MDCAT (SZABMU entry test, Pink Booklet) — 2024 · Solved Past Paper

Body: Shaheed Zulfiqar Ali Bhutto Medical University (SZABMU) · **Post:** MDCAT (SZABMU entry test, Pink Booklet) · **Year:** 2024 · **Questions:** 200 in the original paper — **198 solved and verified**, 2 excluded as defective (Q58, Q105) · **Price:** Free

> **How to use this paper:** each question shows the stem, the four options, and the correct answer. Click “Why each option?” under a question to see all four options explained — one question teaches four topics. General Knowledge answers are as of the 2024 sitting.

Source note: mdcatguide.com compilation, 'MDCAT 2024 — SZABMU (Pink Booklet) | Solved Past Paper', 34 pp. (200 MCQs: Biology 68 / Chemistry 54 / Physics 54 / English 18 / Logical Reasoning 6; 150 minutes, +1 per correct answer, no negative marking; accessed 9 Nov 2026). Inline keys and the p. 32 answer grid agree 200/200. SZABMU does not publish an official key — answers are the reproduction's compilation cross-checked against the PMDC syllabus (stated in the PDF disclaimer). Booklet instructions: different colours carry the same questions in a different order — never build another colour of SZABMU 2024. 1 printed-key correction (Q30 D to B, X-linked inheritance); 2 PICK-ONE (Q3, Q74); 2 DEFECTIVE-excluded (Q58, Q105). Answers verified independently against reference facts, worked derivations and targeted sources, never from the printed key alone. Decisions by the assistant under the owner's 8 Nov 2026 delegation.

Question 1 Biology

When diaphragm moves downward, ribs move upward and outward, volume in _____ increases while pressure in _____ decreases.

- A. abdominal cavity, lungs

st cavity, lungs ✓ **Correct answer**

- C. lungs, abdominal cavity
- D. lungs, chest cavity

A. Wrong: during inspiration the chest (thoracic) cavity enlarges, not the abdominal cavity.

B. Correct: the diaphragm flattens and the ribs rise, so the chest cavity volume increases and the pressure inside the lungs falls, drawing air in.

C. Wrong: the volume increase is in the chest cavity, not the lungs as a named cavity, and the pressure fall is in the lungs.

D. Wrong: the two blanks are the wrong way round — volume increases in the chest cavity and pressure falls in the lungs.

Question 2 Biology

In Drosophila, the heterozygote (w/w+) exceeds in quality of fluorescent pigment in eyes than wild (w+/w+) or white eye (w/w). This kind of dominance is termed _____.

- A. Co-Dominance
- B. Complete Dominance
- C. Incomplete Dominance
- D. Over Dominance ✓ **Correct answer**

A. Wrong: in co-dominance both alleles are expressed side by side, not one exceeding both homozygotes.

B. Wrong: complete dominance gives the heterozygote the same phenotype as one homozygote, not a better one.

C. Wrong: incomplete dominance gives an intermediate phenotype, not one exceeding both parents.

D. Correct: when the heterozygote out-performs both homozygotes, the condition is over-

hybrid vigour at a single locus).

Question 3 Biology

Which one of the following monosaccharides is a hexose-aldehyde form of sugar?

- A. Fructose
- B. Galactose
- C. Glucose ✓ **Correct answer**
- D. Ribose

A. Wrong: fructose is a keto-hexose (it carries a ketone group, not an aldehyde).

B. Also an aldohexose: galactose, like glucose, is a six-carbon sugar with an aldehyde group, so a candidate choosing B would also be right; the printed key records C, the syllabus-standard answer.

C. Correct per the printed key: glucose is the standard aldohexose — six carbons with an aldehyde group.

D. Wrong: ribose is an aldopentose (five carbons), not a hexose. (PICK-ONE: options B and C are both aldohexoses; the key records C. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 4 Biology

Which one of the following organelles is ONLY present in Cyanobacteria?

- A. Heterocyst ✓ **Correct answer**
- B. Lysosomes
- C. Mitochondria
- D. Ribosomes

A. Correct: heterocysts are the thick-walled nitrogen-fixing cells unique to filamentous cyanobacteria.

ribosomes are found in eukaryotic cells, not only in cyanobacteria.

C. Wrong: mitochondria are found in eukaryotic cells, not in cyanobacteria.

D. Wrong: ribosomes are present in almost all cells, not only in cyanobacteria.

Question 5 Biology

During which stage of bacteriophage replication is lysozyme involved?

- A. Adsorption
- B. Attachment
- C. Multiplication
- D. Penetration ✓ **Correct answer**

A. Wrong: adsorption is the phage landing on the host surface; lysozyme is not involved there.

B. Wrong: attachment is the phage binding to the receptor; lysozyme acts after that.

C. Wrong: multiplication is the copying of phage parts inside the cell; lysozyme is not involved there.

D. Correct: the tail lysozyme digests the bacterial cell wall so the phage DNA can be injected — the penetration step.

Question 6 Biology

When muscles contract, the Z-lines are _____, I-band _____ and H-zone disappears.

- A. closer, enlarged
- B. closer, shorten ✓ **Correct answer**
- C. distant, enlarged
- D. distant, shorten

A. Wrong: the I-band shortens during contraction; it does not enlarge.

y the sliding filament theory, the Z-lines are pulled closer together and the I-band shortens (the H-zone disappears and the A-band stays the same length).

C. Wrong: the Z-lines move closer, not further apart, and the I-band does not enlarge.

D. Wrong: the Z-lines move closer, not further apart.

Question 7 Biology

Which type of phosphorylation occurs in the electron transport chain, when NADH transfers electrons to coenzyme Q in the inner mitochondrial membrane?

- A. Cyclic-Phosphorylation
- B. Non-cyclic Phosphorylation
- C. Oxidative Phosphorylation ✓ **Correct answer**
- D. Substrate level Phosphorylation

A. Wrong: cyclic phosphorylation belongs to photosynthesis (photosystem I), not to the mitochondrial chain.

B. Wrong: non-cyclic photophosphorylation belongs to photosynthesis, not to the mitochondrial chain.

C. Correct: ATP made using the energy of electron flow along the respiratory chain is oxidative phosphorylation.

D. Wrong: substrate-level phosphorylation makes ATP directly in a reaction step (e.g. in glycolysis), not from electron transport.

Question 8 Biology

The science of discovery, identification and interpretation of fossils used by Darwin was _____ evidence.

- A. biogeography
- B. chronology

- D. paleontology ✓ **Correct answer**

A. Wrong: biogeography is the study of the distribution of organisms, not of fossils.

B. Wrong: chronology is the ordering of events in time, not the study of fossils.

C. Wrong: homology is similarity of structure from a common ancestor, not the study of fossils.

D. Correct: palaeontology is the study of fossils — Darwin's strongest direct evidence for descent with modification.

Question 9 Biology

Gall stones are mostly made up of _____.

- A. Calcium
- B. Calcium Phosphate
- C. Cholesterol ✓ **Correct answer**
- D. Proteins

A. Wrong: calcium alone is not the main material of gallstones.

B. Wrong: calcium salts are a minor component, not the main one.

C. Correct: about 80% of gallstones are cholesterol stones, formed when bile is supersaturated with cholesterol.

D. Wrong: proteins are not the main material of gallstones.

Question 10 Biology

How much energy present in the chemical bonds of glucose is converted into ATP by anaerobic respiration?

- A. 2% ✓ **Correct answer**

- C. 10%
- D. 36%

A. Correct: anaerobic breakdown yields only 2 ATP from glucose — roughly 2% of the bond energy (aerobic respiration captures about 40%).

B. Wrong: that is about double the anaerobic figure.

C. Wrong: far above the anaerobic figure of about 2%.

D. Wrong: about 36–40% is the aerobic figure, not the anaerobic one.

Question 11 Biology

Who purified filterable agents for the first time?

- A. Charles Chamberland
- B. Ivanowski
- C. Louis Pasteur
- D. Stanley ✓ **Correct answer**

A. Wrong: Chamberland made the porcelain filter; he did not purify the filterable agent.

B. Wrong: Ivanowski demonstrated the filterable agent (tobacco mosaic disease), but did not purify it.

C. Wrong: Pasteur worked on microbes and vaccines, but did not purify a virus.

D. Correct: W. M. Stanley purified and crystallised Tobacco Mosaic Virus in 1935.

Question 12 Biology

Which one of the following is NOT a bacterium?

- A. Acanthurus nigrofuscus ✓ **Correct answer**
- B. Epulopiscium fishelsoni

homicrobium

- D. Mycoplasma Spp

A. Correct: this is the surgeonfish (a chordate) in whose gut the giant bacterium Epulopiscium lives — it is a fish, not a bacterium.

B. Wrong as the answer: Epulopiscium IS a bacterium (a giant one living in the surgeonfish gut).

C. Wrong as the answer: Hyphomicrobium IS a bacterium.

D. Wrong as the answer: Mycoplasma IS a bacterium (the smallest free-living one).

Question 13 Biology

Which malfunctioned organelle is mainly related to Tay-Sachs disease?

- A. Endoplasmic reticulum
- B. Glyoxysomes
- C. Golgi bodies
- D. Lysosomes ✓ **Correct answer**

A. Wrong: Tay-Sachs is not a disease of the endoplasmic reticulum.

B. Wrong: glyoxysomes are plant organelles for fat conversion; they are unrelated to Tay-Sachs.

C. Wrong: Tay-Sachs is not a disease of the Golgi apparatus.

D. Correct: Tay-Sachs is a lysosomal storage disease — hexosaminidase A is missing, so lipid accumulates inside the lysosomes of nerve cells.

Question 14 Biology

Which conjugate molecules are present as surfactants in respiratory distress syndrome?

- A. Glycolipids

- C. Lipopolysaccharides
- D. Lipoproteins ✓ **Correct answer**

A. Wrong: glycolipids are membrane lipids, not the lung surfactant.

B. Wrong: glycoproteins are proteins with sugar chains; the surfactant is a lipoprotein.

C. Wrong: lipopolysaccharides are bacterial wall components, not lung surfactant.

D. Correct: pulmonary surfactant is a lipoprotein (mainly dipalmitoyl lecithin with surfactant proteins); its deficiency causes respiratory distress syndrome in premature babies.

Question 15 Biology

In cyclic photophosphorylation, which process of the light-dependent reaction is NOT included?

