:

- A. Become strong
- B. Get amputated
- C. Disappear ✓ **Correct answer**
- D. Become developed

A. In Lamarck's use-and-disuse idea, it is the USED organ that becomes stronger.

B. Lamarck spoke of gradual shrinking and loss over generations, not of sudden amputation.

C. Lamarck held that a disused organ weakens generation by generation and eventually disappears, while the acquired change is inherited; correct as a statement of Lamarck's theory (modern biology rejects inheritance of acquired characters).

ment is the fate of a much-used organ in Lamarck's theory, not of a disused one.

Question 24 Biology

Which of the following statement is incorrect with reference to the enzyme action?

- A. Substrate binds with the enzyme at its active site
- B. Non-competitive inhibitor binds the enzyme at a site distinct from that of active site
- C. Addition of a lot of succinate do not reverse the inhibition of succinic dehydrogenase by malonate ✓ **Correct answer**
- D. malonate is a competitive inhibitor of succinic dehydogenase

A. Correct: the substrate fits the enzyme's active site.

B. Correct: a non-competitive inhibitor binds elsewhere (an allosteric site) and changes the enzyme's shape.

C. INCORRECT, and therefore the answer: malonate competes with succinate for the active site, so flooding the system with succinate out-competes malonate and reverses the inhibition.

D. Correct: malonate resembles succinate and competes for the same active site.

Question 25 Physics

The temperature of underground water remains constant due to:

- A. Heat capacity ✓ **Correct answer**
- B. Polarity of water
- C. Heat of vaporization
- D. Specific heat of vaporization

A. Water can take in or give out a large amount of heat with only a small temperature

...ch buffers underground water against temperature swings; correct on the textbook's intended reading.

B. Polarity explains water's solvent power and hydrogen bonding, not directly why its temperature stays steady.

C. The heat of vaporisation concerns liquid turning to vapour; underground water is not boiling away.

D. This is the same vaporisation quantity with "specific" added; it is not the property that steadies the water's temperature. CAVEAT (retained, 8 Nov 2026): the answer rests on the textbook convention that "heat capacity" is the steadying property; the stem is labelled Physics in the transcription though its content is water properties, and the earth's insulating cover is not among the options. (The precise property is water's high SPECIFIC heat capacity.)

Question 26 Biology

The shape of Adenovirus is:

- A. Helical shape
- B. Tadpole shape
- C. Polyhedron shape ✓ **Correct answer**
- D. Circular shape

A. Helical capsids belong to viruses such as tobacco mosaic virus, not adenovirus.

B. The tadpole (head-and-tail) shape belongs to bacteriophages.

C. Adenovirus has an icosahedral capsid — a polyhedron with 20 triangular faces; correct.

D. No adenovirus capsid is a flat circle; "circular" describes some genomes, not this capsid.

27 Biology

In human female normally ovulation occurs at day _____ of menstrual cycle.

- A. 9
- B. 11
- C. 14 ✓ **Correct answer**
- D. 15

A. Day 9 is still in the follicular phase, before the egg is mature; ovulation has not yet happened.

B. Day 11 is too early in a typical 28-day cycle; the LH surge has not yet peaked.

C. In a typical 28-day cycle ovulation occurs around day 14, triggered by the mid-cycle LH surge; correct.

D. Day 15 is just after the usual ovulation day; the egg would already have been released.

Question 28 Biology

How many ATPs are produced during oxidative phase of glycolysis?

- A. 2
- B. 4 ✓ **Correct answer**
- C. 34
- D. 36

A. Two is the NET gain of glycolysis (4 made minus 2 invested), not the number produced in the pay-off phase.

B. In the pay-off (oxidative) phase each of the two triose molecules yields 2 ATP by substrate-level phosphorylation, so 4 ATP are produced in total; correct.

C. Thirty-four is of the order of the ATP yield of the whole aerobic respiration of glucose, not of glycolysis alone.

(or 38 in older counts) is the classic total ATP yield per glucose for full aerobic respiration, not the glycolysis pay-off phase.

Question 29 Biology

Which of the following best describes the relationship between endoplasmic reticulum (ER) and Golgi apparatus?

- A. Both ER and Golgi apparatus are completely separate organelles with no interaction
- B. ER is precursor organelle to Golgi apparatus because material is transported from ER to Golgi ✓ **Correct answer**
- C. Golgi apparatus is precursor organelle to ER because material is transported from Golgi to ER
- D. ER and Golgi apparatus have similar roles

A. False: they are linked by vesicles in the endomembrane system and constantly exchange material.

B. Correct: proteins and lipids made in the ER travel in transport vesicles to the Golgi for processing, sorting and packaging.

C. The flow is the other way round; the Golgi is downstream of the ER.

D. Their roles differ: the ER synthesises, the Golgi modifies, sorts and dispatches.

Question 30 Biology

Osmotic gradient of inner medulla of kidney is increased by:

- A. Urea ✓ **Correct answer**
- B. Water
- C. Phosphate
- D. Potassium

cycled into the inner medullary interstitium from the collecting ducts, adding solute there and steepening the osmotic gradient that concentrates urine; correct.

B. Water moving into the medulla would dilute the gradient, not increase it.

C. Phosphate is excreted in urine but plays no role in building the medullary gradient.

D. Potassium is handled mainly in the distal tubule and collecting duct for excretion balance; it does not build the medullary gradient (sodium chloride and urea do).

Question 31 Biology

Decreased level of FSH hormone during menstrual cycle triggers the release of:

- A. hcg
- B. LH ✓ **Correct answer**
- C. Oxytocin
- D. progesterone

A. Human chorionic gonadotropin comes from the placenta after implantation, not from the mid-cycle fall in FSH.

B. At mid-cycle, as FSH falls under feedback, the LH surge occurs and triggers ovulation; LH is the intended answer.

C. Oxytocin acts on the uterus and in milk ejection; it is not released in response to falling FSH.

D. Progesterone rises AFTER ovulation from the corpus luteum; it is not the hormone released when FSH falls. CAVEAT (retained, 8 Nov 2026): the stem's causal wording is loose — physiologically the LH surge is driven by rising oestrogen positive feedback and GnRH, with FSH falling as a parallel feedback effect, not as the trigger itself. The answer rests on the textbook's association of falling FSH with the LH surge at ovulation.

32 Biology

The digestive secretions from different parts of GIT have the ability to kill microbe present in the food. Which of the following best describes this role?

- A. Antiseptics ✓ **Correct answer**
- B. Disinfectants
- C. Chemotherapeutics
- D. Immunosuppressant

A. Antiseptics kill or inhibit microbes on or within living tissue; digestive secretions (such as stomach acid) acting inside the living gut fit this description best among the options; correct on the intended classification.

B. Disinfectants are used on non-living surfaces and objects, not inside the living body.

C. Chemotherapy means drugs used to treat disease (including cancer and infections) given as medicines, not the body's own digestive secretions.

D. An immunosuppressant damps down the immune system — the opposite of killing microbes. CAVEAT (retained, 8 Nov 2026): "antiseptic" is a classification convention here; gastric acid and bile are not usually prescribed as antiseptics, and the answer rests on that textbook labelling.

Question 33 Biology

A carrier mother for hemophilia and a normal father can produce:

- A. All hemophilic sons
- B. 25 % Hemophilic among sons
- C. 50 % hemophilic among sons ✓ **Correct answer**
- D. All normal sons and daughter

A. Only the sons who inherit the mother's affected X chromosome are haemophilic; the others inherit her normal X.

e for a son is one in two, not one in four (25% is the chance of a haemophilic child among ALL children if daughters are counted as unaffected).

C. A carrier mother (X^HX^h) passes the affected X to half her sons, who, having only that X, are haemophilic; correct.

D. Half the sons are haemophilic, and half the daughters are carriers, so this is false.

Question 34 Biology

During ventricular systole, which pressure changes occur?

- A. Ventricular pressure rises above atrial and arterial pressures ✓ **Correct answer**
- B. Atrial pressure rises above Ventricular pressure
- C. Ventricular pressure falls below arterial pressures
- D. Ventricular pressure falls below Atrial pressure

A. The contracting ventricle first exceeds atrial pressure (closing the AV valves), then exceeds arterial pressure (opening the semilunar valves) so blood is ejected; correct.

B. That happens in diastole, when the atria fill the relaxed ventricles.

C. Falling ventricular pressure closes the semilunar valves at the END of systole; during systole itself the pressure is rising above arterial pressure.

D. That is the diastolic filling state, not systole.

Question 35 Biology

Which cell type is essential for stimulating cell division of both B-cells and T-cells?

- A. Plasma cells
- B. Memory cells
- C. Helper T-cells ✓ **Correct answer**
- D. Neutrophils

lls are antibody factories produced BY activated B-cells; they do not stimulate other lymphocytes to divide.

B. Memory cells are the long-lived products of a past response, waiting for a second encounter; they do not drive the division of B- and T-cells.

C. Helper T-cells release cytokines (such as interleukins) that drive the proliferation of both B-cells and cytotoxic T-cells; they are the coordinators of the response; correct.

D. Neutrophils are phagocytes that engulf bacteria at infection sites; they do not stimulate lymphocyte division.

Question 36 Biology

The hormone, when overproduced can lead to hypercalcemia and stone formation is:

- A. Insulin
- B. Thyroxine
- C. Parathyroid hormone ✓ **Correct answer**
- D. Antidiuretic hormone

A. Insulin controls blood glucose, not blood calcium.

B. Thyroxine sets metabolic rate; overproduction causes hyperthyroidism, not hypercalcaemia.

C. Parathyroid hormone raises blood calcium by releasing it from bone and increasing gut and kidney handling; excess causes hypercalcaemia and calcium kidney stones; correct.

D. ADH controls water reabsorption and blood volume; it does not raise blood calcium.

Question 37 Biology

Fibrocartilage is found in:

- A. Trachea

- C. Knee joint ✓ **Correct answer**
- D. Ear flaps

A. The tracheal rings are hyaline cartilage, not fibrocartilage.

B. The nose is supported by hyaline cartilage, not fibrocartilage.

C. The menisci of the knee are fibrocartilage, built to take heavy compression and shock; fibrocartilage is also found in intervertebral discs; correct.

D. The ear flap (pinna) is elastic cartilage, which bends and springs back.

Question 38 Biology

Additional capillaries present in the juxtamedullary nephrons to form a loop of vessels are:

- A. Efferent arterioles
- B. Peritubular capillaries
- C. Vasa recta ✓ **Correct answer**
- D. Afferent arterioles

A. The efferent arteriole carries blood AWAY from the glomerulus; it is a single vessel, not the hairpin capillary loop.

B. Peritubular capillaries surround the tubules of cortical nephrons; they do not form the long medullary hairpin loop.

C. The vasa recta are the long, hairpin capillary loops that run alongside the loops of Henle of juxtamedullary nephrons and preserve the medullary gradient by countercurrent exchange; correct.

D. The afferent arteriole carries blood INTO the glomerulus; it is upstream of the capillary loop.

39 Biology

Y-linked inheritance refers to which mode of the inheritance?

- A. Crisscross
- B. Straight ✓ **Correct answer**
- C. Loop
- D. Jumping

A. Criss-cross inheritance describes X-linked traits passing from father to daughter to grandson; it is not the Y-linked pattern.

B. Y-linked (holandric) traits pass straight down the male line, father to son to grandson, since only males carry a Y chromosome; correct on the textbook's term.

C. "Loop" is not a recognised mode of inheritance.

D. "Jumping" is not a recognised mode of inheritance. CAVEAT (retained, 8 Nov 2026): "straight" is a textbook label for holandric transmission; the answer rests on that terminology convention.

Question 40 Biology

If a colorblind lady marries a normal man, their children will be:

- A. Normal daughters and normal sons
- B. Normal sons and carrier daughters
- C. Colorblind sons and carrier daughters ✓ **Correct answer**
- D. Colorblind sons and colorblind daughters

A. The sons cannot be normal: each son gets his only X chromosome from his colour-blind mother.

B. The daughters are indeed carriers, but the sons are colour-blind, not normal.

C. A colour-blind mother (X^cX^c) gives X^c to every child; sons (X^cY) are colour-blind and

X, with a normal X from the father) are carriers; correct.

D. Daughters would need an affected X from the father too, but the father is normal, so the daughters are carriers, not colour-blind.

Question 41 Biology

All of the following properties of water are associated with its capillary action. EXCEPT:

- A. Adhesion
- B. Density ✓ **Correct answer**
- C. Cohesion
- D. Surface tension

A. Adhesion is water clinging to the vessel walls; it pulls the water column upward and is essential to capillary action.

B. Density does not drive capillary rise; the textbook trio of driving properties is adhesion, cohesion and surface tension, so density is the exception; correct on the intended reading.

C. Cohesion is water molecules clinging to each other by hydrogen bonds, dragging the column up behind the leading edge.

D. Surface tension is the surface effect of cohesion that shapes the meniscus and supports the column. CAVEAT (retained, 8 Nov 2026): density does enter the formula for the HEIGHT of capillary rise ($h = 2\gamma\cos\theta/\rho g r$), so it is not wholly unrelated to capillarity; the answer rests on the convention that only adhesion, cohesion and surface tension are counted as the properties that CAUSE the action.

Question 42 Biology

Which organelle serves as a packaging and a distribution center for molecules within the cells?

- A. Golgi apparatus ✓ **Correct answer**

- C. Ribosome
- D. Vacuole

A. The Golgi modifies, sorts, packages and dispatches proteins and lipids to their destinations inside and outside the cell; correct.

B. Mitochondria generate ATP; they do not package and distribute the cell's molecules.

C. Ribosomes synthesise proteins; they do not sort or package them for delivery.

D. A vacuole stores substances and keeps the cell firm; it is not the distribution centre.

Question 43 Biology

Which of the following hormone is not produced in older women?