- A. Absorption of light
- B. ATP synthesis
- C. Photoexcitation
- D. Photolysis of water ✓ **Correct answer**

A. Wrong as the answer: light absorption IS part of cyclic flow (photosystem I absorbs light).

B. Wrong as the answer: ATP synthesis IS the point of cyclic photophosphorylation.

C. Wrong as the answer: photoexcitation of P700 IS part of cyclic flow.

D. Correct: cyclic flow involves photosystem I only — no water is split, no oxygen is released and no NADPH is made; only ATP is produced.

16 Biology

At which reaction of glycolysis is ATP NOT involved directly?

- A. When 1,3-Bisphosphoglycerate is converted into 3-phosphoglycerate
- B. When Fructose 6-phosphate is converted into fructose 1,6-bisphosphate
- C. When glucose is converted into glucose 6-phosphate
- D. When glyceraldehyde 3-phosphate is converted into 1,3-Bisphosphoglycerate ✓ **Correct answer**

A. Wrong as the answer: that step generates ATP directly (substrate-level phosphorylation).

B. Wrong as the answer: that step consumes ATP directly.

C. Wrong as the answer: that step consumes ATP directly.

D. Correct: that step uses inorganic phosphate and NAD^+ (oxidation), not ATP.

Question 17 Biology

The side of the sheath attached to the head region in bacteriophage is termed _____.

- A. Capsid
- B. Collar ✓ **Correct answer**
- C. Core
- D. End plate

A. Wrong: the capsid is the protein head itself, not the part joining it to the sheath.

B. Correct: the collar is the short neck joining the head to the tail sheath.

C. Wrong: the core is the hollow centre of the tail through which DNA passes.

D. Wrong: the end plate lies at the far (distal) end of the tail, not at the head.

18 Biology

Which is the end product of the electron transport chain taking place at the inner mitochondrial membrane?

- A. Carbon dioxide
- B. NADPH
- C. Oxygen
- D. Water ✓ **Correct answer**

A. Wrong: carbon dioxide comes from the Krebs cycle, not from the electron transport chain.

B. Wrong: NADPH is a product of the light reactions of photosynthesis, not of the mitochondrial chain.

C. Wrong: oxygen is the terminal electron acceptor that is used up, not the end product.

D. Correct: oxygen accepts electrons and combines with hydrogen ions to form water at the end of the chain.

Question 19 Biology

Which type of bond is formed between the hydroxyl group of one amino acid and hydrogen of the amino group of another amino acid with release of water?

- A. Ester bond
- B. Glycosidic linkage
- C. Peptide bond ✓ **Correct answer**
- D. Phosphodiester bond

A. Wrong: an ester bond joins an acid and an alcohol, not two amino acids.

B. Wrong: a glycosidic linkage joins sugar units, not amino acids.

C. Correct: the carboxyl group (–COOH) of one amino acid and the amino group ($–NH_2$) of

condense with loss of water to give the peptide (–CO–NH–) bond. (The stem loosely says "hydroxyl group" where it means the –OH of the carboxyl group; the intended answer is unambiguous.)

D. Wrong: a phosphodiester bond joins nucleotides in DNA and RNA, not amino acids.

Question 20 Biology

Which sexually transmitted disease attacks T4 lymphocytes?

- A. AIDS ✓ **Correct answer**
- B. Genital Herpes
- C. Gonorrhea
- D. Syphilis

A. Correct: HIV binds CD4 receptors on T-helper (T4) cells and destroys them, collapsing cell-mediated immunity.

B. Wrong: herpes is caused by HSV and does not attack T4 lymphocytes.

C. Wrong: gonorrhoea is a bacterial infection of the genital tract; it does not attack T4 cells.

D. Wrong: syphilis is caused by Treponema pallidum; it does not attack T4 lymphocytes.

Question 21 Biology

When does ovulation occur during the uterine cycle in the human female?

- A. After 6 days of start of menstruation
- B. After 10 days of start of menstruation
- C. After 14 days of start of menstruation ✓ **Correct answer**
- D. After 27 days of start of menstruation

A. Wrong: day 6 is still in the proliferative phase; ovulation has not happened.

ay 10 is before the LH surge, ovulation has not happened.

C. Correct: in a 28-day cycle the LH surge releases the secondary oocyte on about day 14.

D. Wrong: day 27 is at the end of the cycle, just before the next menstruation.

Question 22 Biology

How much delay (in seconds) is required for conductance from the S.A. node to the A.V. node?

- A. 0.10 ✓ **Correct answer**
- B. 0.15
- C. 0.20
- D. 0.30

A. Correct: the impulse is held at the AV node for roughly 0.1 s so that the atria empty completely before the ventricles contract.

B. Wrong: the standard AV nodal delay is about 0.1 s, not 0.15 s.

C. Wrong: the standard AV nodal delay is about 0.1 s, not 0.20 s.

D. Wrong: the standard AV nodal delay is about 0.1 s, not 0.30 s.

Question 23 Biology

In roots, the apoplast pathway becomes discontinuous in the endodermis due to the presence of _____.

- A. casparian strips ✓ **Correct answer**
- B. hydathodes
- C. pericyclic
- D. plasmodesmata

A. Correct: the suberin-rich Casparian strip blocks the cell-wall route and forces water

symplast — the plant's checkpoint on mineral entry.

B. Wrong: hydathodes are pores that release water (guttation), not the barrier in the endodermis.

C. Wrong: "pericyclic" is not the name of the endodermal barrier; the pericycle is the layer just inside the endodermis.

D. Wrong: plasmodesmata are the channels of the symplast pathway, not what blocks the apoplast.

Question 24 Biology

The lock and key model (1890) was modified by_____.

- A. Emil Fischer
- B. Erwin Chargaff
- C. Koshland ✓ **Correct answer**
- D. Lorenz Oken

A. Wrong: Fischer proposed the lock-and-key model; he did not modify it.

B. Wrong: Chargaff worked on the base composition of DNA, not on enzyme models.

C. Correct: Daniel Koshland replaced lock-and-key with the induced-fit model in 1958.

D. Wrong: Oken was a 19th-century natural philosopher, unrelated to enzyme models.

Question 25 Biology

When a person exposed to HIV becomes ill but survives, the immunity developed against the disease is called _____.

- A. Artificial Active Immunity
- B. Artificial Passive Immunity
- C. Natural Active Immunity ✓ **Correct answer**

ural Passive Immunity

A. Wrong: artificial active immunity comes from a vaccine, not from a natural infection.

B. Wrong: artificial passive immunity is injected ready-made antibodies (antiserum).

C. Correct: antibodies made by the body's own response to a natural infection — no vaccine, no ready-made antibodies.

D. Wrong: natural passive immunity is antibodies passed from mother to baby.

Question 26 Biology

Which is the main component of the lipid bilayer of the plasma membrane?

- A. Acylglycerol
- B. Lecithin ✓ **Correct answer**
- C. Triglyceride
- D. Waxes

A. Wrong: acylglycerols (fats) are storage lipids, not the main component of the membrane bilayer.

B. Correct: lecithin (phosphatidylcholine) is the most abundant phospholipid of the membrane bilayer.

C. Wrong: triglycerides are storage fats, not membrane lipids.

D. Wrong: waxes are protective coatings, not the main component of the bilayer.

Question 27 Biology

At which stage of Prophase-I does crossing over take place?

- A. Diplotene
- B. Leptotene
- C. Pachytene ✓ **Correct answer**

A. Wrong: in diplotene the chiasmata become visible, but the exchange itself has already happened.

B. Wrong: in leptotene the chromosomes first appear as thin threads; no crossing over happens yet.

C. Correct: synapsis occurs in zygotene, and the actual exchange of segments between non-sister chromatids happens in pachytene.

D. Wrong: in zygotene homologous chromosomes pair up (synapsis), but the exchange happens in the next stage.

Question 28 Biology

In eukaryotic cells, autophagosomes originate from _____.

- A. Endoplasmic reticulum ✓ **Correct answer**
- B. Golgi bodies
- C. Mitochondria
- D. Ribosomes

A. Correct: the isolation membrane that wraps worn-out organelles is derived from the endoplasmic reticulum.

B. Wrong: the Golgi apparatus modifies and packages proteins; autophagosomes do not originate from it.

C. Wrong: mitochondria are the organelles that autophagosomes may engulf, not their origin.

D. Wrong: ribosomes make proteins; they do not give rise to autophagosomes.

29 Biology

Which condition produces a sterile female with Turner's syndrome in humans but a sterile male in Drosophila?

- A. X0 ✓ **Correct answer**
- B. XX0
- C. XXX
- D. XXY

A. Correct: XO gives a sterile Turner female in humans (the Y decides maleness) but a sterile male in Drosophila (the X-to-autosome ratio decides sex).

B. Wrong: that is not the standard notation for the condition described.

C. Wrong: XXX (triple X) females are usually fertile, not sterile Turner females.

D. Wrong: XXY gives Klinefelter syndrome (a male) in humans, not a Turner female.

Question 30 Biology

Haemophilia types A and B zigzag from _____ grandfather through a carrier daughter to a _____.

- A. maternal, granddaughter
- B. maternal, grandson ✓ **Correct answer**
- C. paternal, granddaughter
- D. paternal, grandson

A. Wrong: the affected grandchild is a grandson (he receives the X from his carrier mother), not a granddaughter.

B. Correct: an affected man passes his X to every daughter (carriers), and each carrier daughter passes it to half her sons — the affected man is the grandson's maternal grandfather (his mother's father).

e affected grandchild is a grandson, and a paternal grandfather passes his Y (not his X) down the male line.

D. Wrong: the reproduction's printed key says D, but a paternal grandfather (the father's father) passes his Y chromosome to his son, not his X to the grandson; the X-linked zigzag runs through the mother, so the grandfather is maternal. (PRINTED-KEY ERROR CORRECTED: the reproduction's grid and inline key both say D; corrected to B under the owner's 8 Nov 2026 delegation — the reproduction's own explanation ("grandfather to grandson via the mother") describes the maternal grandfather, contradicting its key letter.)

Question 31 Biology

Which was a key point of Darwinism?

- A. Descent with modification ✓ **Correct answer**
- B. Endosymbiont hypothesis
- C. Inheritance of acquired characters
- D. Use and disuse of organs

A. Correct: descent with modification through natural selection is Darwin's core idea.

B. Wrong: the endosymbiont hypothesis is about the origin of mitochondria and chloroplasts, not a key point of Darwinism.

C. Wrong: that is Lamarck's idea, not Darwin's.

D. Wrong: use and disuse is Lamarck's idea, not Darwin's.

Question 32 Biology

When 3 fatty acids combine with _____, they form triglycerides and 3 molecules of water.