- A. Estrogen ✓ **Correct answer**
- B. Gastrin
- C. Secretin
- D. Renin

A. Ovarian oestrogen production falls sharply after the menopause, so oestrogen is the hormone the question treats as no longer produced in older women; correct on the intended reading.

B. Gastrin continues to be made by the stomach lining throughout life.

C. Secretin continues to be made by the small intestine throughout life.

D. Renin continues to be made by the kidneys throughout life. CAVEAT (retained, 8 Nov 2026): the stem overstates the case — oestrogen is NOT literally absent in older women; small amounts are still made outside the ovaries (e.g. by aromatisation in fat tissue). The answer rests on the textbook convention that post-menopausal oestrogen production has effectively ceased compared with reproductive life.

44 Biology

Which lymphatic structure absorbs dietary fats in the intestine?

- A. Peyer's patches
- B. Lacteals in villi ✓ **Correct answer**
- C. Pancreatic duct
- D. Lymph nodes

A. Peyer's patches are lymphoid tissue in the gut wall that samples gut contents for immune surveillance; they absorb no fat.

B. Each intestinal villus contains a lacteal, a lymphatic capillary that takes up dietary fats packaged as chylomicrons into the lymph; correct.

C. The pancreatic duct delivers digestive juices into the duodenum; it absorbs nothing.

D. Lymph nodes filter lymph along its route; they are not the absorbing structures in the villi.

Question 45 Biology

The part of male reproductive system that maintains the temperature for sperm production is:

- A. Testes
- B. Scrotum ✓ **Correct answer**
- C. Vas deferens
- D. Epididymis

A. The testes are where sperm are produced, but they do not regulate their own temperature.

B. The scrotum holds the testes outside the body cavity and adjusts its position (and the cremaster and dartos muscles adjust it) to keep the testes slightly cooler than core temperature, which sperm production requires; correct.

eferens is the duct that carries sperm onward; it regulates no temperature.

D. The epididymis stores and matures sperm; temperature control is the scrotum's job.

Question 46 Biology

After Liver transplant, doctors suppress the T-lymphocyte activity in patient. Why?

- A. To increase the rate of antibody production
- B. To prevent infections
- C. To avoid graft rejection immune system ✓ **Correct answer**
- D. To produce memory cells faster

A. Suppressing T-cells reduces immune activity, including the help B-cells need to make antibodies; antibody production falls, not rises.

B. Immunosuppression does the opposite: it RAISES the risk of infection, which is its main drawback.

C. T-lymphocytes drive the cellular attack on foreign tissue; suppressing them stops the recipient's immune system rejecting the transplanted liver; correct. (Option C prints the dangling words "immune system" after "graft rejection"; the meaning is "to avoid graft rejection by the immune system".)

D. Memory-cell production is part of the immune response being suppressed, not something suppression speeds up.

Question 47 Biology

How do the kidneys contribute to maintain normal blood calcium level?

- A. By storing excess calcium
- B. By reabsorbing calcium and activating vitamin D ✓ **Correct answer**
- C. By secreting calcium directly into the blood
- D. By converting calcium into urea for excretion

stored in bone, not in the kidneys.

B. The kidneys reclaim filtered calcium instead of losing it, and they convert vitamin D to its active form (calcitriol), which increases calcium absorption from the gut; both actions defend blood calcium; correct.

C. The kidneys do not secrete calcium into blood; they control how much filtered calcium is reabsorbed.

D. Calcium is an element and cannot be converted into urea, which is a nitrogenous waste made in the liver.

Question 48 Biology

Nodes of Ranvier along the length of axons fibers allow:

- A. More diffusion of neurotransmitters
- B. Saltatory conduction of nerve impulse ✓ **Correct answer**
- C. Formation of new synaptic connections
- D. Synthesis of new neurons

A. Neurotransmitters diffuse across synapses, not at the nodes of Ranvier along the axon.

B. The nodes are gaps in the myelin where the action potential is regenerated, so the impulse appears to jump from node to node, travelling much faster; correct.

C. New synapses form by growth of axon terminals, not at the nodes.

D. New neurons are not synthesised at the nodes of Ranvier.

Question 49 Biology

Arachidonic acid, which is the precursor molecule for prostaglandins is:

- A. A saturated fatty acid with 18 carbons
- B. An unsaturated fatty acid with 18 carbons

- D. A tetra-unsaturated fatty acid with 20 carbons ✓ **Correct answer**

A. Wrong on both counts: arachidonic acid is unsaturated and has 20 carbons (an 18-carbon saturated acid is stearic acid).

B. Eighteen carbons describes linoleic/linolenic acids; arachidonic acid has 20.

C. Right chain length, wrong number of double bonds: arachidonic acid has four, not three (a 20-carbon tri-unsaturated acid is eicosatrienoic acid).

D. Arachidonic acid is 20:4 — 20 carbons with four cis double bonds — and is the precursor of prostaglandins and leukotrienes; correct.

Question 50 Biology

Atrial walls are thinner as compared to ventricles because:

- A. Atria are small in size
- B. Atria are present above the ventricles
- C. Atria has to force blood into the ventricles which lie very close to them ✓ **Correct answer**
- D. Blood enters into the atria by osmosis

A. Size alone does not explain wall thickness; the reason is the work the chamber must do.

B. Position in the chest has nothing to do with how thick the wall must be.

C. The atria only push blood a very short distance into the adjacent ventricles, against almost no resistance, so they need little muscle; the ventricles must drive blood to the lungs or the whole body and need thick walls; correct.

D. Blood enters the atria through the great veins by flow and pressure, not by osmosis.

51 Biology

A patient with a genetic disorder undergoes treatment where a normal gene is inserted into their cells. This is called

- A. Gene therapy ✓ **Correct answer**
- B. Genetic testing
- C. Protein engineering
- D. DNA fingerprinting

A. Inserting a working copy of a gene into a patient's cells to correct a genetic disorder is the definition of gene therapy; correct.

B. Testing analyses DNA to diagnose a disorder; it inserts nothing.

C. Protein engineering designs or alters proteins themselves, not by inserting genes into a patient.

D. DNA fingerprinting identifies a person from their DNA pattern; it treats nothing.

Question 53 Biology

Arthritis is a disease that primarily affects the:

- A. Kidneys
- B. Lungs
- C. Joints ✓ **Correct answer**
- D. Muscles

A. Kidney disease is nephritis/nephropathy, not arthritis.

B. Lung disease is not arthritis, though some arthritic conditions can have lung complications.

C. Arthritis is inflammation of the joints, causing pain, swelling and stiffness there; correct.

D. Primary muscle inflammation is myositis; arthritis centres on the joints, even when

Question 54 Biology

Osmoreceptors that detect the osmotic pressure of blood are primarily located in the:

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

A. The cerebellum coordinates movement and balance; it houses no primary osmoreceptors.

B. The medulla controls breathing and heart rate; the osmoreceptors that drive ADH release are not primarily there.

C. Osmoreceptors around the hypothalamus (near the organum vasculosum and supraoptic nucleus) sense plasma osmolality and trigger ADH release and thirst; correct.

D. The cortex processes conscious sensation and thought; it does not primarily detect blood osmotic pressure.

Question 55 Biology

Lamarck theory of evolution was rejected experimentally by:

- A. Earnest Hackle
- B. Charles Darwin
- C. August Weismann ✓ **Correct answer**
- D. Thomas R Malthas

A. Ernst Haeckel (printed "Earnest Hackle") popularised Darwin's ideas and proposed the recapitulation idea; he did not experimentally refute Lamarck.

B. Darwin proposed natural selection as an alternative to Lamarck, but the experimental

me from Weismann.

C. Weismann cut off the tails of mice for many successive generations and found the offspring still grew normal tails, showing acquired mutilations are not inherited and supporting the separation of germ line and body; correct.

D. Thomas Malthus (printed "Malthas") wrote on population and influenced Darwin; he performed no experiment on Lamarck's theory.

Question 56 Biology

Which of the following characteristics is common among sucrose, lactose and maltose?

- A. molecular formula ✓ **Correct answer**
- B. occurrence in living beings
- C. chemical nature of their monosaccharide units
- D. to act as reducing sugar

A. All three are disaccharides with the same formula, $C_{12}H_{22}O_{11}$; they are isomers of one another; correct.

B. Their occurrence differs: sucrose is mainly plant, lactose is mammalian milk, maltose comes from starch breakdown.

C. Their units differ: sucrose is glucose + fructose, lactose is glucose + galactose, maltose is glucose + glucose.

D. Sucrose is a NON-reducing sugar (its anomeric carbons are both linked), while lactose and maltose are reducing; this is not common to all three.

Question 57 Biology

Ribozymes are the biocatalysts that are made up of:

- A. DNA
- B. RNA ✓ **Correct answer**

- D. Fatty acid

A. DNA stores genetic information; catalytic DNA ("DNAzymes") are laboratory constructs, not ribozymes.

B. Ribozymes are RNA molecules folded so that they catalyse chemical reactions (the name joins "ribo-" and "enzyme"); correct.

C. Most enzymes are proteins, but a ribozyme is by definition the RNA exception.

D. Fatty acids build lipids; no fatty acid acts as a ribozyme.

Question 58 Biology

The induced fit model differs from the Lock and Key model because the enzyme in this model:

- A. Has a rigid and fixed active site
- B. Changes shape to fit the substrate ✓ **Correct answer**
- C. Is non-specific in its action
- D. Is denatured during reaction

A. A rigid, fixed active site is the LOCK-AND-KEY picture, the very thing induced fit differs from.

B. In the induced-fit model the active site moulds itself around the substrate when it binds, gripping it more closely; correct.

C. Induced-fit enzymes are still highly specific; flexibility does not mean accepting any substrate.

D. The enzyme is not denatured; it returns to its original shape after the reaction and can be reused.

59 Biology

Which competitive inhibitor blocks the enzyme responsible for bacterial cell wall synthesis?

- A. Sulphonamide
- B. Streptomycin
- C. Tetracycline
- D. Penicillin ✓ **Correct answer**

A. Sulphonamides block folate synthesis in bacteria; they do not block cell-wall synthesis.

B. Streptomycin blocks protein synthesis by binding the bacterial ribosome.

C. Tetracycline blocks protein synthesis by binding the bacterial ribosome.

D. Penicillin blocks the transpeptidase enzymes that cross-link peptidoglycan, so the bacterial cell wall cannot be completed and the cell lyses; correct as the intended identification. CAVEAT (retained, 8 Nov 2026): the stem's label "competitive inhibitor" is loose — penicillin acts as an irreversible (suicide) inhibitor of the transpeptidases, not as a classic reversible competitive inhibitor. The answer rests on the textbook identification of penicillin as the cell-wall drug among the options.

Question 60 Biology

Water commonly known as a universal solvent because:

- A. It dissolves polar and ionic substances effectively ✓ **Correct answer**
- B. It supports chemical reactions without reacting itself
- C. It has a high specific heat capacity
- D. It dissolves many substances due to its small molecule size

A. Water's polarity and hydrogen bonding let it surround and separate ions and polar molecules, which is why it dissolves so many substances; correct.

B. Water often DOES take part in reactions (e.g. hydrolysis), and inertness is not the

ıe "universal solvent" name.

C. True of water, but it explains temperature stability, not solvent power.

D. Small size helps water slip between particles, but the dissolving power comes from its polarity, not its size alone. (This question is repeated verbatim as Q62 in the transcription; both are kept as printed.)

Note: REPEAT: this question is printed again as Q62 (labelled Chemistry) in the transcription; both occurrences are kept as printed in the reviewed file and served once here.

Question 61 Biology

Which of the following structural change in water molecule leads to the low density of ice?

- A. Formation of ionic bonds
- B. Expansion due to hydrogen bonding ✓ **Correct answer**
- C. Increased kinetic energy
- D. Loss of polarity in molecules

A. No ionic bonds form when water freezes; the molecules are still held by hydrogen bonds.

B. On freezing, hydrogen bonds lock the molecules into an open hexagonal lattice with more empty space than in liquid water, so ice expands and is less dense; correct.

C. Freezing REMOVES kinetic energy; the molecules slow down, they do not speed up.

D. Water molecules stay polar in ice; polarity is not lost. (This question is repeated verbatim as Q63 in the transcription; both are kept as printed.)

Note: REPEAT: this question is printed again as Q63 (labelled Chemistry) in the transcription; both occurrences are kept as printed in the reviewed file and served once

Question 64 Chemistry

Reduction of carboxylic acid by using lithium aluminiumhydride produce

- A. Alcohol ✓ **Correct answer**
- B. acid halide
- C. ester
- D. alkane

A. Lithium aluminium hydride ($LiAlH_4$) is a strong reducing agent that reduces a carboxylic acid all the way to the primary alcohol (R–COOH → R–CH_2OH); correct.

B. An acid halide is made by replacing the –OH with a halogen (e.g. with $SOCl_2$), not by reduction.

C. An ester is made by reacting the acid with an alcohol, not by reducing the acid with $LiAlH_4$.

D. $LiAlH_4$ does not strip the oxygen away entirely to give an alkane; the product keeps one oxygen as the alcohol –OH.

Question 65 Chemistry

In separate vessel of volume 2000 cm3 and 1500cm3, 6g of hydrogen and 28g of nitrogen are mixed in each vessel at 25°C, ammonia formed is? N2 + 3H2 ⇌ 2NH3

- A. More in 2 L vessel
- B. More in 1500 cm^3 vessel ✓ **Correct answer**
- C. Equal in both vessel
- D. Cannot be predicted

A. The larger vessel gives lower concentrations and lower pressure, which favours the side with MORE gas moles (the reactants), so less ammonia forms there.

amounts in a smaller volume mean higher pressure and concentration; the equilibrium 4 gas moles ⇌ 2 gas moles shifts toward the fewer-moles side, the products, so more ammonia forms; correct. (6 g H_2 = 3 mol and 28 g N_2 = 1 mol are exactly the stoichiometric amounts.)

C. The equilibrium position depends on volume/pressure, so the two vessels cannot give equal amounts.

D. It can: Le Chatelier's principle predicts the direction of the shift from the volume change.

Question 66 Chemistry

The weakest intermolecular force present in liquid is?

- A. dipole dipole forces
- B. induce dipole force
- C. Instantaneous dipole induced dipole force ✓ **Correct answer**
- D. hydrogen bonding

A. Dipole–dipole forces act between permanent dipoles and are stronger than the fleeting dispersion forces.

B. Dipole–induced-dipole (Debye) forces, from a permanent dipole inducing a dipole in a neighbour, are stronger than the purely instantaneous dispersion force.

C. London dispersion forces arise from momentary, fleeting dipoles and are the weakest of the intermolecular forces listed; correct.

D. Hydrogen bonding is the STRONGEST of the intermolecular forces listed, not the weakest.

Question 67 Chemistry

Orientation of molecule is more important in following cases except:

- B. complex molecules
- C. poly atomic molecules
- D. low pressure ✓ **Correct answer**

A. At high pressure molecules collide far more often, so whether they meet in the right orientation matters a great deal for reaction.

B. Large, complex molecules must approach each other in a specific orientation for the reactive parts to meet.

C. Polyatomic molecules likewise need the right atoms to face each other when they collide.

D. At low pressure collisions are rare, so orientation is treated as the least important of the listed cases; correct on the intended "except" reading. CAVEAT (retained): the answer rests on the textbook's orientation-factor convention; strictly, orientation matters in every individual reactive collision, and pressure changes how OFTEN collisions happen rather than whether orientation matters when one occurs. (This question is repeated verbatim as Q73; both are kept as printed.) PROMOTED to VERIFIED — 37v-batch-addendum-2026-11-08.md (8 Nov 2026): Atkins, Physical Chemistry (Ch. 18A, collision theory): orientation matters for complex molecules and at high pressure; low pressure is the textbook 'except' case by elimination. Caveat: the 'except' is the textbook elimination/convention reading.

Note: REPEAT: this question is printed again as Q73 in the transcription (option A printed 'high Pressure' there, 'High Pressure' here); both occurrences are kept as printed in the reviewed file and served once here.

Question 68 Chemistry

Keeping temperature constant, if pressure is increased, density of gas will

- A. Increases ✓ **Correct answer**
- B. decreases

- D. remains same

A. At constant temperature, raising the pressure compresses the gas into a smaller volume, so the same mass occupies less space and the density (mass/volume) rises; correct.

B. Density moves the opposite way: squeezing a gas raises, not lowers, its density.

C. Density doubles only if the pressure is doubled (at constant temperature); the stem says pressure is merely "increased" by an unstated amount.

D. Density cannot stay the same when the volume changes while the mass is fixed.

Question 69 Chemistry

IUPAC name of chloroform is:

- A. methylchloride
- B. methyltrichloride
- C. trichloromethane ✓ **Correct answer**
- D. chloromethane

A. That would be a methane with one chlorine and a methyl group named loosely; it is not the systematic name of $CHCl_3$.

B. Not a valid systematic name; the parent chain is methane itself.

C. $CHCl_3$ is methane with three hydrogens replaced by chlorine: trichloromethane; correct.

D. Chloromethane is CH_3Cl, with only one chlorine.

Question 70 Chemistry

Which among the following will react with ammonical cuprous chloride:

- A. 1-butene

utyne ✓ **Correct answer**

- C. 2-butene
- D. 2-butyne

A. Alkenes do not give a precipitate with ammoniacal cuprous chloride; the test is specific to terminal alkynes.

B. 1-Butyne is a TERMINAL alkyne ($HC{\equiv}C{-}CH_2CH_3$) with an acidic hydrogen on the triple-bond carbon; it reacts to give the red precipitate of copper(I) butynide; correct.

C. An alkene; no reaction with ammoniacal cuprous chloride.

D. 2-Butyne is an INTERNAL alkyne with no hydrogen on either triple-bond carbon, so it cannot form the copper acetylide and does not react.

Question 71 Chemistry

Which of the following is not a crystalline solid?

- A. KCl
- B. Fe metal
- C. Glass ✓ **Correct answer**
- D. rhombic S

A. Potassium chloride forms a regular ionic crystal lattice; it is crystalline.

B. Iron metal has an ordered crystal lattice; it is crystalline.

C. Glass is a supercooled liquid with no regular repeating lattice; it is the classic amorphous (non-crystalline) solid; correct.

D. Rhombic sulphur forms regular crystals; it is crystalline.

Question 72 Chemistry

Number of electron with l=2 in an atom having atomic number 23 is:

- B. 3 ✓ **Correct answer**
- C. 4
- D. 5

A. Two would mean only two d-electrons, but vanadium's configuration holds three.

B. Atomic number 23 is vanadium, [Ar] $3d^3 4s^2$; l = 2 means d-subshell electrons, and there are exactly three 3d electrons; correct.

C. Four would require a $3d^4$ configuration, which is chromium's (Z = 24), not vanadium's.

D. Five d-electrons is manganese's (Z = 25) configuration, not vanadium's.

Question 74 Chemistry

Reaction having high activation energy are:

- A. spontaneous
- B. fast
- C. slow ✓ **Correct answer**
- D. always exothermic

A. Spontaneity depends on the free-energy change, not on the activation barrier; a spontaneous reaction can still be very slow (e.g. diamond turning to graphite).

B. A high barrier means few molecules have enough energy to react, so the reaction is slow, not fast.

C. High activation energy means only a tiny fraction of collisions can clear the barrier, so the rate is low; correct.

D. Activation energy says nothing about whether heat is released or absorbed; high-barrier reactions can be endothermic or exothermic.

75 Chemistry

According to the Kinetic molecular theory, the kinetic energy of gas molecules increases when they are

- A. melted from solid to liquid state ✓ **Correct answer**
- B. mixed with other molecules at lower temperature
- C. frozen into solids
- D. condensed into liquids

A. Melting involves adding thermal energy, and the question treats that added energy as raising molecular kinetic energy; correct as the intended reading.

B. Mixing with colder molecules lowers the average molecular energy, so kinetic energy falls, not rises.

C. Freezing removes thermal energy and molecular motion slows, so kinetic energy falls.

D. Condensation removes thermal energy (latent heat is given out) and molecular motion slows, so kinetic energy falls. CAVEAT (retained, 8 Nov 2026): strictly, during melting at a constant melting temperature the average kinetic energy (which temperature measures) does NOT rise — the added heat goes into potential energy as bonds between particles loosen, while the temperature stays constant. Kinetic energy rises while a substance is HEATED within one phase, not during the isothermal phase change itself. No option states that case. A is kept because it is the only option involving adding thermal energy (B, C and D all remove it) and the Code-2 key (Q103) is A.

Question 76 Chemistry

If the equilibrium expression of a reversible reaction is [C]2/[A][B] The balanced chemical equation should be

- A. C=A+B
- B. 2C=A+B
- C. A+B=C

B = 2C ✓ Correct answer

A. That equation would give the equilibrium expression [A][B]/[C], the reciprocal of what is given.

B. That also puts C on the reactant side, giving [A][B]/$[C]^2$, not $[C]^2$/[A][B].

C. That would give [C]/[A][B], with [C] to the first power only.

D. Products go on top, raised to their coefficients: $[C]^2$/[A][B], exactly the expression given; correct. (The expression prints "[C]2" with the superscript lost; it is read as $[C]^2$.)

Question 77 Chemistry

Common name of 1,3 benzene diol is:

- A. Pyrogallol
- B. Cresol
- C. Resorcinol ✓ **Correct answer**
- D. Catechol

A. Pyrogallol is 1,2,3-benzenetriol, with THREE hydroxyl groups, not the 1,3-diol.

B. Cresol is methylphenol (one –OH and one methyl group), a different compound.

C. 1,3-Benzenediol (the two –OH groups meta to each other) is resorcinol; correct.

D. Catechol is 1,2-benzenediol, with the –OH groups next to each other (ortho), not 1,3.

Question 78 Chemistry

How many sigma and pi bonds are present in maleic anhydride?

- A. 5 sigma 3 pi
- B. 6 sigma 3 pi
- C. 7 sigma 2 pi
- D. 9 sigma 3 pi ✓ **Correct answer**

:s only the ring bonds and misses the C=O and C–H sigma bonds.

B. Still short: the two carbonyl sigma bonds and the two C–H sigma bonds are missing from this count.

C. Both counts are wrong: there are three pi bonds (one C=C and two C=O), not two.

D. Direct count of maleic anhydride ($C_4H_2O_3$): 5 ring sigma bonds + 2 C=O sigma bonds + 2 C–H sigma bonds = 9 sigma; 1 C=C pi + 2 C=O pi = 3 pi; correct.

Question 79 Chemistry

Addition of three molecules of chlorine into benzene prove that benzene has

- A. double bonds ✓ **Correct answer**
- B. non polar
- C. planar
- D. non planer

A. Benzene adds three molecules of Cl_2 to give $C_6H_6Cl_6$; taking up three halogen molecules is the classic evidence for three units of unsaturation, i.e. the equivalent of three double bonds; correct.

B. Addition of chlorine says nothing about polarity; benzene's non-polarity is a separate property.

C. Planarity is shown by structure and diffraction evidence, not by the addition reaction.

D. Benzene is in fact planar, and the addition reaction does not prove non-planarity.

Question 80 Chemistry

Propyle is allowed to react with hydrochloric acid two times then final product is

- A. 1,1-dichloropropane
- B. 1,2-dichloropropane

dichloropropane ✓ **Correct answer**

- D. 1,2-dichoropropene

A. The chlorines do not both end up on carbon 1; Markovnikov addition puts them on the more substituted carbon.

B. That would put the chlorines on adjacent carbons; the second addition does not happen there.

C. "Propyle" is the misprinted propyne ($CH_3–C≡CH$): the first HCl adds by Markovnikov's rule to give 2-chloropropene, and the second HCl adds to the same carbon, giving the geminal dihalide 2,2-dichloropropane; correct.

D. A propene is the product of only ONE addition; two additions give the saturated dichloropropane, and the option also misprints "dichoropropene".

Question 81 Chemistry

Diethyl ether and Methyl n-propyl ether are

- A. position isomers
- B. functional group isomers
- C. metramers ✓ **Correct answer**
- D. tautomar

A. Position isomers differ in where a functional group sits on the same chain; here the functional group (the ether oxygen) is in the same relative place and the alkyl groups differ.

B. Both compounds are ethers with the same –O– functional group, so they cannot be functional-group isomers.

C. Diethyl ether ($C_2H_5–O–C_2H_5$) and methyl n-propyl ether ($CH_3–O–C_3H_7$) have the same formula and the same functional group but different alkyl groups on either side of the oxygen — the definition of metamers (printed "metramers"); correct.

s (printed "tautomar") are isomers that interconvert by moving a hydrogen atom; these two ethers do no such thing.

Question 82 Chemistry

In the given reaction CH3OH -> HCOOH, oxidation state of carbon changes from:

- A. -2 to 0
- B. -2 to +2 ✓ **Correct answer**
- C. -3 to +2
- D. 0 to +2

A. The starting value −2 is right, but formic acid's carbon is +2, not 0 (0 would be formaldehyde, HCHO).

B. In methanol, CH_3OH, carbon is −2 (three H at +1 each, O at −2, OH hydrogen at +1); in formic acid, HCOOH, carbon is +2; correct.

C. Carbon in methanol is −2, not −3 (that would be the methyl carbon of ethane).

D. The starting oxidation state is −2, not 0.

Question 83 Chemistry

For endothermic reaction, enthalpy change is:

- A. $\Delta H_{reactant} > \Delta H_{product}$
- B. $\Delta H_{reactant} < \Delta H_{product}$ ✓ **Correct answer**
- C. $\Delta H_{reactant} = \Delta H_{product}$
- D. $\Delta H_{reactant} = \Delta H_{product} = 0$

A. That would mean the products hold LESS enthalpy than the reactants, i.e. heat is given out — an exothermic reaction.

B. An endothermic reaction absorbs heat, so the products end up with MORE enthalpy than the reactants and ΔH is positive; correct.

halpies would mean no heat is absorbed or released at all.

D. Enthalpies are not zero; the point is the difference between them.

Question 84 Chemistry

The structure of four Chloroalkanes W, X, Y and Z are shown: W = (CH3)2CHCH(Cl)CH3, X = CH2(Cl)CH3, Y = (CH3)3CHCH2Cl, Z = (CH3)2CHC(CH3)2Cl Select the Chloroalkane classified as tertiary,

- A. W only
- B. X only
- C. Y only
- D. Z only ✓ **Correct answer**

A. W, $(CH_3)_2CHCH(Cl)CH_3$, has its chlorine on a carbon bonded to two other carbons: a secondary chloroalkane.

B. X, $CH_2(Cl)CH_3$ (chloroethane), has its chlorine on a carbon bonded to only one other carbon: a primary chloroalkane.

C. Y, $(CH_3)_3CHCH_2Cl$, has its chlorine on a CH_2 carbon bonded to only one other carbon: a primary chloroalkane.

D. Z, $(CH_3)_2CHC(CH_3)_2Cl$, has its chlorine on a carbon bonded to three other carbons: a tertiary chloroalkane; correct. NOTE (8 Nov 2026): the mdcatpapers transcription prints different Y/Z structures (Y as $(CH_3)_3CCl$, tertiary) and keys C; the Code-2 PDF's legible structures (read visually from the rendered PDF p. 16) make Z the only tertiary chloroalkane, and the Code-2 key (content-consistent across all four codes: CODE-1 A, CODE-2 D, CODE-3 D, CODE-4 B — the same Z-only content at different letters) is D. The stem prints "teriary" for "tertiary".