- A. Alcohol

- C. Glyceride
- D. Glycerol ✓ **Correct answer**

A. Wrong: "alcohol" is too general; the specific alcohol is glycerol.

B. Wrong: an ester is the product of the reaction, not the reactant that combines with the fatty acids.

C. Wrong: a glyceride is the product (a glycerol ester), not the starting alcohol.

D. Correct: three fatty acids esterify the three –OH groups of glycerol, releasing three water molecules.

Question 33 Biology

Which cells produce the first polar body during oogenesis?

- A. Oogonia
- B. Ovum
- C. Primary oocytes ✓ **Correct answer**
- D. Secondary oocytes

A. Wrong: oogonia divide by mitosis to make primary oocytes; they do not produce polar bodies.

B. Wrong: the ovum is the final product; it does not produce the first polar body.

C. Correct: meiosis-I of the primary oocyte gives the secondary oocyte plus the first polar body.

D. Wrong: the secondary oocyte produces the second polar body in meiosis-II, not the first.

34 Biology

Which chemical in blood circulation causes inflammation of the upper respiratory tract?

- A. Acetyl amine
- B. Ampicillin
- C. Histamine ✓ **Correct answer**
- D. Tetracycline

A. Wrong: there is no such inflammatory chemical called "acetyl amine" in this context.

B. Wrong: ampicillin is an antibiotic, not a cause of inflammation.

C. Correct: histamine released by mast cells dilates capillaries and increases permeability, producing the swelling and mucus of allergic rhinitis.

D. Wrong: tetracycline is an antibiotic, not a cause of inflammation.

Question 35 Biology

Which hormone has greater influence on peripheral vasoconstriction with a net rise in blood pressure?

- A. Antidiuretic hormone
- B. Epinephrine
- C. Nor-epinephrine ✓ **Correct answer**
- D. Thyroid stimulating hormone

A. Wrong: ADH mainly conserves water; its vasoconstrictor effect is smaller than nor-epinephrine's.

B. Wrong: epinephrine (adrenaline) raises heart rate and dilates some vessels; its dominant effect is not generalised vasoconstriction.

C. Correct: nor-epinephrine acts mainly on alpha-receptors, so its dominant effect is generalised vasoconstriction and raised blood pressure.

SH acts on the thyroid gland, it does not cause vasoconstriction.

Question 36 Biology

Which protein does NOT exhibit quaternary structure?

- A. Actin
- B. Haemoglobin
- C. Insulin
- D. Myoglobin ✓ **Correct answer**

A. Wrong as the answer: actin polymerises into filaments and is treated in the syllabus as having quaternary organisation.

B. Wrong as the answer: haemoglobin has four polypeptide chains — the classic quaternary protein.

C. Wrong as the answer: insulin has two chains (A and B), so it has quaternary structure.

D. Correct: myoglobin is a single polypeptide with one haem group — tertiary structure only.

Question 37 Biology

What is the range of carbon dioxide in air?

- A. 0.003-0.004%
- B. 0.03-0.04% ✓ **Correct answer**
- C. 0.3-0.4%
- D. 3-4%

A. Wrong: that is ten times too small.

B. Correct: atmospheric CO_2 is about 0.03–0.04% by volume (roughly 300–400 ppm) in the textbook figure; it is the only option in the right range.

at is ten times too large.

D. Wrong: that is a hundred times too large.

Question 38 Biology

A covalently bonded inorganic ion with the protein part of an enzyme is termed _____.

- A. Apoenzyme
- B. Coenzyme
- C. Holoenzyme
- D. Prosthetic group ✓ **Correct answer**

A. Wrong: the apoenzyme is the protein part alone, without its cofactor.

B. Wrong: a coenzyme is a loosely attached organic cofactor, not a covalently bound inorganic one.

C. Wrong: the holoenzyme is the complete enzyme (apoenzyme plus cofactor), not the cofactor itself.

D. Correct: a tightly (covalently) bound cofactor is a prosthetic group.

Question 39 Biology

When neurotransmitter molecules bind receptors on the post-synaptic membrane, they trigger an action potential by causing changes in its _____.

- A. concentrations of certain ion
- B. concentrations of hydrogen ion
- C. permeability of calcium ion
- D. permeability to certain ion ✓ **Correct answer**

A. Wrong: the ion concentrations change as a result, but the direct trigger is the change in permeability.

ydrogen ion concentration is not what the receptor changes.

C. Wrong: the main change is in permeability to Na^+/K^+, not specifically to calcium.

D. Correct: receptor binding opens ligand-gated channels, altering membrane permeability to Na^+/K^+, which then changes ion concentration and triggers the action potential.

Question 40 Biology

Which gland is mainly related to secretion of stress hormones?

- A. Adrenal gland ✓ **Correct answer**
- B. Parathyroid gland
- C. Pituitary gland
- D. Thymus gland

A. Correct: the adrenal medulla releases adrenaline and nor-adrenaline and the cortex releases cortisol — the classic stress hormones.

B. Wrong: the parathyroid secretes parathyroid hormone for calcium balance, not stress hormones.

C. Wrong: the pituitary releases tropic hormones; the stress hormones themselves come from the adrenal gland.

D. Wrong: the thymus matures T-lymphocytes; it does not secrete stress hormones.

Question 41 Biology

Which type of plastid helps in pollination and seed dispersal?

- A. Amyloplast
- B. Chloroplast
- C. Chromoplast ✓ **Correct answer**
- D. Leucoplast

nyloplasts store starch, they do not attract pollinators.

B. Wrong: chloroplasts carry out photosynthesis; they do not colour flowers and fruits.

C. Correct: chromoplasts give flowers and fruits their bright colours, attracting pollinators and dispersal agents.

D. Wrong: leucoplasts are colourless storage plastids.

Question 42 Biology

Which one of the following is acoelomate?

- A. Aurelia
- B. Chaetopterus
- C. Euplectella
- D. Taenia ✓ **Correct answer**

A. Wrong: Aurelia (jellyfish) is diploblastic with no coelom in the usual sense, but the textbook acoelomate example here is Taenia; Aurelia is a cnidarian, not a triploblastic acoelomate.

B. Wrong: Chaetopterus is a coelomate annelid.

C. Wrong: Euplectella is a sponge (parazoan), not a triploblastic acoelomate.

D. Correct: Taenia (tapeworm, Platyhelminthes) has no body cavity — it is acoelomate.

Question 43 Biology

What will be the CO2 fixation efficiency in plants with photorespiration?

- A. 20%
- B. 25% ✓ **Correct answer**
- C. 50%
- D. 75%

e textbook figure for CO_2 fixation efficiency with photorespiration is 25%, not 20%.

B. Correct: photorespiration wastes fixed carbon, so only about 25% of the potential CO_2 fixation is realised.

C. Wrong: the textbook figure is 25%, not 50%.

D. Wrong: the textbook figure is 25%, not 75%.

Question 44 Biology

In the Calvin cycle, conversion of 5 molecules of glyceraldehyde 3-phosphate into 3 molecules of ribulose 1,5-bisphosphate using ATP is termed _____.

- A. CO2 Fixation
- B. Phosphorylation
- C. Reduction
- D. Regeneration ✓ **Correct answer**

A. Wrong: fixation is the attachment of CO_2 to RuBP, not the rebuilding of RuBP.

B. Wrong: phosphorylation happens within this phase, but the phase as a whole is called regeneration.

C. Wrong: reduction is the phase that makes G3P from PGA using ATP and NADPH.

D. Correct: this is the regeneration phase, which rebuilds the RuBP acceptor so the cycle can continue.

Question 45 Biology

Lungs are covered with double layered thin membranous sacs called _____.

- A. Epicardium
- B. Larynx

- D. Pleura ✓ **Correct answer**

A. Wrong: the epicardium is the outer layer of the heart wall, not the lung covering.

B. Wrong: the larynx is the voice box, not the lung covering.

C. Wrong: parabronchi are air passages in bird lungs, not the covering of human lungs.

D. Correct: the visceral and parietal pleura enclose the pleural cavity containing lubricating pleural fluid.

Question 46 Biology

Which allows the exchange of RNA and protein between the nucleus and cytoplasm?

- A. Nuclear matrix
- B. Nuclear pores ✓ **Correct answer**
- C. Nucleolus
- D. Nucleoplasm

A. Wrong: the nuclear matrix is the internal scaffold of the nucleus, not the gateway for exchange.

B. Correct: nuclear pore complexes in the nuclear envelope are the gateways for mRNA out and proteins in.

C. Wrong: the nucleolus makes ribosomal RNA; it does not transport material across the envelope.

D. Wrong: the nucleoplasm is the fluid inside the nucleus, not the gateway.

Question 47 Biology

Which one of the following is an anaerobic bacterium?

- A. Campylobacter

- C. Pseudomonas
- D. Spirochete ✓ **Correct answer**

A. Wrong: Campylobacter is microaerophilic (needs a little oxygen), not anaerobic.

B. Wrong: E. coli is a facultative anaerobe (it grows with or without oxygen), not an obligate anaerobe.

C. Wrong: Pseudomonas is strictly aerobic.

D. Correct: spirochetes include obligate anaerobes (e.g. Treponema), which is the textbook's anaerobic group in this list.

Question 48 Biology

Which blood vessel has a larger bore, thin walls and no pulse?

- A. Aorta
- B. Arteries
- C. Capillaries
- D. Veins ✓ **Correct answer**

A. Wrong: the aorta has thick elastic walls and a strong pulse.

B. Wrong: arteries have thick muscular walls and carry blood at high, pulsatile pressure.

C. Wrong: capillaries have very thin walls but a tiny bore, not a larger one.

D. Correct: veins have wide lumens, thin walls, valves and carry blood at low, non-pulsatile pressure.

Question 49 Biology

Which group of chemicals is used to kill or inhibit the growth of microorganisms in living tissues?

septics ✓ **Correct answer**

- B. Chemotherapeutics
- C. Disinfectants
- D. Vaccines

A. Correct: antiseptics are applied to living tissue to kill or inhibit microbes.

B. Wrong: chemotherapeutic agents act inside the body against disease, but the term for agents used on living tissue surfaces is antiseptic.

C. Wrong: disinfectants are for non-living surfaces, not living tissues.

D. Wrong: vaccines prevent disease by stimulating immunity; they do not kill microbes on tissues.

Question 50 Biology

In human testes, spermatozoa are present in _____.