Note: FILE CORRECTION (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the mdcatpapers transcription prints different Y/Z structures (Y as (CH3)3CCl, tertiary) and keys C; the Code-2 PDF's legible structures (p. 16, read visually from the

ge) are W = (CH3)2CHCH(Cl)CH3 (secondary), X = CH2(Cl)CH3 (primary), Y = (CH3)3CHCH2Cl (primary), Z = (CH3)2CHC(CH3)2Cl (tertiary), and the Code-2 key (Q112, CODE-2 = D) agrees. Answer D (Z only).

Question 85 Chemistry

The smallest repeating pattern from which the lattice is built in a crystalline solid is called

- A. Crystallite
- B. Amorphous region
- C. Unit cell ✓ **Correct answer**
- D. Crystal lattice

A. A crystallite is a small crystal grain made of many unit cells, not the smallest repeating pattern.

B. An amorphous region has no repeating pattern at all; it is the opposite of a crystal.

C. The unit cell is the smallest repeating unit which, repeated in three dimensions, builds the whole crystal; correct.

D. The lattice is the whole three-dimensional array of points; the unit cell is its smallest repeating piece.

Question 86 Chemistry

According to Le Chatelier's principle, in Haber's process yield of ammonia can be increased by:

- A. decreasing pressure and increasing temperature
- B. increasing pressure and decreasing temperature ✓ **Correct answer**
- C. increasing volume and decreasing temperature
- D. decreasing concentration of H2

A. Both changes push the equilibrium the wrong way: lower pressure favours more gas

ants) and higher temperature favours the endothermic reverse reaction.

B. The forward reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$ goes from 4 gas moles to 2 and is exothermic, so high pressure and low temperature both shift the equilibrium toward ammonia; correct. (In practice a moderate temperature with a catalyst is used, because too low a temperature makes the reaction too slow.)

C. Increasing the volume lowers the pressure, which opposes ammonia formation; only the temperature half is right.

D. Removing a reactant shifts the equilibrium BACKWARD, reducing the ammonia yield.

Question 87 Chemistry

Hyperbola is obtained when graph is plotted between:

- A. P and 1/V
- B. PV and V
- C. P and V ✓ **Correct answer**
- D. V and 1/P

A. The former marked key (wrong). Boyle's law says P is proportional to 1/V, so a plot of P against 1/V is a STRAIGHT line through the origin, not a hyperbola.

B. At constant temperature PV is constant, so a plot of PV against V is a horizontal straight line.

C. Boyle's law gives PV = constant, i.e. P = constant/V, which is the equation of a rectangular hyperbola; a P-vs-V plot IS the hyperbola; correct.

D. V is proportional to 1/P, so this plot is also a straight line. DECISION (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the derivation gives C — the hyperbola is the P–V curve. The source page's own explanation says the same ("P vs 1/V is linear; P vs V produces a hyperbola") while retaining A as the marked answer, so the marked key contradicts its own explanation; and the Code-2 key (Q116, CODE-2 = C)

the derivation. The former marked key A is wrong.

Question 88 Chemistry

Highest energy for one quantum among radiation is:

- A. microwave
- B. infrared
- C. ultra violet ✓ **Correct answer**
- D. visible

A. Microwaves have the lowest frequency (and lowest photon energy) of the four listed.

B. Infrared photons carry more energy than microwaves but less than visible light.

C. Photon energy E = hf rises with frequency, and ultraviolet has the highest frequency of the four, so each ultraviolet quantum carries the most energy; correct.

D. Visible light sits between infrared and ultraviolet in frequency, so its quanta carry less energy than ultraviolet quanta.

Question 89 Chemistry

Which of the following reagent is commonly used to prepare alkyne form vicinal dihalide?

- A. H2 and catalyst
- B. KOH/NaNH2 ✓ **Correct answer**
- C. KMnO4
- D. LiAlH4

A. Hydrogen with a catalyst reduces unsaturated compounds (hydrogenation); it does not remove two HX molecules to build a triple bond.

B. A vicinal dihalide needs TWO dehydrohalogenations to reach an alkyne, which requires a strong base; sodamide ($NaNH_2$) is the standard reagent, and strong alcoholic KOH is the

ook base, correct.

C. Potassium permanganate is an oxidising agent; it cleaves or oxidises, it does not dehydrohalogenate.

D. Lithium aluminium hydride is a reducing agent for carbonyl compounds and acids, not a dehydrohalogenation base.

Question 90 Chemistry

In a standard hydrogen electrode, the platinum electrode:

- A. Reacts with hydrogen
- B. Provide a surface for oxidation and reduction. ✓ **Correct answer**
- C. Acts as a salt bridge.
- D. Provide voltage to the circuit.

A. Platinum is inert here; it takes no chemical part in the hydrogen reaction.

B. The platinum gives hydrogen gas a conducting surface on which electrons can be exchanged ($H_2 \rightleftharpoons 2H^+ + 2e^-$) without itself reacting; correct.

C. A salt bridge is a separate component joining two half-cells; the platinum electrode is not one.

D. The electrode provides no voltage of its own; the potential arises from the hydrogen redox equilibrium, measured against the other half-cell.

Question 91 Chemistry

Which of the following compound has lower Lattice Energy?

- A. LiCl
- B. KCl ✓ **Correct answer**
- C. CaCl2
- D. CaH2O

ller than K^+, so Li^+ and Cl^- pack closer and LiCl has the HIGHER lattice energy of the two 1:1 chlorides.

B. K^+ is larger than Li^+, so the ions sit farther apart and KCl's lattice energy is lower than LiCl's; correct among the meaningful options.

C. Ca^{2+} carries double the charge, which raises the lattice energy well above either 1:1 chloride.

D. "CaH_2O" is not a meaningful compound formula (it is a misprint in the fetched text) and cannot be compared. (The comparison is therefore decided between LiCl, KCl and $CaCl_2$.)

Question 92 Chemistry

Reaction of 2-Bromobutane with alcoholic KOH yields:

- A. 2-Butanol
- B. 2-Butene ✓ **Correct answer**
- C. 2-Butyne
- D. 1-Butanol

A. 2-Butanol is the SUBSTITUTION product, formed with aqueous KOH; alcoholic KOH instead causes elimination.

B. Alcoholic KOH removes HBr from 2-bromobutane (dehydrohalogenation), giving the alkene 2-butene as the main product; correct.

C. An alkyne would need two eliminations from a dihalide; one elimination from a monobromide stops at the alkene.

D. 1-Butanol would require both substitution and a shift of the functional group to carbon 1; it is not formed here.

93 Chemistry

Which species contain an element with an oxidation number of +4?

- A. CrO2-4
- B. MnO2-
- C. H2SO4
- D. Na2CO3 ✓ **Correct answer**

A. Read as chromate, CrO_4^{2-}: oxygen is −2 each (−8 total) and the ion charge is −2, so chromium is +6, not +4.

B. As printed in the mdcatpapers transcription this option reads "MnO2-", which looks ambiguous — but the Code-2 PDF (p. 17, read visually from the rendered page, 8 Nov 2026) prints it as MnO_4^{2-} (manganate): manganese is +6 (four oxygens at −8, ion charge −2), not +4. So B does not qualify. (The option text is kept as filed; the PDF's reading is recorded here.)

C. In sulphuric acid, sulphur is +6 (four oxygens at −8, two hydrogens at +2, neutral molecule).

D. In carbonate, CO_3^{2-}, carbon is +4 (three oxygens at −6, ion charge −2); sodium is +1; correct. DECISION (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the ambiguity is settled by the visual read of the Code-2 PDF p. 17 — option B is MnO_4^{2-} (manganate, Mn +6), not MnO_2. Only D contains a +4 element, and the Code-2 key (Q122, CODE-2 = D) agrees.

Note: READING NOTE (8 Nov 2026): the mdcatpapers transcription prints option B as 'MnO2-', which looks ambiguous, but the Code-2 PDF (p. 17, read visually from the rendered page) prints it as MnO4 2- (manganate): manganese is +6, not +4. Only D (Na2CO3, carbon +4) qualifies. Code-2 key Q122 = D.

94 Chemistry

The rate of reaction

- A. Increases as the reaction proceeds
- B. Decreases as the reaction proceeds
- C. Remains the same as the reaction proceeds
- D. May decrease or increase as the reaction proceeds ✓ **Correct answer**

A. Not a universal rule: in most simple reactions the rate falls as reactants are used up.

B. True for most ordinary reactions, but not for all: autocatalytic reactions speed up as product builds.

C. Only a zero-order reaction keeps a constant rate while reactant remains; this is not general.

D. The cautious general statement: depending on the mechanism (ordinary consumption vs autocatalysis, temperature changes, etc.) the instantaneous rate may fall or rise; correct as the intended general answer. CAVEAT (retained, 8 Nov 2026): the answer rests on the wording convention that the stem asks for a statement true of reactions in general; for the simple reactions students usually meet, B (decreases) is the expected behaviour.

Question 95 Chemistry

The order of chemical reaction is defined as:

- A. The number of reactants involved in balanced equation
- B. The number of products formed in balanced equation
- C. The power to which the concentration of a reactant is raised in the rate equation ✓ **Correct answer**
- D. The rate constant of the reaction

A. That describes the molecularity/stoichiometry, not the order; order is found experimentally from the rate law.

ıct count has nothing to do with the order.

C. The order with respect to a reactant is exactly that exponent, and the overall order is the sum of the exponents; correct.

D. The rate constant k is a different quantity: it fixes how fast the reaction goes at unit concentrations, not the order.

Question 96 Chemistry

Real gases show more positive deviation as pressure increases because of

- A. Ionic nature
- B. repulsive forces ✓ **Correct answer**
- C. attractive forces
- D. non polar nature

A. Real gases are neutral molecules, not ions; ionic nature plays no part.

B. At high pressure molecules are forced close together, the finite volume they occupy and the repulsion between them dominate, and the gas occupies more volume (exerts more pressure) than the ideal law predicts — positive deviation; correct.

C. Attractions pull molecules together and cause NEGATIVE deviation (lower pressure than ideal), dominant at moderate pressures and low temperatures.

D. Polarity affects the strength of attractions, but it is not the cause of positive deviation at high pressure.

Question 97 Chemistry

Which statement applies to both ideal and real gases

- A. collision between molecules are elastic
- B. molecules are in constant random motion ✓ **Correct answer**
- C. molecules attract each other

ecules have zero size

A. Perfectly elastic collisions are a postulate of the IDEAL-gas model; real-gas collisions need not be treated that way.

B. Both ideal and real gas molecules move ceaselessly and randomly, colliding with each other and the walls; correct.

C. Real molecules do attract each other, but the ideal model assumes NO attractions, so this does not apply to both.

D. Point masses with no volume are an ideal-gas idealisation; real molecules occupy space.

Question 98 Physics

If voltage across a resistor is doubled then its resistance will become: (temperature and physical state of the conductor remains constant).

- A. Doubled
- B. Half
- C. Four times
- D. Remains constant ✓ **Correct answer**

A. Resistance is a property of the resistor (material, length, area, temperature), not of the voltage across it.

B. Halving would follow if resistance were inversely tied to voltage; it is not.

C. No squared dependence exists between resistance and applied voltage.

D. With temperature and physical state unchanged, R stays fixed; doubling V simply doubles the current (V = IR); correct.

99 Physics

A particle is moving in a uniform circular path whose projection is executing simple harmonic motion on horizontal diameter. The ratio of instantaneous velocity to the maximum velocity of the projection while passing through the center is:

- A. 1 : 1 ✓ **Correct answer**
- B. 1 : 2
- C. 2 : 1
- D. 1 : 4

A. The projection moves fastest exactly at the centre, where its velocity equals the maximum velocity ($v_{max} = \omega r$) of the simple harmonic motion; the ratio is therefore 1:1; correct.

B. That would mean the centre velocity is half the maximum, but the centre is where the velocity IS the maximum.

C. The velocity can never exceed the maximum velocity of the motion.

D. No quarter-speed relation holds at the centre; the velocity there is at its peak.

Question 100 Physics

The option that shows the conditions used by Laplace for connecting the velocity of sound is options medium used thermodynamics process 1 solid adiabatic 2 liquids isobaric 3 gas adiabatic 4 gas isothermal

- A. 1
- B. 2
- C. 3 ✓ **Correct answer**
- D. 4

A. Row 1 pairs a SOLID with an adiabatic process; Laplace's correction concerns sound in a GAS, not a solid.

rs LIQUIDS with an isobaric process; Laplace's correction is not about liquids or constant pressure.

C. Row 3 pairs GAS with ADIABATIC: Laplace corrected Newton by recognising that sound waves compress and rarefy a gas too quickly for heat exchange, so the process is adiabatic, giving $v = \sqrt{(\gamma P/\rho)}$; correct.

D. Row 4 pairs gas with ISOTHERMAL: that is Newton's original (incorrect) assumption, which gave too low a speed. (The fetched stem is garbled — it ends with the words "options medium used thermodynamics process" — and the options are a numbered 1–4 table mapped to A–D; the stem and rows are reproduced as printed and the mapping is read as A = row 1, B = row 2, C = row 3, D = row 4.)

Question 101 Physics

If different colored light beams have same total energy, which color beam will contain the smallest number of photons?

- A. Violet ✓ **Correct answer**
- B. Blue
- C. Green
- D. Red

A. Each photon carries $E = hf$; violet has the highest frequency of the colours listed, so each violet photon carries the most energy and the fewest photons are needed to reach a fixed total energy; correct.

B. Blue photons carry less energy each than violet photons, so more of them are needed for the same total.

C. Green light has a lower frequency than blue or violet, so still more photons are needed.

D. Red has the lowest frequency of the four, so a red beam needs the LARGEST number of photons for the same total energy.

102 Physics

A patient is injected with a radioactive isotope to trace blood flow and detect circulation issues. The isotope used is more likely to be:

- A. Iodine-131
- B. Phosphorus-32
- C. Cobalt-60
- D. Sodium-24 ✓ **Correct answer**

A. The former marked key (wrong). Iodine-131 is a well-known medical radioisotope, but its standard use is thyroid diagnosis and therapy (it concentrates in the thyroid), not blood-flow tracing.

B. Phosphorus-32 is a beta emitter used in some therapies and research; it is not a blood-flow tracer.

C. Cobalt-60 is a strong gamma source used in radiotherapy and sterilisation, not injected to trace circulation.

D. Sodium-24 (half-life about 15 hours, gamma emitter) was the classic tracer for blood circulation and blood-volume studies: injected sodium mixes with the blood and its gamma rays are followed around the circulation; correct. DECISION (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): on the stem's own terms — tracing blood flow and circulation — D (sodium-24) is the historically correct circulation tracer among the options, while A is the thyroid isotope. Fresh sources confirm it (UPPSC notes: 'Radio-sodium (specifically Sodium-24, Na-24) is commonly used [to measure the speed of blood flow]'; OSTI 1949: 'Use of Na24 in a circulation study'). The Code-2 key (Q131, CODE-2 = D) agrees. The former marked key A is wrong.

Question 103 Physics

Water flows through a pipe of 0.02 m^2 with a speed of 3 m/s. The pipe narrows to 0.01 m^2. The speed in narrow section is:

m/s

- B. 3 m/s
- C. 6 m/s ✓ **Correct answer**
- D. 9 m/s

A. The speed rises when the pipe narrows, it does not halve.

B. The speed cannot stay the same when the cross-section halves; the same volume must pass through a smaller opening.

C. Continuity: $A_1v_1 = A_2v_2$, so $v_2 = 3 \times (0.02/0.01) = 6$ m/s; correct.

D. That would require the area ratio to be 3, but it is 2.

Question 104 Physics

In the human circulatory system, turbulent blood flow is most likely to occur when the:

- A. Vessel diameter is very small
- B. Velocity of blood is very low
- C. Blood flows through a clogged vessel ✓ **Correct answer**
- D. Blood viscosity increases

A. A very small diameter keeps the Reynolds number low and the flow smooth (laminar), as in capillaries.

B. Low velocity also keeps the Reynolds number low and the flow laminar.

C. A narrowing or obstruction (plaque, clot) disturbs smooth flow, raises local velocity and eddying, and produces turbulence (heard as a bruit); correct.

D. Higher viscosity damps disturbances and favours laminar flow; turbulence is favoured by LOW viscosity, not high.

105 Physics

A conducting ring is placed near a current-carrying coil. As the current in the coil increases, the induced current in the ring flows:

- A. In the direction of magnetic field
- B. To increases the magnetic flux
- C. To oppose increasing magnetic flux ✓ **Correct answer**
- D. Randomly without a definite direction

A. The induced current's direction is set by the CHANGE in flux, not by simply following the field direction.

B. Increasing the flux further would reinforce the change, the opposite of what Lenz's law requires.

C. Lenz's law: the induced current creates a magnetic field that opposes the INCREASE in flux through the ring; correct.

D. The induced current has a definite direction fixed by Lenz's law; nothing about it is random.

Question 106 Physics

In progressive waves, energy is transferred from one point to another through:

- A. Circular motion of particles
- B. Oscillatory motion of particles ✓ **Correct answer**
- C. Rotation of particles
- D. Translation of particles

A. Circular particle orbits occur in water surface waves, but the general mechanism of energy transfer in a progressive wave is oscillation, not circular motion.

B. In a progressive wave each particle oscillates about its fixed mean position and hands energy on to its neighbours; the wave travels, the particles do not; correct.

do not spin their way along carrying the wave's energy.

D. If particles translated (travelled along with the wave), the medium itself would flow; in a wave the medium stays put while the disturbance and its energy move on.

Question 107 Physics

A capacitor is connected to an AC source. If the frequency of the AC source is doubled the current in a purely capacitive circuit will:

- A. Be doubled ✓ **Correct answer**
- B. Remains Unchanged
- C. Become Half
- D. Becomes zero

A. Capacitive reactance Xc = 1/(2πfC) halves when f doubles, so for the same voltage the current I = V/Xc doubles; correct.

B. The reactance depends on frequency, so the current cannot stay unchanged.

C. Halving is what happens to the REACTANCE, not the current; the current moves the other way.

D. A capacitor passes AC; doubling the frequency increases the current, it does not stop it.

Question 108 Physics

When thermal energy is transferred from a hot object to a cold one, the change occurs in the hot object as:

- A. Increases in internal energy
- B. Decrease in internal energy ✓ **Correct answer**
- C. Increase in temperature
- D. Increase in heat content

A. The hot object is LOSING energy, so its internal energy falls; it is the cold object whose

B. Energy leaving the hot object lowers the total kinetic and potential energy of its particles, i.e. its internal energy; correct.

C. The hot object's temperature falls as it loses energy (unless a phase change intervenes), it does not rise.

D. "Heat content" is not a state property, and the hot object is giving energy out, not taking it in.

Question 109 Physics

Two spectral lines in the Hydrogen atom spectrum are close together. This likely means:

- A. The energy difference is zero
- B. The energy difference is small ✓ **Correct answer**
- C. The light intensity is low
- D. The atom become unstable

A. Zero difference would mean the two lines coincide as one line, not two close lines.

B. Each line's position is set by the energy gap of its transition ($\Delta E = h\nu$); lines close together in wavelength come from transitions with similar, small differences in energy; correct.

C. Intensity (brightness) is a separate property from line spacing; close lines can be bright.

D. Line spacing says nothing about the atom's stability.

Question 110 Physics

When two identical waves arrive in phase at same point and in a region at the same time the resultant displacement is equal to

- A. Displacement of a single wave

- C. Sum of their displacements ✓ **Correct answer**
- D. Product of their displacements

A. In phase, the two displacements reinforce; the result is larger than either wave alone (twice as large for identical waves).

B. Subtraction gives the result for waves arriving in ANTI-phase (destructive interference), not in phase.

C. The superposition principle: displacements add algebraically, so in-phase waves give the sum (constructive interference, doubled amplitude for identical waves); correct.

D. Displacements are never multiplied; superposition is addition.

Question 111 Physics

High slope of Ohm's law graph means

- A. Low resistance ✓ **Correct answer**
- B. High resistance
- C. Open circuit
- D. Low current

A. The printed key, confirmed: on the I–V reading the graph is current (I) against voltage (V): slope = I/V = 1/R, so a steep slope means a large conductance and a LOW resistance; correct.

B. On the other standard reading — voltage (V) against current (I), the graph usually drawn for Ohm's law — slope = V/I = R, so a steep slope means a HIGH resistance.

C. An open circuit gives no current at all (infinite resistance, a flat I–V line), which is not what "high slope" describes on either reading.

D. Slope describes the ratio of the two quantities, not the size of the current alone.

e SZABMU Code-2 key (PDF Q140) arbitrates the I–V reading — slope = I/V = 1/R, so a steep slope means low resistance. Caveat retained: the V–I reading (B) is a genuine alternative convention; the official key uses I–V.

Question 112 Physics

The electric potential at a point due to a point charge is 100J/C. If a test charge of magnitude 1C placed at that point is replaced with a 2C charge, then the physical quantity that will change is:

- A. Electric Field at that point
- B. Electric potential at that point
- C. Electric Potential Energy of the system ✓ **Correct answer**
- D. Temperature

A. The field is set by the source charge alone; changing the test charge does not alter it.

B. Potential is a property of the source charge distribution (V = kQ/r); it is defined per unit charge and does not depend on the test charge.

C. Potential energy is U = qV, so doubling q from 1 C to 2 C doubles U (from 100 J to 200 J); this is the quantity that changes; correct.

D. Temperature has no connection to replacing a test charge.

Question 113 Physics

The waves among the following which require a material medium for their propagation are:

- A. Gamma rays
- B. X-rays
- C. Infrared waves
- D. Infrasonic waves ✓ **Correct answer**

ays are electromagnetic waves; they travel through a vacuum.

B. X-rays are electromagnetic waves; they travel through a vacuum.

C. Infrared radiation is electromagnetic; it travels through a vacuum (sunlight's heat reaches us through space).

D. Infrasound is sound below human hearing — a mechanical wave that needs vibrating matter to carry it and cannot travel through a vacuum; correct.

Question 114 Physics

Unequal changes occurring in velocity of a body is called

- A. Uniform acceleration
- B. Instantaneous acceleration
- C. variable acceleration ✓ **Correct answer**
- D. Uniform velocity

A. Uniform acceleration means EQUAL changes in velocity in equal intervals of time — the opposite of what is described.

B. Instantaneous acceleration is the acceleration AT one instant; it does not describe a pattern of unequal changes over time.

C. When velocity changes by unequal amounts in equal times, the acceleration itself is changing, i.e. variable (non-uniform) acceleration; correct.

D. Uniform velocity means NO change in velocity at all, so no acceleration of any kind.

Question 115 Physics

What will potential difference, if a wire has resistance of 10Ω and current 2A flow through it :

- A. 5V

- C. 20V ✓ **Correct answer**
- D. 40V

A. 5 V would come from dividing (10/2); Ohm's law multiplies, it does not divide.

B. 10 V would be the result of 5 A through 10 Ω, or 2 A through 5 Ω; it does not match the given numbers.

C. V = IR = 2 A × 10 Ω = 20 V; correct.

D. 40 V would need 4 A through 10 Ω, double the given current.

Question 116 Physics

According to the particle model of light, a photon is:

- A. A particle with mass and charge
- B. A quantum of energy with zero rest mass and zero charge ✓ **Correct answer**
- C. A continuous energy wave
- D. A particle that travels slower than light

A. A photon has no rest mass and no electric charge; a massive charged particle is matter, not light.

B. A photon is a discrete packet of electromagnetic energy, massless and uncharged, carrying energy E = hf and momentum; correct.

C. A continuous wave is the WAVE model of light; the particle model treats light as discrete quanta.

D. Photons always travel at the speed of light in vacuum; nothing massive does that, and no photon travels slower in vacuum.

117 Physics

The current in forward biased PN junction is mainly due to:

- A. Majority carriers ✓ **Correct answer**
- B. Minority carriers
- C. leakage carrier
- D. Thermionic emission

A. Forward bias lowers the barrier so majority carriers (electrons from the n-side, holes from the p-side) diffuse across the junction in large numbers; that diffusion is the main forward current; correct.

B. Minority carriers dominate the small REVERSE (saturation) current, not the forward current.

C. Leakage current is a small surface/generation effect, not the main forward current.

D. Thermionic emission is electrons boiling off a heated cathode in vacuum devices; it is not the mechanism of a PN junction.

Question 118 Physics

Stationary waves are formed in a stretched string of 2m length, such that two vibrating loops are formed. The distance between consecutive nodes formed is:

- A. 0.5 m
- B. 1 m ✓ **Correct answer**
- C. 2 m
- D. 3 m

A. Half a metre would be the node spacing if four loops formed; only two loops form here.

B. Two loops fill the 2 m string, so each loop is 1 m = λ/2, giving λ = 2 m, and consecutive nodes are λ/2 = 1 m apart; correct.

es is the whole string length (and the wavelength), not the node spacing.

D. Three metres exceeds the entire string; it cannot be a spacing within it.

Question 119 Physics

A high internal resistance battery is not suitable for heavy loads due to:

- A. Excess voltage drop ✓ **Correct answer**
- B. High terminal voltage
- C. Infinite emf
- D. Constant current

A. A heavy load draws a large current, and the voltage lost inside the battery (I × r) grows with it, so little voltage is left at the terminals to drive the load; correct.

B. High internal resistance LOWERS the terminal voltage under load; it does not raise it.

C. No battery has infinite emf; emf is a fixed property of the cell chemistry.

D. The current is not held constant; it falls as the internal drop eats the terminal voltage.

Question 120 Physics

Two equal charges experience a certain force when placed in vacuum. When the charges are placed in a medium, the force becomes 1/4th. The dielectric constant of the medium is:

- A. 0.25
- B. 2
- C. 4 ✓ **Correct answer**
- D. 16

A. 0.25 is the factor by which the force falls, not the dielectric constant; the constant is its reciprocal.

c constant of 2 would halve the force, not quarter it.

C. In a medium F = F_vacuum/κ, so a force of one quarter means κ = 4; correct.

D. A dielectric constant of 16 would cut the force to one sixteenth, not one quarter.

Question 121 Physics

If a test charge of magnitude 2C experience forces of 100N and 200N at two points A and B in an electric field respectively. The ratio of electric fields at A to that of B is:

- A. 1:1
- B. 1:2 ✓ **Correct answer**
- C. 1:4
- D. 2:1

A. Equal fields would give equal forces on the same test charge; the forces differ.

B. Field E = F/q with the same q = 2 C at both points, so E_A:E_B = 100:200 = 1:2; correct.

C. A 1:4 ratio would need the forces to differ by a factor of four; they differ by a factor of two.

D. That reverses the ratio: the field at B, where the force is larger, is the larger field.

Question 122 Physics

A body of mass 2 kg moving with velocity 3 m/s collides with a body of mass 1 kg at rest. If they stick together, their common velocity after collision is:

- A. 1 m/s
- B. 2 m/s ✓ **Correct answer**
- C. 3 m/s
- D. 4 m/s

A. That would conserve only 3 kg·m/s of momentum, but the system starts with 6 kg·m/s.

m is conserved in the perfectly inelastic collision: (2 × 3) + (1 × 0) = (2 + 1) × v, so 6 = 3v and v = 2 m/s; correct.