- A. epididymis
- B. interstitial cells
- C. seminiferous tubules ✓ **Correct answer**
- D. sertoli cells

A. Wrong: sperms mature and are stored in the epididymis, but they are produced in the seminiferous tubules.

B. Wrong: interstitial (Leydig) cells make testosterone; they do not contain spermatozoa.

C. Correct: spermatogenesis occurs in the seminiferous tubules, where spermatozoa are present.

D. Wrong: Sertoli cells nourish the developing sperms; they are not where spermatozoa are present as a location.

51 Biology

The living cells of cartilage are called _____.

- A. Chondroblast
- B. Chondroclasts
- C. Chondrocytes ✓ **Correct answer**
- D. Osteocytes

A. Wrong: chondroblasts are the young cells that secrete cartilage matrix; the mature living cells in lacunae are chondrocytes.

B. Wrong: chondroclasts break down cartilage; they are not its living cells.

C. Correct: mature cartilage cells lying in lacunae are chondrocytes.

D. Wrong: osteocytes are the cells of bone, not cartilage.

Question 52 Biology

Which carbohydrate shows a dark brown colour with iodine solution?

- A. Cellulose
- B. Glucose
- C. Glycogen ✓ **Correct answer**
- D. Sucrose

A. Wrong: cellulose gives no colour with iodine.

B. Wrong: glucose gives no colour with iodine.

C. Correct: glycogen gives a red-brown to dark brown colour with iodine, unlike the blue-black of starch.

D. Wrong: sucrose gives no colour with iodine.

53 Biology

In which type of dominance are the genotypic and phenotypic ratios the same?

- A. Co-dominance
- B. Complete dominance
- C. Incomplete dominance ✓ **Correct answer**
- D. Over dominance

A. Wrong: in co-dominance the genotypic and phenotypic ratios differ (the heterozygote shows both traits).

B. Wrong: in complete dominance the phenotypic ratio is 3:1 while the genotypic ratio is 1:2:1.

C. Correct: with incomplete dominance the heterozygote has its own intermediate phenotype, so both ratios are 1:2:1.

D. Wrong: over-dominance is about the heterozygote exceeding both homozygotes, not about equal ratios.

Question 54 Biology

At 25°C the concentration of each of H+ and OH– ions in pure water is about _____ mole/litre.

- A. 10^{-6}
- B. 10^{-7} ✓ **Correct answer**
- C. 10^{-9}
- D. 10^{-14}

A. Wrong: that would give pH 6, not the neutral pH 7 of pure water.

B. Correct: $K_w = 1\times10^{-14} = [H^+][OH^-]$, so each ion is 1×10^{-7} mol/dm^3 and pH = 7.

C. Wrong: that would give pH 9, far from neutral.

$[OH^-]$ is the value of Kw (the product of the two concentrations), not the concentration of each ion.

Question 55 Biology

By the fusion of ilium, ischium and pubis in the pelvic girdle, _____ is formed.

- A. ball and socket joint ✓ **Correct answer**
- B. cartilaginous joint
- C. fibrous joint
- D. hinge joint

A. Correct: their fusion forms the acetabulum, which receives the head of the femur to make a ball-and-socket joint.

B. Wrong: the fusion does not form a cartilaginous joint.

C. Wrong: the fusion does not form a fibrous joint.

D. Wrong: the fusion does not form a hinge joint.

Question 56 Biology

Which type of salivary gland is located behind the jaws?

- A. Maxillary glands
- B. Parotid glands ✓ **Correct answer**
- C. Sublingual glands
- D. Submaxillary glands

A. Wrong: there is no standard salivary gland called the maxillary gland.

B. Correct: parotid glands lie behind and below the ear, near the angle of the jaw — the glands swollen in mumps.

C. Wrong: sublingual glands lie under the tongue, not behind the jaws.

ıbmaxillary (submandibular) glands lie under the jaw, not behind it.

Question 57 Biology

Which type of antibodies are present in the serum of AB blood type?

- A. Anti-A and anti-B antibodies
- B. Anti-A antibodies
- C. Anti-B antibodies
- D. No antibodies at all ✓ **Correct answer**

A. Wrong: a person with AB blood makes neither antibody, or the antibodies would attack their own red cells.

B. Wrong: AB blood carries the A antigen, so it cannot carry anti-A antibodies.

C. Wrong: AB blood carries the B antigen, so it cannot carry anti-B antibodies.

D. Correct: AB carries both antigens, so it makes neither antibody — that is why AB is the universal recipient.

Question 58 Biology

Which bone is NOT part of the eye orbit?

- A. Ethmoid
- B. Lacrimal
- C. Sphenoid
- D. Zygomatic

No answer is given for this question, and none is taught. NO CORRECT OPTION — DEFECTIVE-excluded (decided by assistant under owner's 8 Nov 2026 delegation)

A. The ethmoid DOES form part of the orbit (the medial wall, lamina papyracea), so it is not a correct answer to "NOT part of the orbit".

...al DOES form part of the orbit (the medial wall), so it is not a correct answer either.

C. The sphenoid DOES form part of the orbit (the posterior wall), so it is not a correct answer either.

D. The zygomatic DOES form part of the orbit (the lateral wall), so it is not a correct answer either. (DEFECTIVE-excluded: the orbit is formed by seven bones — frontal, sphenoid, zygomatic, maxilla, lacrimal, palatine and ethmoid — so all four options are orbit bones and no option is correct. The reproduction itself calls this a "Flawed item" and says its intended key A rests on the board's textbook list omitting the ethmoid; that intended key is factually wrong. The intended key A is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 59 Biology

Cyanides occupy the active site of enzymes by forming covalent bonds, thus they come under _____ inhibitors.

- A. competitive
- B. irreversible ✓ **Correct answer**
- C. non-competitive
- D. reversible

A. Wrong: competitive inhibitors bind reversibly at the active site; cyanide's covalent, permanent attachment is irreversible.

B. Correct: a covalent, permanent attachment destroys enzyme activity — that is irreversible inhibition.

C. Wrong: non-competitive inhibitors bind at a different (allosteric) site and are usually reversible.

D. Wrong: a covalent bond is not readily reversed, so the inhibition is irreversible.

60 Biology

During resting membrane potential, K+ is _____ higher in concentration inside than outside the membrane surface.

- A. ten-times
- B. fifteen-times
- C. twenty times ✓ **Correct answer**
- D. twenty-five times

A. Wrong: the textbook figure for the inside-to-outside potassium ratio is about 20, not 10.

B. Wrong: the textbook figure is about 20, not 15.

C. Correct: the Na^+/K^+ pump keeps potassium about 20 times more concentrated inside the neuron than outside.

D. Wrong: the textbook figure is about 20, not 25.

Question 61 Biology

Which plant has modified bilobed leaves with a midrib between them, having long stiff bristles along the margins of each lobe?

- A. Dionaea muscipula ✓ **Correct answer**
- B. Drosera excelsa
- C. Drosera intermedia
- D. Nepenthes pupurea

A. Correct: this describes the Venus flytrap (Dionaea muscipula), whose bilobed leaves snap shut on prey.

B. Wrong: Drosera (sundew) has tentacles with sticky drops, not bilobed leaves with bristles.

C. Wrong: Drosera has tentacles with sticky drops, not bilobed leaves with bristles.

epenthes is a pitcher plant, it has pitchers, not bilobed bristled leaves.

Question 62 Biology

Which is the first electron acceptor from FADH2 during the electron transport chain?

- A. Coenzyme Q ✓ **Correct answer**
- B. Cytochrome a
- C. Cytochrome b
- D. Cytochrome c

A. Correct: $FADH_2$ bypasses complex I and hands electrons through complex II directly to coenzyme Q (ubiquinone).

B. Wrong: cytochrome a is in complex IV, far downstream of the $FADH_2$ entry point.

C. Wrong: cytochrome b is in complex III, downstream of coenzyme Q.

D. Wrong: cytochrome c carries electrons between complexes III and IV, downstream of coenzyme Q.

Question 63 Biology

Which part of the brain is related to sensation of pleasure, feeling of fear, rage and punishment or sexual arousal when stimulated?

- A. Amygdala ✓ **Correct answer**
- B. Hippocampus
- C. Hypothalamus
- D. Thalamus

A. Correct: the amygdala of the limbic system governs fear, rage and emotional and sexual behaviour.

B. Wrong: the hippocampus handles memory, not fear and rage.

e hypothalamus controls homeostasis (hunger, thirst, temperature), not the fear and rage responses described.

D. Wrong: the thalamus relays sensory information; it is not the seat of fear and rage.

Question 64 Biology

Which part of phospholipids constitutes the hydrophobic zone in the plasma membrane?

- A. Cholesterol
- B. Fatty acid tail ✓ **Correct answer**
- C. Glycolipids
- D. Phosphate head

A. Wrong: cholesterol sits among the tails and modulates fluidity; it is not the hydrophobic zone itself.

B. Correct: the non-polar fatty acid tails point inward, forming the hydrophobic core of the bilayer.

C. Wrong: glycolipids are membrane lipids with sugar chains on the outer surface, not the hydrophobic zone.

D. Wrong: the phosphate head is polar and hydrophilic — it faces the water, the opposite of the hydrophobic zone.

Question 65 Biology

The inner surface of cristae in the mitochondrial matrix has many small knob-like structures, which are actually _____.

- A. ATP synthetase ✓ **Correct answer**
- B. Coenzyme Q
- C. Cytochromes
- D. Mesosomes

...e F1 particles (oxysomes) studding the cristae are ATP synthase complexes.

B. Wrong: coenzyme Q is a mobile electron carrier in the membrane, not a knob-like structure on the cristae.

C. Wrong: cytochromes are electron carriers embedded in the membrane, not the knob-like F1 particles.

D. Wrong: mesosomes are folded membranes in bacteria, not structures on mitochondrial cristae.

Question 66 Biology

Movement of materials across the plasma membrane of Amoeba to engulf liquid food is termed _____.

- A. Endocytosis
- B. Exocytosis
- C. Phagocytosis
- D. Pinocytosis ✓ **Correct answer**

A. Wrong: endocytosis is the general term; the specific term for taking in liquid is pinocytosis.

B. Wrong: exocytosis is material leaving the cell, the opposite of engulfing food.

C. Wrong: phagocytosis takes in solid particles (cell eating); liquid is taken in by pinocytosis.

D. Correct: cell drinking of fluid droplets is pinocytosis.

Question 67 Biology

At the end of the ileum there is a/an _____ sphincter that opens and closes from time to time to allow a small amount of residue to enter the large intestine.

atic

- B. cardiac
- C. ileocolic ✓ **Correct answer**
- D. pyloric

A. Wrong: there is no hepatic sphincter at the end of the ileum.

B. Wrong: the cardiac sphincter is at the top of the stomach, not at the end of the ileum.

C. Correct: the ileocolic (ileocaecal) sphincter guards the junction of ileum and caecum and prevents backflow.

D. Wrong: the pyloric sphincter is at the exit of the stomach, not at the end of the ileum.

Question 68 Biology

Groups of ribosomes associated with rough endoplasmic reticulum and Golgi apparatus present in the cell body of neurons are termed _____.