C. The combined mass cannot keep the original speed; sharing the momentum over more mass slows it down.

D. Faster than the incoming body, which would create momentum from nothing.

Question 123 Physics

Two balls thrown with equal speeds but at different angles cover equal horizontal distance. If one is thrown at an angle of 40°, then the angle of projection of the other is:

- A. 20°
- B. 30°
- C. 45°
- D. 50° ✓ **Correct answer**

A. 20° is not complementary to 40° (they sum to 60°, not 90°), so the ranges differ.

B. 30° and 40° sum to 70°, not 90°, so the ranges differ.

C. 45° gives the maximum range; a 40° throw has a shorter range, so 45° cannot match it.

D. Range depends on sin 2θ, and sin 80° = sin 100°; complementary angles (40° + 50° = 90°) give equal ranges at equal speeds; correct.

Question 124 Physics

The work done on a body is stored in it in the form of:

- A. Power
- B. Energy ✓ **Correct answer**
- C. Momentum
- D. Impulse

he RATE of doing work, not the stored result of it.

B. Work transfers energy: the work done on a body appears as increased kinetic or potential energy stored in it (work–energy theorem); correct.

C. Momentum is changed by impulse (force × time), not stored as the result of work.

D. Impulse is force × time and equals momentum change; work (force × distance) is stored as energy, not as impulse.

Question 125 Physics

If 20 waves pass a point in 2 seconds and with a speed of 5m/s, then the wavelength of wave is:

- A. 0.5 m ✓ **Correct answer**
- B. 1 m
- C. 1.5 m
- D. 2 m

A. Frequency f = 20 waves / 2 s = 10 Hz, and λ = v/f = 5/10 = 0.5 m; correct.

B. That would require f = 5 Hz, i.e. only 10 waves in 2 seconds.

C. No combination of the given numbers gives 1.5 m.

D. That would require f = 2.5 Hz, i.e. only 5 waves in 2 seconds.

Question 126 Physics

The unit of RC in case of charging a capacitor is:

- A. Farad
- B. Seconds ✓ **Correct answer**
- C. Ohm
- D. Volt

is the unit of capacitance (C) alone, not of the product RC.

B. R (ohm) × C (farad) = seconds: RC is the time constant, the time scale on which the capacitor charges; correct.

C. The ohm is the unit of resistance (R) alone, not of RC.

D. The volt is the unit of potential difference; RC has nothing to do with volts dimensionally.

Question 127 Physics

A longitudinal wave has a frequency of 500 Hz and wavelength of 0.6 m, its speed is:

- A. 30 m/s
- B. 83 m/s
- C. 300 m/s ✓ **Correct answer**
- D. 1200 m/s

A. 30 comes from dividing (30 = 500/... no); the wave equation multiplies frequency by wavelength.

B. 83 m/s is not the product of 500 and 0.6.

C. v = fλ = 500 × 0.6 = 300 m/s; correct.

D. That would need a wavelength of 2.4 m at this frequency, four times the given one.

Question 128 Physics

The true statement about angular displacement is:

- A. It always increases with time
- B. It is treated as vector for small rotations ✓ **Correct answer**
- C. It is always a scalar quantity
- D. It is measured in meters

displacement can decrease (rotation reversing) or stay put; it does not always increase.

B. For small rotations, angular displacement obeys vector addition and has an axis direction (right-hand rule), so it is treated as a vector; correct. (Large finite rotations do not commute and are not true vectors.)

C. It has a direction (the axis), so it is not always a scalar.

D. Angular displacement is measured in radians (or degrees), not metres; metres measure arc length.

Question 129 Physics

π radians are equivalent to

- A. 30°
- B. 270°
- C. 90°
- D. 180° ✓ **Correct answer**

A. 30° is π/6 radians, not π radians.

B. 270° is 3π/2 radians.

C. 90° is π/2 radians.

D. π radians is half a full turn: 180°; correct.

Question 130 Physics

A person moves 600 m towards north then 300 m towards south. Its displacement to distance ratio is:

- A. 1:3 ✓ **Correct answer**
- B. 1:2

- D. 3:1

A. Displacement is the net result: 600 north − 300 south = 300 m north. Distance is the total path: 600 + 300 = 900 m. Ratio = 300:900 = 1:3; correct.

B. That would need a displacement of 450 m, which no combination of the two legs gives.

C. That would need a displacement of 600 m, i.e. no southward leg at all.

D. That reverses the ratio; displacement can never exceed distance.

Question 131 Physics

In a stationary wave the point that undergoes zero acceleration is:

- A. Node ✓ **Correct answer**
- B. Antinode
- C. Midpoint between node and antinode
- D. Every point along the wave

A. At a node the displacement is always zero, and in simple harmonic motion acceleration is proportional to displacement ($a = -\omega^2 y$), so the acceleration is always zero there too; correct.

B. An antinode oscillates with MAXIMUM amplitude and maximum acceleration.

C. That point oscillates with intermediate amplitude, so its acceleration is non-zero (except at the instant it passes the mean position).

D. Only the nodes stay still; every other point oscillates with some acceleration.

Question 132 Physics

If the speed of sound is measured at sea level and at the top of a mountain, both at the same temperature, it will be:

- B. Greater at the mountain top
- C. The same at both places ✓ **Correct answer**
- D. Greater where the air is denser

A. Pressure and density are higher at sea level, but for an ideal gas their effects cancel in the speed of sound, which depends on temperature.

B. Nothing at the mountain top raises the speed at the same temperature; the air is thinner, not faster-sounding.

C. The speed of sound in air, $v = \sqrt{(\gamma RT/M)}$, depends on temperature (and gas composition), not on pressure or density alone; at equal temperature it is equal; correct.

D. Density alone does not set the speed: at fixed temperature, higher density comes with proportionally higher pressure, and the ratio — which fixes the speed — is unchanged.

Question 133 English

The book was written by Rashid Khan. Identify the correct usage of voice.

- A. Rashid Khan writes the book.
- B. Rashid Khan wrote the book. ✓ **Correct answer**
- C. Rashid Khan written the book.
- D. Rashid Khan has write the book.

A. Present simple; the passive "was written" is past, so the active form must be past too.

B. "Was written" (past passive) converts to the past simple active "wrote", with Rashid Khan as subject; correct.

C. "Written" is a participle and needs an auxiliary ("has written"); on its own the sentence is ungrammatical.

D. "Has write" is ungrammatical; the perfect form would be "has written", and it would

the tense.

Question 134 English

Identify the example of complex sentence.

- A. I both thanked him and rewarded him.
- B. Life is what we make it. ✓ **Correct answer**
- C. He owed his success to his father.
- D. Jumping up, he ran away.

A. One main clause with a compound predicate; a simple sentence, not a complex one.

B. A complex sentence: the main clause "Life is ..." plus the subordinate noun clause "what we make it" as its complement; correct.

C. A single main clause with no subordinate clause; a simple sentence.

D. A simple sentence with a participial phrase; it has only one finite clause.

Question 135 English

Pick out the sentence which illustrates the use of infinitive.

- A. He refused to obey the orders. ✓ **Correct answer**
- B. He refused obeying the orders.
- C. He refused obey the orders.
- D. He refused obeyed the orders.

A. "To obey" is the infinitive (to + base verb), correctly used after "refused"; correct.

B. "Obeying" is a gerund/participle; "refuse" does not take a gerund object in this construction.

C. A bare infinitive after "refuse" is ungrammatical; "to" is required.

D. "Obeyed" is a past-tense/past-participle form and cannot follow "refused" this way.

136 English

What is the effect of using synonyms with different shades of meaning in satire?

- A. To create a serious tone
- B. To highlight the absurdity or irony of a situation ✓ **Correct answer**
- C. To confuse the reader
- D. To add complexity to the language

A. Satire works by mockery and irony, not by solemnity; choosing loaded synonyms is not a device for seriousness.

B. Picking a synonym with a slightly different connotation lets the satirist expose the gap between what is claimed and what is meant, sharpening the irony; correct on the intended reading.

C. Confusion is not the aim; satire aims to make its target clear through pointed word choice.

D. Complexity for its own sake is not the effect being asked about; the point is the ironic effect. CAVEAT (retained, 8 Nov 2026): the answer rests on an interpretive literary convention about satire, not on a derivation.

Question 137 English

People approach the situation differently depending on who they are. The word 'approach' in this sentence means .....

- A. relate ✓ **Correct answer**
- B. coordinate
- C. comprehend
- D. verify

A. "Relate" is the nearest of the four to the sense here: the way people deal with, or relate to, a situation; correct as the intended nearest synonym.

te" means to organise or bring together; it does not capture how someone deals with a situation.

C. "Comprehend" means to understand; approaching a situation is about handling it, not merely understanding it.

D. "Verify" means to check or prove true; it has no connection with approaching a situation. DECISION NOTE (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): "approach" here most naturally means "deal with / tackle", which is not among the options; "relate" is the nearest synonym offered. Collins confirms the deal-with sense ('to begin to deal with (a matter)'; 'a way of dealing with a matter'), and no dictionary source gives 'comprehend' (understand) as a sense of 'approach'. The Code-2 key (Q167 = C) disagrees and is recorded here, not followed.

Note: KEY DISAGREEMENT (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the Code-2 key (Q167) is C ('comprehend'); the filed A ('relate') is kept because Collins defines 'approach' as 'begin to deal with (a matter)' and no dictionary source supports 'approach = comprehend'.

Question 138 English

The team won the match, _____ they broke the school record.

- A. Similarly
- B. Nevertheless
- C. Furthermore ✓ **Correct answer**
- D. Instead

A. The former marked key (wrong). "Similarly" draws a COMPARISON between two like things; winning a match and breaking a record are not two like things being compared.

B. "Nevertheless" concedes something in spite of a difficulty ("in spite of that"); nothing here is conceded.

C. "Furthermore" ADDS a further achievement to the first: they won the match and, in

y broke the record, this is the connector the sentence needs; correct.

D. "Instead" replaces one thing with another; the team did both things, one did not replace the other. DECISION (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the correct additive connector is C ("Furthermore"); the source page's own explanation says the same ("'Furthermore' would be best") while retaining A as the marked answer, and the Code-2 key (Q168, CODE-2 = C) agrees. The former marked key A is wrong.

Question 139 English

Travelling in a hot dusty train gives me no pleasure. The underlined part of the sentence is:

- A. Adverb phrase
- B. Adjective phrase
- C. Noun phrase ✓ **Correct answer**
- D. Infinitive phrase

A. An adverb phrase modifies a verb, adjective or adverb; this phrase is the SUBJECT of the sentence, not a modifier.

B. An adjective phrase modifies a noun; this phrase does not modify any noun.

C. "Travelling in a hot dusty train" is a gerund phrase (travelling + its modifiers) doing the work of a noun as the subject of "gives"; correct.

D. An infinitive phrase begins with "to" + a verb ("to travel"); this phrase begins with the gerund "travelling". (The underlining is not visible in the fetched text; the underlined part is taken to be the sentence-initial phrase "Travelling in a hot dusty train", the only phrase that fits the question.)

Question 140 English

What does "I've told you a million times" means?

provide an exact count

- B. To emphasize frustration or impatience ✓ **Correct answer**
- C. To confuse the listener
- D. To make the character sound foolish

A. "A million times" is hyperbole, not a literal count; nobody has literally told someone something a million times.

B. The exaggeration stresses how often the speaker has repeated themselves and how fed up they are; correct.

C. The listener understands the exaggeration perfectly well; confusion is not the point.

D. The idiom expresses exasperation, not foolishness.

Question 141 Logical Reasoning

An outbreak of a corona disease is reported in the city. What should be the first course of action?

- A. Develop a vaccination plan.
- B. Conduct research on the disease.
- C. Implement quarantine measures.
- D. Inform the public by using all means. ✓ **Correct answer**

A. Vaccination planning matters, but a vaccine cannot be developed and delivered fast enough to be the FIRST response to an outbreak already spreading.

B. Research is needed, but it takes time; it cannot be the immediate first step while transmission continues.

C. Immediate containment — isolating cases and quarantining contacts — stops the spread first, before longer-term measures can work; the containment-first reading, and the filed answer before this decision. In real outbreak response, public communication begins at the same time as containment, so the ranking is a convention, not a derivation.

break the public must be informed at once, by every means, so people take protective action, seek care promptly and cooperate with containment; this is the paper's keyed first step (Code-2 key Q172 = D); correct as the paper's keyed answer. DECISION NOTE (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): C and D cannot be separated by derivation — both run together in real practice. The tie is broken by the paper's own key, which is content-consistent across all four codes (CODE-1 C, CODE-2 D, CODE-3 C, CODE-4 D — the same 'inform the public' content at different letters). The filed C is recorded here as the alternative reading, not hidden.

Note: PICK-ONE (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the filed answer was C (implement quarantine measures — the containment-first reading, recorded in the explanations as the alternative); the Code-2 key (Q172, CODE-2 = D, content-consistent across all four codes) is D (inform the public by using all means). In real outbreak response the two run together; the key breaks the tie.

Question 142 Logical Reasoning

Find the next number: 5,11,23,47,95, _____ ?

- A. 191 ✓ **Correct answer**
- B. 193
- C. 192
- D. 199

A. The rule that generates the given terms is ×2+1: 5×2+1 = 11, 11×2+1 = 23, 23×2+1 = 47, 47×2+1 = 95, so the next term is 95×2+1 = 191; this option satisfies the rule exactly; correct.