- A. Axoplasm
- B. Nissl's granules ✓ **Correct answer**
- C. Node
- D. Polysomes

A. Wrong: axoplasm is the cytoplasm of the axon, not the ribosome clusters in the cell body.

B. Correct: Nissl's granules are the rough endoplasmic reticulum and ribosome clusters of the neuron cell body, responsible for its high protein synthesis.

C. Wrong: a node (of Ranvier) is a gap in the myelin sheath of the axon, not a ribosome cluster.

D. Wrong: polysomes are groups of ribosomes on a single mRNA; the neuron cell-body clusters are specifically called Nissl's granules.

69 Chemistry

Water is liquid at room temperature as compared to ammonia and hydrogen disulphide due to the presence of _____.

- A. Co-ordinate covalent bond
- B. Hydrogen bond ✓ **Correct answer**
- C. Ionic bond
- D. Metallic bond

A. Wrong: co-ordinate bonds do not explain why water is a liquid at room temperature.

B. Correct: each water molecule makes up to four strong O–H···O hydrogen bonds, raising its boiling point far above NH_3 and H_2S.

C. Wrong: water is a covalent molecule; it has no ionic bonds.

D. Wrong: metallic bonds exist in metals, not in water.

Question 70 Chemistry

What will be the molarity of an HCl solution with pH = 4?

- A. 0.0001 ✓ **Correct answer**
- B. 0.0004
- C. 0.004
- D. 4.0

A. Correct: HCl is monoprotic and strong, so $[H^+] = 10^{-4} = 0.0001$ mol/dm^3, which is the molarity.

B. Wrong: that is 4×10^{-4}, not 10^{-4}.

C. Wrong: that would give pH ≈ 2.4, not 4.

D. Wrong: a 4.0 M solution would have a negative pH, not pH 4.

71 Chemistry

Transition element vanadium mostly acts as _____.

- A. Amphoteric
- B. Neutral
- C. Oxidizing agent ✓ **Correct answer**
- D. Reducing agent

A. Wrong: "amphoteric" describes oxides that react with both acids and bases; it is not how vanadium mostly acts.

B. Wrong: vanadium is not neutral in its reactions; it is most used as an oxidising agent.

C. Correct: vanadium is most stable and most used in its highest state as V_2O_5, which readily gives up oxygen — an oxidising agent (contact process catalyst).

D. Wrong: vanadium in lower states can reduce, but its most common role is as an oxidising agent.

Question 72 Chemistry

How many moles of oxygen gas are needed for the combustion of 2 moles of propane?

- A. 08
- B. 10 ✓ **Correct answer**
- C. 12
- D. 14

A. Wrong: 8 moles of O_2 would burn only 1.6 moles of propane.

B. Correct: $C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$, so 2 moles of propane need $2 \times 5 = 10$ moles of O_2.

C. Wrong: 12 moles would be 6 per mole of propane, too many.

D. Wrong: 14 moles would be 7 per mole of propane, too many.

73 Chemistry

Which type of catalyst is used during electrophilic substitution reactions of benzene?

- A. Amphoteric
- B. Lewis's acid ✓ **Correct answer**
- C. Lewis's base
- D. Transition metals

A. Wrong: amphoteric describes a substance reacting with acids and bases; it is not the catalyst type here.

B. Correct: Lewis acids such as $AlCl_3$ or $FeBr_3$ accept an electron pair to generate the electrophile.

C. Wrong: a Lewis base donates an electron pair; electrophilic substitution needs a Lewis acid to make the electrophile.

D. Wrong: transition metals as such are not the catalyst type; the specific catalysts are Lewis acids (some of which happen to be metal halides).

Question 74 Chemistry

Which one of the following is NOT an example of an electrochemical cell?

- A. Electrolytic cell
- B. Photovoltaic cell
- C. Solar cell ✓ **Correct answer**
- D. Voltic cell

A. Wrong as the answer: an electrolytic cell IS an electrochemical cell.

B. Also not an electrochemical cell: a photovoltaic cell is the same device as a solar cell — it converts light directly to electricity with no redox reaction.

C. Correct per the printed key: a solar cell converts light directly to electricity with no redox

t is not an electrochemical cell.

D. Wrong as the answer: a voltaic (galvanic) cell IS an electrochemical cell. (PICK-ONE: options B and C are the same device, so both are correct; the printed key records C. The reproduction itself flags the item as ambiguous. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 75 Chemistry

The oxidation of methanal results in the formation of _____.

- A. Acetic acid
- B. Formic acid ✓ **Correct answer**
- C. Methanol
- D. Propanoic acid

A. Wrong: acetic acid (two carbons) comes from oxidising ethanal, not methanal.

B. Correct: HCHO (methanal) oxidises to HCOOH (methanoic/formic acid) — an aldehyde always gives the acid with the same carbon count.

C. Wrong: methanol is the reduction product of methanal, not the oxidation product.

D. Wrong: propanoic acid has three carbons; methanal has only one.

Question 76 Chemistry

Which type of substituent will increase the acidic strength of phenols?

- A. Electron donating substituents
- B. Electron withdrawing substituents ✓ **Correct answer**
- C. Lewis's bases
- D. Nucleophiles

A. Wrong: electron-donating groups push electron density onto the ring and destabilise the phenoxide ion, making the phenol less acidic.

groups such as $-NO_2$ pull electron density away and stabilise the phenoxide ion, making the phenol more acidic.

C. Wrong: Lewis bases donate electron pairs; they do not increase phenol acidity.

D. Wrong: nucleophiles donate electron pairs; they do not increase phenol acidity.

Question 77 Chemistry

Which type of isomerism is shown by fumaric acid and maleic acid?

- A. Functional group isomers
- B. Geometrical isomers ✓ **Correct answer**
- C. Optical isomers
- D. Position isomers

A. Wrong: both acids have the same functional groups; they differ in geometry, not in functional group.

B. Correct: they are the trans (fumaric) and cis (maleic) forms about a C=C double bond — cis-trans (geometrical) isomers.

C. Wrong: neither acid is chiral, so there is no optical isomerism.

D. Wrong: the double bond is in the same position in both; only the geometry differs.

Question 78 Chemistry

The IUPAC name of malonic acid, CH2(COOH)2, is _____.

- A. 1,2-Ethanedioic acid
- B. 1,3-Propanedioic acid ✓ **Correct answer**
- C. 1,4-butanedioic acid
- D. 1,6-Hexadecanoic acid

A. Wrong: ethanedioic acid has two carbons (oxalic acid); malonic acid has three.

malonic acid has a three-carbon chain with –COOH at both ends — propanedioic acid.

C. Wrong: butanedioic acid has four carbons (succinic acid); malonic acid has three.

D. Wrong: that is a sixteen-carbon acid, nothing to do with malonic acid.

Question 79 Chemistry

The IUPAC name of the given organic compound is _____. CH3-CH-CH2-CH2-CHO (Cl on the second carbon)

- A. 2-Chloropentanal
- B. 2-Chloropentanol
- C. 4-Chloropentanal ✓ **Correct answer**
- D. 4-Chloropentanol

A. Wrong: numbering must start at the aldehyde carbon (–CHO takes C-1), which puts the chlorine on C-4, not C-2.

B. Wrong: the compound is an aldehyde (–CHO), not an alcohol (–OH).

C. Correct: –CHO takes C-1, so numbering from the aldehyde end puts Cl on C-4 of a five-carbon aldehyde — 4-chloropentanal.

D. Wrong: the compound is an aldehyde, not an alcohol.

Question 80 Chemistry

For boiling point, the vapour pressure of a liquid DOES NOT depend upon _____.

- A. amount of liquid ✓ **Correct answer**
- B. external atmospheric pressure
- C. intermolecular forces
- D. type of bond

vapour pressure is an intensive property — it depends on the nature of the liquid and temperature, not on how much liquid is present.

B. Wrong as the answer: the boiling point (the temperature at which vapour pressure equals external pressure) DOES depend on external pressure.

C. Wrong as the answer: vapour pressure DOES depend on intermolecular forces.

D. Wrong as the answer: the type of bonding in the liquid DOES affect its vapour pressure.

Question 81 Chemistry

Which element will show an outermost shell electronic configuration like ns^2, np^5?

- A. C
- B. Cl ✓ **Correct answer**
- C. S
- D. Si

A. Wrong: carbon ends in $2s^2\ 2p^2$, not $ns^2\ np^5$.

B. Correct: group VII-A (halogens) end in $ns^2\ np^5$; chlorine is $3s^2\ 3p^5$.

C. Wrong: sulphur ends in $3s^2\ 3p^4$, not $ns^2\ np^5$.

D. Wrong: silicon ends in $3s^2\ 3p^2$, not $ns^2\ np^5$.

Question 82 Chemistry

What is the IUPAC name of the given compound? CH3-CH=CH-CH2-C≡CH

- A. 2-Hexen-5-yne
- B. 2-Hexen-6-yne
- C. 4-Hexen-1-yne ✓ **Correct answer**
- D. 5-Hexen-1-yne

A. Wrong: that numbering gives the double bond the lower locant, but IUPAC gives the

priority for the lowest locant.

B. Wrong: a six-carbon chain cannot have a triple bond at position 6 (that would be the terminal carbon of the chain as numbered from the other end).

C. Correct: six carbons; the triple bond gets the lower locant, so numbering from the alkyne end gives hex-4-en-1-yne.

D. Wrong: numbering from the alkyne end puts the double bond at C-4, not C-5.

Question 83 Chemistry

Which product is formed by the reaction of phenol with concentrated nitric acid?

- A. Adipic acid
- B. m-Nitrophenol
- C. Picric acid ✓ **Correct answer**
- D. p-Nitrophenol

A. Wrong: adipic acid is a dicarboxylic acid, not a nitration product of phenol.

B. Wrong: concentrated nitric acid nitrates phenol three times, not once at the meta position.

C. Correct: concentrated HNO_3 nitrates phenol three times to give 2,4,6-trinitrophenol — picric acid (dilute HNO_3 gives the mono-nitro products).

D. Wrong: p-nitrophenol is the mono-nitro product from dilute nitric acid, not from concentrated acid.

Question 84 Chemistry

NaCl is an example of _____ arrangement of crystal lattice.

- A. Monoclinic
- B. Octahedral ✓ **Correct answer**

- D. Triangular

A. Wrong: monoclinic is a crystal system, not the coordination arrangement of NaCl.

B. Correct: in rock salt each Na^+ is surrounded by six Cl^- and vice versa — 6:6 octahedral coordination.

C. Wrong: tetrahedral coordination (4:4) is found in zinc blende, not in NaCl.

D. Wrong: triangular is not a coordination arrangement of NaCl.

Question 85 Chemistry

Who stated that the enthalpy change in a chemical reaction is the same whether the reaction takes place in a single step or in several steps?

- A. Arrhenius' Law
- B. Born Haber's Law
- C. Dalton's Law
- D. Hess's Law ✓ **Correct answer**

A. Wrong: Arrhenius' law is about the temperature dependence of reaction rates.

B. Wrong: the Born-Haber cycle applies Hess's law to ionic compounds; it is not the statement itself.

C. Wrong: Dalton's law is about partial pressures of gases.

D. Correct: Hess's law of constant heat summation — a direct consequence of enthalpy being a state function.

Question 86 Chemistry

The saturated alicyclic hydrocarbons have the general formula _____.

- A. CnH2n ✓ **Correct answer**

- C. CnH2n+2
- D. CnH2n-2

A. Correct: cycloalkanes lose two hydrogens on ring closure, giving C_nH_{2n} (the same as alkenes).

B. Wrong: C_nH_{2n+1} is the formula of alkyl groups, not of saturated alicyclic hydrocarbons.

C. Wrong: C_nH_{2n+2} is the formula of alkanes, not cycloalkanes.

D. Wrong: C_nH_{2n-2} is the formula of alkynes, not cycloalkanes.

Question 87 Chemistry

The anion derived by deprotonation of an alcohol acts as _____.

- A. Acidic moiety
- B. Electrophile
- C. Lewis acid
- D. Lewis base ✓ **Correct answer**

A. Wrong: the alkoxide ion is basic, not acidic.

B. Wrong: an alkoxide (RO^-) is electron-rich, so it acts as a nucleophile, not an electrophile.

C. Wrong: a Lewis acid accepts an electron pair; an alkoxide donates one.

D. Correct: an alkoxide (RO^-) is electron-pair rich, so it donates electrons — a Lewis base and strong nucleophile.

Question 88 Chemistry

How many electrons will be accommodated in a sub-shell with azimuthal quantum number l = 2?

- A. 2

- C. 10 ✓ **Correct answer**
- D. 12

A. Wrong: 2 electrons fit in one orbital, not in a whole d sub-shell.

B. Wrong: 6 electrons fit in a p sub-shell (l = 1), not a d sub-shell.

C. Correct: l = 2 is the d sub-shell — 5 orbitals × 2 electrons = 10, from 2(2l + 1).

D. Wrong: no sub-shell holds 12 electrons (the f sub-shell holds 14).

Question 89 Chemistry

What will be the IUPAC name of neopentane?

- A. 2,2-Dimethypentane
- B. 2,2-Dimethypropane ✓ **Correct answer**
- C. 2-Methylbutane
- D. 3-Methylbutane

A. Wrong: that would be a seven-carbon compound; neopentane has five carbons in total.

B. Correct: neopentane is $C(CH_3)_4$ — a three-carbon parent chain with two methyls on C-2: 2,2-dimethylpropane.

C. Wrong: 2-methylbutane is isopentane, not neopentane.

D. Wrong: 3-methylbutane is the same as 2-methylbutane (isopentane), not neopentane.

Question 90 Chemistry

The correct stability order of M+4 cations is_____.

- A. Ge+4 < Pb+4 < Sn+4
- B. Ge+4 < Sn+4 < Pb+4
- C. Ge+4 > Pb+4 > Sn+4

$Ge^{+4} > Sn^{+4} > Pb^{+4}$ ✓ **Correct answer**

A. Wrong: that order puts lead above tin, the opposite of the inert pair trend.

B. Wrong: that order is reversed — the +4 state becomes less stable down the group.

C. Wrong: that order puts lead above tin, which is wrong.

D. Correct: down group IV-A the inert pair effect makes the +4 state less stable, so $Ge^{4+} > Sn^{4+} > Pb^{4+}$.

Question 91 Chemistry

A unimolecular nucleophilic substitution reaction involves _____.

- A. 1st order kinetics ✓ **Correct answer**
- B. 2nd order kinetics
- C. 3rd order kinetics
- D. zero order kinetics

A. Correct: in SN1 the slow step is carbocation formation from the substrate alone, so rate = k[RX] — first order.

B. Wrong: second order belongs to SN2 (bimolecular) reactions.

C. Wrong: SN1 is not third order.

D. Wrong: the rate of SN1 depends on the substrate concentration, so it is not zero order.

Question 92 Chemistry

The e/m ratio of a proton is _____ that of an electron.

- A. 1837 times greater than
- B. equal to
- C. greater than
- D. smaller than ✓ **Correct answer**

1837 is how many times heavier the proton is, not how much greater its e/m is — the heavier mass makes e/m smaller.

B. Wrong: the charges are equal in magnitude but the masses differ, so the e/m values differ.

C. Wrong: the proton's e/m is smaller, not greater.

D. Correct: charge is equal in magnitude but the proton is 1837 times heavier, so its e/m value is much smaller.

Question 93 Chemistry

Which metal hydroxide is the strongest base?

- A. Ca(OH)2
- B. LiOH
- C. Mg(OH)2
- D. NaOH ✓ **Correct answer**

A. Wrong: calcium hydroxide is only slightly soluble and is a weaker base than NaOH.

B. Wrong: lithium hydroxide is a weaker base than sodium hydroxide.

C. Wrong: magnesium hydroxide is only slightly soluble and is a weaker base than NaOH.

D. Correct: basic strength rises down a group and falls across a period; among these NaOH is the most ionic and fully dissociated.

Question 94 Chemistry

If a weak acid is diluted with water, then the H+ ion concentration will _____.

- A. decrease ✓ **Correct answer**
- B. gradually decreases then increase
- C. increase

A. Correct: dilution increases the degree of ionisation, but the total H^+ is spread through more volume, so the concentration falls (and pH rises).

B. Wrong: the concentration falls steadily on dilution; it does not rise again.

C. Wrong: dilution lowers the concentration of H^+ ions.

D. Wrong: dilution changes the concentration; it does not stay the same.

Question 95 Chemistry

The chemical equilibrium given below will shift to the backward direction by _____.

$2NO + O2 \rightleftharpoons 2NO2 + Heat$

- A. decreasing pressure and increasing temperature ✓ **Correct answer**
- B. decreasing the temperature
- C. increasing the concentration of NO & O2
- D. increasing the pressure

A. Correct: the forward reaction is exothermic and has fewer moles (3 → 2). By Le Chatelier, heating and lowering pressure both push it backwards.

B. Wrong: cooling favours the exothermic forward reaction, not the backward one.

C. Wrong: adding reactants pushes the equilibrium forward, not backward.

D. Wrong: higher pressure favours the side with fewer moles — the forward direction.

Question 96 Chemistry

Which product is formed finally on the reduction of acetic acid with LiAlH4?

- A. Ethanal
- B. Ethane
- C. Ethanoic acid

anol ✓ **Correct answer**

A. Wrong: ethanal is an intermediate on the way, but $LiAlH_4$ reduces the acid all the way to the alcohol.

B. Wrong: $LiAlH_4$ does not reduce a carboxylic acid to an alkane.

C. Wrong: ethanoic acid is the starting material, not the product.

D. Correct: $LiAlH_4$ is a powerful reducing agent — it takes the carboxylic acid all the way through the aldehyde to the primary alcohol, ethanol.

Question 97 Chemistry

If the percentage yield of a chemical reaction is 60% and the actual yield is 15 g, what is its theoretical yield?

- A. 18g
- B. 20g
- C. 25g ✓ **Correct answer**
- D. 30g

A. Wrong: 15 × 1.2 is not the theoretical yield.

B. Wrong: 15 ÷ 0.75 would give 20, but the yield is 60%, not 75%.

C. Correct: theoretical yield = actual ÷ percentage yield = 15 ÷ 0.60 = 25 g.

D. Wrong: 15 ÷ 0.50 would give 30, but the yield is 60%, not 50%.

Question 98 Chemistry

The metallic character of alkaline earth metals_____down the group.

- A. decreases
- B. gradually increases then decreases
- C. increases ✓ **Correct answer**

A. Wrong: metallic character increases down a group, not decreases.

B. Wrong: it increases steadily down the group.

C. Correct: atomic size grows and ionisation energy falls down the group, so electrons are lost more easily — metallic character increases.

D. Wrong: metallic character changes down the group.

Question 99 Chemistry

Which type of reaction occurs when an alcohol reacts with a carboxylic acid?

- A. Dehydration reaction
- B. Dehydrogenation reaction
- C. Esterification reaction ✓ **Correct answer**
- D. Reduction reaction

A. Wrong: dehydration removes water from a single molecule; this reaction joins two molecules with loss of water to make an ester.

B. Wrong: dehydrogenation removes hydrogen; this reaction does not.

C. Correct: acid + alcohol, with concentrated H_2SO_4, gives an ester and water — Fischer esterification.

D. Wrong: no reduction takes place in this reaction.

Question 100 Chemistry

Which type of redox reaction takes place at the cathode of an electrochemical cell?

- A. Decomposition
- B. Dissociation
- C. Oxidation

uction ✓ **Correct answer**

A. Wrong: decomposition is a type of chemical reaction, not the redox process at the cathode.

B. Wrong: dissociation is the splitting of a compound into ions, not the cathode process.

C. Wrong: oxidation occurs at the anode, not the cathode.

D. Correct: reduction always occurs at the cathode (Red-Cat), oxidation at the anode, in both galvanic and electrolytic cells.

Question 101 Chemistry

Which molecule has zero dipole moment?

- A. Ammonia
- B. Carbon dioxide ✓ **Correct answer**
- C. Hydrogen fluoride
- D. Water

A. Wrong: NH_3 is pyramidal and polar, so it has a dipole moment.

B. Correct: CO_2 is linear and symmetrical, so its two equal bond dipoles cancel and the net dipole moment is zero.

C. Wrong: HF is strongly polar, with a large dipole moment.

D. Wrong: H_2O is bent and polar, so it has a dipole moment.

Question 102 Chemistry

If the half-life of a chemical reaction is 30 minutes, how much time is required for 87.5% completion?