B. The former marked key (wrong). No step of the ×2+1 rule produces 193 from 95 (95×2+3 = 193 would break the pattern of the earlier steps).

C. 192 is 95×2+2; it fits neither the ×2+1 rule nor any other consistent rule for the given terms.

2+9; it fits no consistent rule for the given terms. DECISION (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the derivation gives A — the source page's own explanation computes 191 ("95*2+1=191") and then notes "the printed options include 191; choose that", while retaining 193 as the marked answer. The Code-2 key (Q173, CODE-2 = B, 193) agrees with the marked key but fits no consistent rule for the given terms, so it is not followed. The former marked key B is wrong.

Note: KEY DISAGREEMENT (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the Code-2 key (Q173, CODE-2 = B, 193) agrees with the former marked key, but 193 fits no consistent rule for 5, 11, 23, 47, 95 (x2+1 gives 191); the derivation is followed, not the key.

Question 143 Logical Reasoning

Which number comes in the missing place? 1, 3, 7, 15, 31, _____

- A. 61
- B. 63 ✓ **Correct answer**
- C. 65
- D. 67

A. 61 would follow a +30 step from 31, but the steps so far double (+2, +4, +8, +16); +30 breaks the pattern.

B. The terms are 2^n-1 (1, 3, 7, 15, 31) or equivalently ×2+1 at each step (31×2+1 = 63); correct.

C. 65 is 31×2+3; the added amount in every earlier step is exactly 1.

D. 67 fits no step pattern in the given terms.

Question 144 Logical Reasoning

Every alphabet in the word "SURGEON" represent a fixed numerical value and the numbers when added, sum up to 99. Based on this, what will the sum of the word "EDR?

- A. 102
- B. 78
- C. 99 ✓ **Correct answer**
- D. 56

A. No letter values are given anywhere in the fetched stem, so 102 cannot be derived from the information printed.

B. No letter values are given, so 78 cannot be derived either.

C. The printed key, confirmed: the target word in the PDF (Q175) is "EORGNSU", an anagram of SURGEON — the same letters, so the same fixed values and the same sum, 99; correct. (The transcription's "EDR?QNSH" is a garbled rendering of "EORGNSU".)

D. No letter values are given, so 56 cannot be derived either. VERIFIED: SZABMU Code-2 PDF Q175 — the target word is EORGNSU, an anagram of SURGEON, so its letter values sum to the same total, 99; PDF key C. The facsimile supplies the correct wording.

Note: STEM NOTE: the transcription prints the target word as 'EDR?QNSH' with a literal '?'; the Code-2 PDF (Q175) prints 'EORGNSU', an anagram of SURGEON — the same letters, so the same sum, 99. The stem is kept as printed; the facsimile wording is recorded here.

Question 145 Logical Reasoning

What is the primary difference between hypothesis and a theory?

- A. A hypothesis is a proven fact, while a theory is an unproven data
- B. A hypothesis is a specific prediction, while a theory is a broad explanation
- C. A hypothesis is a qualitative statement, while a theory is quantitative statement
- D. A hypothesis is a tentative explanation, while a theory is a well-substantiated explanation ✓ **Correct answer**

A. Backwards and wrong on both halves: a hypothesis is unproven by definition, and a

best-supported explanation, not "unproven data".

B. Partly true in flavour (theories are broader), but a hypothesis is more than a prediction — it is a tentative explanation — and this option misses the key difference, which is the weight of evidence.

C. Both hypotheses and theories can be qualitative or quantitative; that is not the difference between them.

D. Correct: a hypothesis is a testable, tentative proposal, while a scientific theory is a broad explanation supported by a large body of tested evidence.

Question 146 Logical Reasoning

What comes next? ZX, WU, TR, QO, ____

- A. NL ✓ **Correct answer**
- B. LN
- C. NM
- D. KH

A. The marked letter, confirmed with the facsimile's content: the clean pattern is first letters Z, W, T, Q (−3 each) and second letters X, U, R, O (−3 each), giving the next pair NL; correct.

B. LN reverses the expected pair: the first letter should be N and the second L.

C. N is the expected first letter, but the second letter should be L, not M.

D. K and H fall outside both letter sequences of the given pairs. VERIFIED: SZABMU Code-2 PDF Q177 — options A. NL · B. LN · C. NM · D. KH; key A. Derivation: ZX → WU → TR → QO → NL (−3, −3 each). FILE CORRECTION (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the transcription printed the option set as A. ON · B. LM · C. NN · D. KH, in which the correct answer NL was not an option at all; corrected to the Code-2 PDF Q177 option set above (the 37k Q98 facsimile-correction precedent). The letter A is confirmed

facsimile's content (NL).

Note: FILE CORRECTION (8 Nov 2026, decided by assistant under owner's 8 Nov delegation): the transcription printed the option set as A. ON · B. LM · C. NN · D. KH, in which the correct answer NL was not an option at all; corrected to the Code-2 PDF Q177 option set (A. NL · B. LN · C. NM · D. KH), the 37k Q98 facsimile-correction precedent.

Question 147 Logical Reasoning

In a row of students, a student is at 13th position from the left end and 20th position from the right end. How many students are there in the row?

- A. 30
- B. 31
- C. 32 ✓ **Correct answer**
- D. 33

A. 30 would be 13 + 20 − 3; the overlap correction is 1 (the student counted twice), not 3.

B. 31 would be 13 + 20 − 2; the student is counted in both position counts, so only 1 must be subtracted.

C. Total = position from left + position from right − 1 = 13 + 20 − 1 = 32 (12 students to the left, 19 to the right, plus the student); correct.

D. 33 is the plain sum 13 + 20, which counts the student twice.

Question 148 Logical Reasoning

A is older than B but younger than F. C is younger than B but older than D. Who is the youngest of them?

- A. A
- B. B
- C. C

Correct answer

A. A is older than B, so A cannot be the youngest.

B. B is older than both C and D, so B cannot be the youngest.

C. C is younger than B but OLDER than D, so C is not the youngest.

D. The chain is F > A > B > C > D; D is below everyone else named and nothing places anyone below D; correct.

Question 149 Logical Reasoning

A hiker climbed to a higher altitude, where he felt the air pressure was lower as compared to the lower altitude. What is the likely effect?

- A. The hiker felt more energetic.
- B. The hiker felt no difficulty in breathing.
- C. The hiker might experience altitude sickness. ✓ **Correct answer**
- D. The hiker felt healthier and fresh.

A. Lower pressure means less oxygen available per breath; feeling more energetic is the opposite of the expected effect.

B. Breathing typically becomes HARDER at altitude as the body works to take in enough oxygen.

C. Reduced air pressure and lower partial pressure of oxygen at altitude can cause altitude sickness (headache, nausea, fatigue, breathlessness); correct.

D. That contradicts the physiological effect of thin air at altitude.

Question 150 Biology

HIV belongs to which class of virus with respect to genome type?

- A. Single stranded DNA viruses

ible stranded RNA viruses

- C. ssRNA; template for DNA synthesis ✓ **Correct answer**
- D. ssRNA; template for mRNA synthesis

A. HIV's genome is RNA, not single-stranded DNA.

B. HIV's genome is single-stranded RNA, not double-stranded RNA.

C. HIV is a retrovirus: its genome is single-stranded RNA and reverse transcriptase uses that ssRNA as the template to synthesise DNA (Davidson College; ScienceDirect).

D. The ssRNA is not used directly as a template for mRNA synthesis in the retroviral cycle.

Question 151 Biology

Thinking, memory and voluntary actions are mainly controlled by:

- A. Cerebrum ✓ **Correct answer**
- B. Cerebellum
- C. Pons
- D. Hippocampus

A. The cerebrum (cerebral cortex) is the seat of thinking, memory and voluntary movement.

B. The cerebellum coordinates movement; it does not control thinking and memory.

C. The pons relays signals; it does not control thinking, memory and voluntary actions.

D. The hippocampus is one memory structure within the cerebrum, not the controller of all three functions.

Question 152 Biology

Ventricular diastole causes:

- A. ventricular contraction

- C. Opening of semilunar valve
- D. Closure of of semilunar valve ✓ **Correct answer**

A. Ventricular contraction is systole, not diastole.

B. In diastole the AV valves open, they do not close.

C. In diastole the semilunar valves shut, they do not open.

D. In diastole the ventricle relaxes, ventricular pressure falls below arterial pressure, so the semilunar valves shut. NOTE: the stem prints "Closure of of semilunar valve" — doubled "of", kept as printed.

Question 153 Biology

Which of the following statement correctly describes the organelle that is not membrane bound?

- A. Presence of cristae
- B. Modification and packaging of proteins
- C. Presence of digestive enzymes
- D. Made of rRNA and protein ✓ **Correct answer**

A. Cristae belong to the mitochondrion, which is membrane-bound.

B. Modification and packaging of proteins is the Golgi apparatus, which is membrane-bound.

C. Digestive enzymes belong to the lysosome, which is membrane-bound.

D. "Made of rRNA and protein" is the ribosome, the non-membrane-bound organelle.

Question 154 Biology

A biological laboratory is developing gene therapy with a modified virus that infects the

Which of the following category does this virus belong to?

- A. Algal virus
- B. Fungal virus
- C. Animal virus ✓ **Correct answer**
- D. Bacterial virus

A. Algal viruses infect algae, not birds.

B. Fungal viruses infect fungi, not birds.

C. Birds are animals, so a virus infecting birds is an animal virus.

D. Bacterial viruses infect bacteria, not birds.

Question 155 Biology

CFTR gene that encode a protein which regulate:

- A. Protein and salt
- B. Salt and Water ✓ **Correct answer**
- C. Sugar and Water
- D. Liquid and Protein

A. The CFTR protein regulates salt and water movement, not protein.

B. The CFTR protein is a chloride channel; chloride transport controls the movement of water in tissues, and it also regulates sodium channels — i.e. salt and water movement (MedlinePlus Genetics; PMC 2022 review).

C. The CFTR protein does not regulate sugar.

D. "Liquid and protein" does not describe the CFTR protein's regulation.

Question 156 Biology

Which organelle is usually referred to as post office of the cell and why?

gi apparatus, because it receives, sorts and packages material for transport to other parts of cell ✓ **Correct answer**

- B. Rough endoplasmic reticulum because it synthesizes protein used by the cell
- C. Mitochondria, because it synthesizes and provides energy to other parts of the cells
- D. Nucleus, because it controls other organelles of the cell

A. The Golgi apparatus receives, modifies, sorts and packages material for transport; that is the "post office" description.

B. Protein synthesis is the rough ER's function, not the post-office role.

C. Energy provision is the mitochondrion's function, not the post-office role.

D. Control of other organelles is the nucleus's function, not the post-office role.

Question 157 Biology

Components of reflex arc must contain neurons from:

- A. Motor nerve and Mixed nerve
- B. Sensory nerve and intermediate nerve
- C. Motor nerve and Sensory Nerve ✓ **Correct answer**
- D. Mixed nerve and intermediate nerve

A. A mixed nerve is a nerve containing both fibre types, not a neuron class the arc must contain.

B. An interneuron is present in polysynaptic arcs but is not essential (monosynaptic arcs lack one).

C. A reflex arc must at minimum detect the stimulus (sensory neuron) and drive the effector (motor neuron).

D. Neither a mixed nerve nor an intermediate neuron is essential to every reflex arc.

158 Biology

A confirmed COVID patient shows weak specific immunity. Which component is most likely deficient in this patient?

- A. Red Blood Cells
- B. Helper T-Lymphocytes ✓ **Correct answer**
- C. Thrombocytes
- D. Suppressor T-Lymphocytes

A. Red cells carry oxygen; they do not drive specific immunity.

B. Helper T-lymphocytes (CD4+) orchestrate specific (adaptive) immunity, activating B-cells and cytotoxic T-cells; their deficiency weakens the specific response.

C. Thrombocytes (platelets) clot blood; they do not drive specific immunity.

D. Suppressor (regulatory) T-cells damp the response down rather than drive it.

Question 159 Biology

Which of the following organ takes part in the T-cell maturation for both the lymphatic and endocrine systems?

- A. Spleen
- B. Thymus ✓ **Correct answer**
- C. Liver
- D. Kidney

A. The spleen is lymphatic only; it is not an endocrine gland and not the T-cell maturation site.

B. The thymus is both the site of T-cell maturation (a lymphatic organ) and an endocrine gland (it secretes thymosin and other hormones).

C. The liver is neither the T-cell maturation site nor an endocrine gland in this sense.

y is neither the T-cell maturation site nor an endocrine gland in this sense.

Question 160 Biology

A chromosome which contain centromere at the center is called:

- A. mesocentric chromosome
- B. metacentric chromosome ✓ **Correct answer**
- C. acrocentric chromosome
- D. telocentric chromosome

A. "Mesocentric" is not the standard term for this.

B. A centromere at the centre (arms of equal length) defines a metacentric chromosome.

C. Acrocentric has the centromere near one end.

D. Telocentric has the centromere at the very end.

Question 161 Biology

Binding site for a substrate on enzyme is:

- A. Allosteric site
- B. Passive site
- C. Active site ✓ **Correct answer**
- D. Regulatory site

A. Allosteric sites bind effectors, not substrate.

B. "Passive site" is not a standard term.

C. The substrate binds at the enzyme's active site.

D. Regulatory sites bind effectors, not substrate.

162 Biology

The most abundant polysaccharide in plants, widely used in paper and as a source of dietary fibre for human is:

- A. Chitin
- B. Glycogen
- C. Starch
- D. Cellulose ✓ **Correct answer**

A. Chitin is fungal/arthropod, not the plant paper/fibre material.

B. Glycogen is the animal store, not the plant paper/fibre material.

C. Starch is the plant energy store, not the paper/fibre material.

D. Cellulose is the structural polysaccharide of plant cell walls, the most abundant organic polymer on earth, the raw material of paper, and indigestible dietary fibre in humans.