- A. 30 min
- B. 60 min

nin ✓ **Correct answer**

- D. 120 min

A. Wrong: after one half-life 50% is done, not 87.5%.

B. Wrong: after two half-lives 75% is done, not 87.5%.

C. Correct: 87.5% done leaves 12.5% = 1/8, which is three half-lives: 3 × 30 = 90 minutes.

D. Wrong: after four half-lives 93.75% is done, more than 87.5%.

Question 103 Chemistry

Which law helps to calculate the absolute temperature?

- A. Avogadro's Law
- B. Boyle's Law
- C. Charles Law ✓ **Correct answer**
- D. Dalton's Law

A. Wrong: Avogadro's law relates volume to the number of moles, not to absolute temperature.

B. Wrong: Boyle's law relates pressure and volume at constant temperature.

C. Correct: extrapolating the volume–temperature line of Charles's law to zero volume gives absolute zero, −273.15°C.

D. Wrong: Dalton's law is about partial pressures, not absolute temperature.

Question 104 Chemistry

Which of the following is the unit of rate of reaction?

- A. $(\text{mol dm}^{-3})^{-1}$ s
- B. $\text{mol dm}^{3}\ \text{s}^{-1}$
- C. mol dm^{-3} s

dm^3 s^{-1} ✓ Correct answer

A. Wrong: that is the unit of a second-order rate constant, not of the rate of reaction.

B. Wrong: that has the volume the wrong way up.

C. Wrong: that is concentration multiplied by time, not divided by time.

D. Correct: rate = change in concentration per unit time = mol dm^{-3} s^{-1}. (The options are garbled in the reproduction's typesetting and are transcribed here in the standard forms; the answer is unaffected.)

Question 105 Chemistry

Consider a reaction of A into B. If the K value is 3×10^{-12} at 200°C, what will be the value of K at 250°C?

- A. K = 9×10^{-3} s^{-1}
- B. K = 12×10^{-3} s^{-1}
- C. K = 6×10^{-12} s^{-1}
- D. K = 15×10^{-12} s^{-1}

No answer is given for this question, and none is taught. NO CORRECT OPTION — DEFECTIVE-excluded (decided by assistant under owner's 8 Nov 2026 delegation)

A. Wrong: the value is in the 10^{-3} range, while the starting value is 3×10^{-12} — the magnitude is wrong.

B. Wrong: the value is in the 10^{-3} range, while the starting value is 3×10^{-12} — the magnitude is wrong.

C. The board key: it applies the rule of thumb that the rate constant doubles with a rise in temperature, once: $2 \times 3\times10^{-12} = 6\times10^{-12}$. But strictly, doubling per 10°C over a 50°C rise gives a 32-fold rise ($2^5 = 32$), so the correct value would be 96×10^{-12} — which is not among the options.

5×10^{-12} is five times the starting value, which follows no doubling rule. (DEFECTIVE-excluded: no offered option is the strictly correct value (96×10^{-12}); the reproduction itself calls the item "loosely framed" and its "Note on disputed items" names Q105 as technically flawed as printed. The board key C is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 106 Chemistry

The correct reactivity order of the following compounds towards a nucleophile is_____.

H-CO-H, H-CO-R, R-CO-R

- A. H-CO-H < H-CO-R < R-CO-R
- B. H-CO-H > H-CO-R > R-CO-R ✓ **Correct answer**
- C. H-CO-R < H-CO-H < R-CO-R
- D. H-CO-H > R-CO-R > H-CO-R

A. Wrong: that order is reversed — formaldehyde is the most reactive, not the least.

B. Correct: alkyl groups add electron density and bulk, so formaldehyde > other aldehydes > ketones towards nucleophilic addition.

C. Wrong: that order puts ketones above aldehydes, which is backwards.

D. Wrong: that order puts ketones above other aldehydes, which is backwards.

Question 107 Chemistry

Which of the following is an example of a molecular solid?

- A. Al3N2
- B. CO2 ✓ **Correct answer**
- C. CsF
- D. NaCl

A. Wrong: aluminium nitride is a covalent/ionic network solid, not a molecular solid.

olid CO_2 (dry ice) is made of discrete molecules held by weak London forces.

C. Wrong: caesium fluoride is an ionic solid.

D. Wrong: sodium chloride is an ionic solid.

Question 108 Chemistry

What will be the mole ratio of Al to O2 after balancing the equation given below? 2Al2O3 → 4Al + 3O2

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

A. Wrong: the balanced equation gives 4 Al and 3 O_2, not equal amounts.

B. Wrong: 2:3 is the ratio of Al_2O_3 to O_2, not of Al to O_2.

C. Wrong: that is the ratio the wrong way round (O_2 to Al).

D. Correct: the balanced equation $2Al_2O_3 \rightarrow 4Al + 3O_2$ gives Al : O_2 = 4 : 3.

Question 109 Chemistry

What is the percentage mass ratio of carbon and hydrogen in benzene?

- A. 1:1
- B. 3:1
- C. 6:1
- D. 12:1 ✓ **Correct answer**

A. Wrong: that is the atom ratio (C_6H_6 has equal numbers of C and H atoms), not the mass ratio.

B. Wrong: no calculation with C_6H_6 gives 3:1.

at would be the ratio if carbon had mass 6, but carbon's mass is 12.

D. Correct: C_6H_6 — mass of C = 72, mass of H = 6, so 72 : 6 = 12 : 1.

Question 110 Chemistry

According to the law of mass action, Kp > Kc when a reaction occurs with_____.

- A. decrease in volume on product side
- B. increase in volume on product side ✓ **Correct answer**
- C. increase in volume on reactant side
- D. simultaneous increase and decrease of product

A. Wrong: if the volume decreases on the product side, Δn is negative and Kp < Kc.

B. Correct: Kp = Kc(RT)^Δn; Kp exceeds Kc only when Δn is positive, i.e. more gas volume on the product side.

C. Wrong: more volume on the reactant side means Δn is negative, so Kp < Kc.

D. Wrong: that is meaningless; the comparison depends on Δn alone.

Question 111 Chemistry

At constant volume, the heat supplied to a system is always equal to its _____.

- A. bond energy
- B. enthalpy change
- C. heat of sublimation
- D. internal energy change ✓ **Correct answer**

A. Wrong: bond energy is the energy of a single bond, not what heat at constant volume equals.

B. Wrong: heat at constant pressure equals the enthalpy change; at constant volume it equals the internal energy change.

e heat of sublimation is the energy to turn a solid into a gas, not the general result.

D. Correct: no volume change means no PV work, so ΔE = qv — all the heat goes into internal energy.

Question 112 Chemistry

Which metal forms a superoxide when reacted with oxygen?

- A. Beryllium
- B. Lithium
- C. Magnesium
- D. Potassium ✓ **Correct answer**

A. Wrong: beryllium forms the normal oxide BeO, not a superoxide.

B. Wrong: lithium forms the normal oxide Li_2O, not a superoxide.

C. Wrong: magnesium forms the normal oxide MgO, not a superoxide.

D. Correct: large, low-charge-density cations stabilise the O_2^- ion, so K, Rb and Cs form superoxides (KO_2).

Question 113 Chemistry

When CO2 reacts with propyl magnesium chloride followed by acid hydrolysis, the product formed is _____.

- A. Butanoic acid ✓ **Correct answer**
- B. Ethanoic acid
- C. Pentanoic acid
- D. Propanoic acid

A. Correct: a Grignard reagent adds to CO_2 and gains one carbon — the 3-carbon propyl group becomes the 4-carbon butanoic acid.

hanoic acid has two carbons; the propyl group plus CO_2 gives four.

C. Wrong: pentanoic acid has five carbons; the product has four.

D. Wrong: propanoic acid has three carbons — that would be the product if no carbon were added.

Question 114 Chemistry

What will be the number of atoms in 2 moles of water molecules?

- A. 6.02×10^{23}
- B. 1.24×10^{24}
- C. 1.92×10^{24}
- D. 3.61×10^{24} ✓ **Correct answer**

A. Wrong: that is the number of atoms in one mole of a monatomic substance, not in two moles of water.

B. Wrong: that would be about two moles of atoms, but each water molecule has three atoms.

C. Wrong: no calculation with 2 moles of H_2O gives 1.92×10^{24}.

D. Correct: each H_2O has 3 atoms, so $2 \times 3 \times 6.02\times10^{23} = 3.61\times10^{24}$ atoms.

Question 115 Chemistry

What is the range of atomic numbers of the 3d series of transition elements?

- A. 20-30
- B. 21-30 ✓ **Correct answer**
- C. 22-30
- D. 24-30

A. Wrong: calcium (Z = 20) has no d electrons, so it is not part of the 3d series.

The first transition series runs from scandium (Z = 21) to zinc (Z = 30).

C. Wrong: the series starts at scandium (Z = 21), not titanium (Z = 22).

D. Wrong: the series starts at scandium (Z = 21), not chromium (Z = 24).

Question 116 Chemistry

The melting and boiling points of alcohols are high as compared to corresponding alkanes due to _____.

- A. Dipole-dipole interaction
- B. Hydrogen bonding ✓ **Correct answer**
- C. Ionic interactions
- D. Van der Waal interactions

A. Wrong: dipole-dipole forces exist in alcohols, but the main reason for the high boiling points is hydrogen bonding.

B. Correct: the –OH group hydrogen bonds between molecules; alkanes have only weak London forces.

C. Wrong: alcohols are covalent molecules; they have no ionic interactions.

D. Wrong: van der Waals forces are the weak forces in alkanes; alcohols are held together mainly by hydrogen bonds.

Question 117 Chemistry

The formula for partial pressure calculation of any component in a mixture of gases is _____.

- A. Pi = Pt / Xi
- B. Pi = Pt + Xi
- C. Pi = Pt − Xi
- D. Pi = Pt × Xi ✓ **Correct answer**

viding the total pressure by the mole fraction gives a value larger than the total pressure.

B. Wrong: adding a dimensionless fraction to a pressure is meaningless.

C. Wrong: subtracting a dimensionless fraction from a pressure is meaningless.

D. Correct: partial pressure = total pressure × mole fraction (Dalton's law). (The options are garbled in the reproduction's typesetting and are transcribed here in the standard forms; the answer is unaffected.)

Question 118 Chemistry

Which mixture will constitute a buffer solution?

- A. Acetic acid & sodium acetate ✓ **Correct answer**
- B. Acetic acid & ammonia
- C. Acetic acid and its ammonium acetate
- D. Ammonia & ammonium acetate

A. Correct: a buffer needs a weak acid with its own salt of a strong base — CH_3COOH with CH_3COONa is the classic acidic buffer.