Question 163 Biology

This given organelle is involved in the synthesis of oil, phospholipids and steroids:

- A. Mitochondria
- B. Golgi complex
- C. Endoplasmic reticulum ✓ **Correct answer**
- D. Ribosomes

A. Mitochondria make ATP; they do not synthesise lipids.

B. The Golgi modifies and packages; it does not synthesise lipids.

C. The smooth endoplasmic reticulum synthesises lipids (oils, phospholipids, steroids).

D. Ribosomes make protein; they do not synthesise lipids. NOTE: the stem refers to a "given" organelle (a figure), but this PDF contains no images at all, so the figure is absent from this reproduction and the stem as printed is incomplete. The answer is verified by

among the options, not from the missing figure.

Question 164 Biology

Which type of neurons stimulate the muscles to contract in a reflex arc?

- A. Efferent neurons ✓ **Correct answer**
- B. Sensory neurons
- C. Interneurons
- D. Afferent neurons

A. Efferent (motor) neurons carry the signal out to the effector muscle and stimulate its contraction.

B. Sensory neurons carry the signal in; they do not stimulate the muscle.

C. Interneurons relay the signal in between; they do not stimulate the muscle.

D. Afferent neurons carry the signal in; they do not stimulate the muscle.

Question 165 Biology

Receptors that are located in the retina of eye are called:

- A. Merkel disc
- B. Ruffini endings
- C. Pacinian corpuscles
- D. Rod and Cone cells ✓ **Correct answer**

A. Merkel discs are skin mechanoreceptors, not retinal.

B. Ruffini endings are skin mechanoreceptors, not retinal.

C. Pacinian corpuscles are skin mechanoreceptors, not retinal.

D. Rods and cones are the retinal photoreceptors.

166 Biology

The bony roof of the oral cavity, which separates it from the nasal cavity, is formed by the:

- A. soft palate
- B. Mandible
- C. Hard palate ✓ **Correct answer**
- D. Maxilla

A. The soft palate is the non-bony rear part of the roof, not the bony roof.

B. The mandible forms the lower jaw, not the roof of the mouth.

C. The bony roof of the mouth IS the hard palate — that is the name of the structure.

D. The maxilla names a contributing bone (the hard palate is formed by the palatine processes of the maxillae plus the horizontal plates of the palatine bones); C is the intended identification of the structure itself. CAVEAT (retained): anatomically the hard palate is formed by the palatine processes of the maxillae plus the horizontal plates of the palatine bones, so D (maxilla) names a contributing bone.

Question 167 Biology

Which structure in neuron is responsible for receiving information from other neurons?

- A. Axon
- B. Soma
- C. Dendrite ✓ **Correct answer**
- D. Axon terminal

A. The axon sends signals out; it does not receive them.

B. The soma (cell body) integrates signals; it is not the receiving structure.

C. Dendrites receive incoming signals from other neurons.

terminal sends signals out, it does not receive them.

Question 168 Biology

Chemicals that stimulate the olfactory receptors enter the nasal cavity in the form of _____.

- A. solid
- B. liquid
- C. gas ✓ **Correct answer**
- D. plasma

A. Solids do not enter as olfactory stimuli.

B. Liquids are not the airborne route for olfactory stimuli.

C. Olfactory stimuli are volatile odorant molecules carried in the air — in gaseous form — into the nasal cavity, where they dissolve in the mucus over the olfactory epithelium.

D. Plasma does not enter as an olfactory stimulus.

Question 169 Biology

Neurosecretory cells are:

- A. endocrine cells
- B. exocrine cells
- C. neuroglial cells
- D. neurons that have been adapted to secrete hormones ✓ **Correct answer**

A. Neurosecretory cells are neurons first, not ordinary endocrine cells.

B. They are not exocrine cells.

C. They are not glia.

D. Neurosecretory cells are neurons specialised to release hormones into the blood (e.g.

c neurons releasing ADH/oxytocin).

Question 170 Chemistry

Number of sigma bond in acetylene and ethylene are?

- A. 3 & 5 ✓ **Correct answer**
- B. 5 & 3
- C. 6 & 5
- D. 5 & 6

A. Acetylene HC≡CH: 2 C–H σ + 1 C–C σ = 3 σ (the triple bond contributes 1 σ + 2 π). Ethylene $H_2C=CH_2$: 4 C–H σ + 1 C–C σ = 5 σ (the double bond contributes 1 σ + 1 π). So 3 & 5.

B. Reverses the two counts.

C. 6 & 5 is wrong for acetylene (3 σ).

D. 5 & 6 is wrong for both.

Question 171 Chemistry

Which of the following has smallest bond angle?

- A. C_2H_2
- B. NH_3
- C. H_2S ✓ **Correct answer**
- D. $BeCl_2$

A. C_2H_2 is linear, 180°.

B. NH_3 is pyramidal, ≈107°.

C. H_2S is bent, ≈92° (two lone pairs compress the angle below the tetrahedral value and below ammonia's) — the smallest.

linear, 180°.

Question 172 Chemistry

Which one of the following has highest ionic character?

- A. $AlCl_3$
- B. BCl_3
- C. PCl_3
- D. NaH ✓ **Correct answer**

A. $AlCl_3$ is a covalent chloride (vapourises as covalent Al_2Cl_6 dimers).

B. BCl_3 is a covalent chloride.

C. PCl_3 is a covalent chloride.

D. NaH is an ionic (saline) hydride, a crystal lattice of Na^+ and H^- (chembook.co.uk; docbrown Period-3 survey). CAVEAT (retained): by raw electronegativity difference alone $AlCl_3$ ($\Delta \approx 1.55$) exceeds NaH ($\Delta \approx 1.27$); the verdict follows the ionic-vs-covalent classification (Fajans polarisation by the small, highly charged Al^{3+}/B^{3+}/P centres), not the raw $\Delta\chi$ ranking.

Question 173 Chemistry

Which one has highest bond energy?

- A. sp-s ✓ **Correct answer**
- B. sp^3-s
- C. sp^2-s
- D. sp^3-p

A. Bond strength rises with s-character of the hybrid orbital (more s = shorter, stronger bond): sp (50% s) > sp^2 (33% s) > sp^3 (25% s), and an s-orbital overlap beats a p-orbital overlap. So sp–s is the strongest combination listed.

…ly 25% s-character, the weakest of the three hybridisations listed.

C. sp^2 (33% s) is weaker than sp (50% s).

D. sp^3-p combines the lowest s-character with a p-orbital overlap. CAVEAT (retained): this is the textbook s-character ranking convention; the stem does not name the atoms involved, so the answer is the ranking, not a measured bond energy.

Question 174 Chemistry

The relationship of (+) tartaric acid and (-) Tartaric acid are:

- A. geometric isomers
- B. enantiomers ✓ **Correct answer**
- C. diastereomers
- D. plannar

A. Geometric isomers need cis/trans about a double bond or ring.

B. (+) and (−) tartaric acid are non-superimposable mirror images (opposite configuration at both chiral centres, equal and opposite optical rotation) — the definition of enantiomers.

C. Diastereomers are stereoisomers that are not mirror images.

D. "Plannar" is not a relationship term.

Question 175 Chemistry

IUPAC name of compound $C_6H_5COCH_3$ is?

- A. methylphenylketone
- B. phenylethanone ✓ **Correct answer**
- C. octan-2-one
- D. benzylethanone

enylketone is the loose common form (acetophenone), not the systematic name.

B. The parent chain is ethanone (CH_3–CO–) with a phenyl substituent on the carbonyl carbon: phenylethanone.

C. Octan-2-one names a different (8-carbon) compound.

D. Benzylethanone would be $C_6H_5CH_2COCH_3$.

Question 176 Chemistry

During reaction of aldehyde with HCN, the hybridization of carbon atom of carbonyl group changes to:

- A. $sp \rightarrow sp^2$
- B. $sp^3 \rightarrow sp^2$
- C. $sp^2 \rightarrow sp^3$ ✓ **Correct answer**
- D. $dsp^2 \rightarrow sp^3$

A. The carbonyl carbon starts sp^2, not sp.

B. The carbon becomes sp^3, not sp^2.

C. The carbonyl carbon starts sp^2 (trigonal planar, C=O) and, on cyanide addition forming the cyanohydrin (C–OH, C–CN, single bonds only), becomes tetrahedral sp^3.

D. dsp^2 is not the carbonyl carbon's hybridisation.

Question 177 Chemistry

Acetone reacts with water in presence of catalyst produces:

- A. propan-2-ol
- B. propan-1,2-diol
- C. propan-2,2-diol ✓ **Correct answer**

panol

A. Propan-2-ol is a reduction product, not the hydration product.

B. Propan-1,2-diol puts the two –OH on different carbons; hydration gives the geminal diol.

C. Hydration of the carbonyl gives the geminal diol — "Acetone reacts reversibly with water to form 2,2-propanediol. $CH_3COCH_3 + H_2O \rightarrow (CH_3)_2C(OH)_2$" (chemistrylearner.com, Hydration Reaction).

D. Propanol is a reduction product, not the hydration product. CAVEAT (retained): the gem-diol is unstable and the equilibrium lies far to the acetone side ($K \approx 10^{-3}$, Wikipedia "Geminal diol"); the product named is the hydrate in principle, which is what the question asks for.

Question 178 Chemistry

Which one show positive test with Fehling solution:

- A. acetophenone
- B. metaformaldehyde
- C. acetaldehyde ✓ **Correct answer**
- D. benzaldehyde

A. Acetophenone is a ketone (no reaction with Fehling's).

B. "Metaformaldehyde" as printed gives no positive Fehling's aldehyde.

C. Fehling's solution oxidises aliphatic aldehydes (red Cu_2O precipitate); acetaldehyde is an aliphatic aldehyde.

D. Benzaldehyde is an aromatic aldehyde (does not reduce Fehling's under the test conditions).

179 Chemistry

Oxidation state of Tungsten in $Na_2W_4O_{13}\cdot H_2O$ is:

- A. +5
- B. +6 ✓ **Correct answer**
- C. +8
- D. Zero

A. +5 does not satisfy the charge balance: 2(+1) + 4x + 13(−2) = 0 → x = +6.

B. Worked derivation — 2(+1) + 4x + 13(−2) = 0 → 4x = 24 → x = +6 (water of crystallisation is neutral and contributes nothing).

C. +8 does not satisfy the charge balance.

D. Zero does not satisfy the charge balance. NOTE: the sprint addendum paraphrased this formula as $Na_2WO_4\cdot 2H_2O$; the PDF as extracted reads $Na_2W_4O_{13}\cdot H_2O$ (verified on PDF page 14). Both formulae give +6, so the key letter B is unaffected, but the file-fold-in uses the PDF's formula, not the sprint's paraphrase.

Question 180 Chemistry

Which of the following reagents is used to convert benzene to 2-chloro methyl benzene?

- A. $CH_3Cl/AlCl_3$ followed by Cl_2 in the presence of anhydrous $FeCl_3$. ✓ **Correct answer**
- B. $CH_3Cl/AlCl_3$ followed by Cl_2 in the presence of diffused sunlight
- C. $Cl_2/FeCl_3$ followed by CH_3Cl in the presence of diffused sunlight.
- D. Cl_2/UV followed by CH_3Cl in the presence of anhydrous $FeCl_3$.

A. (1) Friedel–Crafts methylation ($CH_3Cl/AlCl_3$) gives toluene; (2) ring chlorination of toluene with $Cl_2/FeCl_3$ gives o- and p-chlorotoluene (methyl is ortho/para-directing), including the 2-chloro (ortho) product (NCERT Hydrocarbons solutions).

B. Sunlight drives free-radical side-chain chlorination (benzyl chloride route), not ring chlorination.

ht step is wrong, and chlorinating first then methylating takes a different route.

D. The UV step drives free-radical side-chain chlorination, not ring chlorination.

Question 181 Chemistry

Which of following reaction will move backward by decreasing pressure?

- A. 4Q ↔️ T+S ✓ **Correct answer**
- B. 2A ↔️ 3C
- C. K ↔️ L
- D. H+2M ↔️ 2B+2D

A. Decreasing pressure shifts equilibrium toward the side with MORE gas moles; backward means toward reactants, so the reactants must have more moles than the products: 4 reactant moles vs 2 product moles (shifts backward).

B. 2 vs 3 (shifts forward).

C. 1 vs 1 (no shift).

D. 3 vs 4 (shifts forward).

Question 182 Physics

A football is kicked with a speed of 20 m/s at an angle of 30° with the horizontal, the maximum height it attains is:

- A. 5 m ✓ **Correct answer**
- B. 10 m
- C. 15 m
- D. 20 m

A. $H = v^2\sin^2\theta / 2g = (20^2 \times \sin^2 30°) / (2 \times 10) = (400 \times 0.25) / 20 = 100 / 20 = 5$ m.

; not match the derivation.

C. 15 m does not match the derivation.

D. 20 m does not match the derivation. NOTE: g = 10 m/s², the value the paper's key uses; with g = 9.8 the height is ≈5.1 m, still nearest A.

Question 183 English

Identify the sentence with no spelling error:

- A. Rabia completes homework assignments well in time. ✓ **Correct answer**
- B. Rabia complete homwork assignments well in time.
- C. Rabia completes homework asignments well in time.
- D. Rabia completes homework assigments well in time.

A. Fully correct.

B. Misspells "homework" as "homwork" (and "complete" for "completes").

C. Misspells "assignments" as "asignments".

D. Misspells "assignments" as "assigments".

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