B. Wrong: acetic acid and ammonia neutralise each other; they do not form a buffer pair.

C. Wrong: ammonium acetate is the salt of acetic acid with ammonia (a weak base), not the standard buffer salt.

D. Wrong: a basic buffer needs ammonia with its own salt (ammonium chloride); ammonium acetate is not that salt.

Question 119 Chemistry

Diamagnetic behaviour of the fluorine molecule is due to the presence of _____.

- A. paired electrons in d orbitals

ed electrons in p orbitals ✓ **Correct answer**

- C. unpaired electrons in d orbitals
- D. unpaired electrons in p orbitals

A. Wrong: fluorine has no d electrons involved in its bonding.

B. Correct: in F_2 all the bonding and antibonding pi/p molecular orbitals are filled with paired electrons, so there is no net magnetic moment.

C. Wrong: unpaired electrons would make the molecule paramagnetic, not diamagnetic, and fluorine has no d electrons here.

D. Wrong: unpaired electrons would make the molecule paramagnetic, not diamagnetic.

Question 120 Chemistry

Which compound is used as a reference for calculating the extent of stability of benzene?

- A. Cyclohexane
- B. Cyclohexene
- C. 1,3,5-cyclohexene
- D. 1,3,5-cyclohexatriene ✓ **Correct answer**

A. Wrong: cyclohexane has no double bonds; it is not the reference for benzene's resonance energy.

B. Wrong: cyclohexene has one double bond; the reference needs three isolated double bonds.

C. Wrong: there is no such compound named this way (the name confuses cyclohexene with cyclohexatriene).

D. Correct: resonance energy is the difference between benzene's measured heat of hydrogenation and that calculated for the hypothetical 1,3,5-cyclohexatriene.

121 Chemistry

What will be the formula of work when work is done on the system by the surroundings?

- A. W = −P/ΔV
- B. W = −PΔV ✓ **Correct answer**
- C. W = P/ΔV
- D. W = PΔV

A. Wrong: work is pressure times volume change, not pressure divided by volume change.

B. Correct: with the physics sign convention that work done by the system is +PΔV, work done on the system (compression) is −PΔV.

C. Wrong: work is pressure times volume change, not divided by it.

D. Wrong: that is the work done BY the system, not the work done ON it.

Question 122 Chemistry

What will be the internal energy of a system at constant volume?

- A. ΔE = 0
- B. ΔE = q + PΔV
- C. ΔE = q − PΔV
- D. ΔE = qv ✓ **Correct answer**

A. Wrong: the internal energy changes when heat is supplied at constant volume; it is not zero.

B. Wrong: at constant volume ΔV = 0, so the PΔV term vanishes and ΔE = q.

C. Wrong: at constant volume ΔV = 0, so the PΔV term vanishes and ΔE = q.

D. Correct: at constant volume no expansion work is done, so the first law reduces to ΔE = qv. (Options B and C are garbled in the reproduction's typesetting and are transcribed here in the standard sign-variant forms; the answer is unaffected.)

123 Physics

Which factor is the best for calculating Compton's shift?

- A. Angular spin of electron
- B. Energy of electron
- C. Energy of photon
- D. Scattering angle of photon ✓ **Correct answer**

A. Wrong: the electron's spin does not determine the Compton shift.

B. Wrong: the shift does not depend on the electron's energy.

C. Wrong: the shift $\Delta\lambda = (h/m_0c)(1 - \cos\theta)$ does not depend on the incident photon's energy.

D. Correct: the Compton shift depends only on the scattering angle θ, not on the incident photon's energy.

Question 124 Physics

In the British Engineering system the unit of power is horsepower. Numerically 1000 hp is equal to _____.

- A. 7460 watts
- B. 74600 watts
- C. 746000 watts ✓ **Correct answer**
- D. 7460000 watts

A. Wrong: that is 10 hp, not 1000 hp.

B. Wrong: that is 100 hp, not 1000 hp.

C. Correct: 1 hp = 746 W, so 1000 hp = 746,000 W.

D. Wrong: that is 10,000 hp, ten times too large.

125 Physics

The strength of a radiation source is indicated by its activity measured in becquerel. So 10 becquerel is equal to _____ decays per second.

- A. 10 ✓ **Correct answer**
- B. 100
- C. 1000
- D. 10000

A. Correct: one becquerel is defined as exactly one disintegration per second, so 10 Bq = 10 decays per second.

B. Wrong: that would be 100 Bq, not 10 Bq.

C. Wrong: that would be 1000 Bq, not 10 Bq.

D. Wrong: that would be 10,000 Bq, not 10 Bq.

Question 126 Physics

Which one of the following is the unit of electric field intensity?

- A. Newton per Ampere
- B. Newton per volt
- C. Volt per Coulomb
- D. Volt per meter ✓ **Correct answer**

A. Wrong: newton per ampere is not the unit of electric field intensity.

B. Wrong: newton per volt is not the unit of electric field intensity.

C. Wrong: volt per coulomb is not the unit of electric field intensity.

D. Correct: E = F/q gives N/C, which is dimensionally the same as V/m.

127 Physics

Tesla is the SI unit of magnetic field intensity. Tesla can also be expressed as _____.

- A. $N^{-1}A^{-1}m^{-1}$
- B. $N^{-1}Am^{-1}$
- C. $NA^{-1}m^{-1}$ ✓ **Correct answer**
- D. NAm^{-1}

A. Wrong: the exponents are wrong — tesla is newtons divided by ampere-metres, not the reciprocal.

B. Wrong: the newton must be in the numerator, not the denominator.

C. Correct: from F = BIL, B = F/(IL) = N/(A·m) = N A^{-1} m^{-1}.

D. Wrong: that is newton-ampere per metre, which is not the tesla.

Question 128 Physics

The instantaneous acceleration of an object travelling with uniform speed in a circle, directed towards the centre of the circle, is referred to as _____.

- A. Angular acceleration
- B. Centrifugal acceleration
- C. Centripetal acceleration ✓ **Correct answer**
- D. Tangential acceleration

A. Wrong: angular acceleration is the rate of change of angular velocity, not the centre-seeking acceleration.

B. Wrong: centrifugal is the outward pseudo-force felt in a rotating frame, not the real centre-seeking acceleration.

C. Correct: centripetal acceleration a = v^2/r always points to the centre and only changes the direction of velocity.

ngential acceleration changes the speed along the circle; with uniform speed it is zero.

Question 129 Physics

A man pulls a trolley through a distance of 50 m by applying a force of 100 N which makes an angle of 60° with the x-axis. Calculate the work done. (cos 60° = 0.5)

- A. 2500 J ✓ **Correct answer**
- B. 5340 J
- C. 6430 J
- D. 7120 J

A. Correct: W = F d cos θ = 100 × 50 × 0.5 = 2500 J.

B. Wrong: no combination of 100 N, 50 m and cos 60° gives 5340 J.

C. Wrong: no combination of 100 N, 50 m and cos 60° gives 6430 J.

D. Wrong: no combination of 100 N, 50 m and cos 60° gives 7120 J.

Question 130 Physics

The Lyman series contains wavelengths in the _____ of the hydrogen spectrum.

- A. far-infrared region
- B. infrared region
- C. ultraviolet region ✓ **Correct answer**
- D. visible region

A. Wrong: the far-infrared holds the Pfund series, not Lyman.

B. Wrong: the infrared holds the Paschen (and Brackett) series, not Lyman.

C. Correct: Lyman lines end at n = 1, the largest energy jumps, so they fall in the ultraviolet.

e visible region holds the Balmer series, not Lyman.

Question 131 Physics

A diode is a/an_____device, which can be used for the rectification process.

- A. insulating
- B. perfect conducting
- C. perfect insulating
- D. semiconductor ✓ **Correct answer**

A. Wrong: an insulator does not conduct at all and cannot rectify.

B. Wrong: a perfect conductor conducts both ways and cannot rectify.

C. Wrong: a perfect insulator conducts neither way and cannot rectify.

D. Correct: a diode is a p-n junction of semiconductor material that conducts in forward bias only, converting AC to DC.

Question 132 Physics

At what value of angle between the magnetic field intensity and vector area does the magnetic flux become zero?

- A. 0°
- B. 30°
- C. 45°
- D. 90° ✓ **Correct answer**

A. Wrong: at 0° the flux is maximum (cos 0° = 1), not zero.

B. Wrong: at 30° cos θ ≈ 0.87, so the flux is large, not zero.

C. Wrong: at 45° cos θ ≈ 0.71, so the flux is substantial, not zero.

D. Correct: Φ = BA cos θ, at θ = 90° cos θ = 0, so the field lies in the plane of the surface

pass through it.

Question 133 Physics

Which one of the following is an example of transverse waves?

- A. Sound waves
- B. Water waves ✓ **Correct answer**
- C. Waves associated with electron
- D. Waves in spring

A. Wrong: sound waves are longitudinal (particles move along the direction of travel).

B. Correct: water surface waves move particles perpendicular to the direction of travel — transverse.

C. Wrong: electron (matter) waves are not the textbook example of transverse waves in this list.

D. Wrong: waves in a spring (compressions) are longitudinal.

Question 134 Physics

Which one of the following is the SI unit of conventional current in a conductor?

- A. Ampere ✓ **Correct answer**
- B. Coulomb
- C. Ohm
- D. Ohm meter

A. Correct: current is charge per unit time; its SI base unit is the ampere (1 A = 1 C/s).

B. Wrong: the coulomb is the unit of charge, not current.

C. Wrong: the ohm is the unit of resistance, not current.

D. Wrong: ohm-metre is the unit of resistivity, not current.

135 Physics

In a one-dimensional elastic collision of two bodies of the same mass, what happens if a moving body collides with a mass initially at rest?

- A. The collision would become inelastic
- B. Their velocities will be interchanged ✓ **Correct answer**
- C. Their velocities will remain same
- D. Velocities of both bodies will be zero

A. Wrong: the collision is stated to be elastic; it does not become inelastic.

B. Correct: for equal masses in an elastic head-on collision the velocities are exchanged — the moving body stops and the stationary one moves off with its speed.

C. Wrong: the moving body stops and the stationary one moves, so the velocities do not stay the same.

D. Wrong: the stationary body moves off with the first body's speed; only the first body stops.

Question 136 Physics

Which one of the following is the SI unit of angular displacement?

- A. Degree
- B. Radian ✓ **Correct answer**
- C. Revolution
- D. Steradian

A. Wrong: the degree is a unit of angle, but the SI unit is the radian.

B. Correct: the radian is the SI unit of plane angle.

C. Wrong: a revolution is a count of turns, not the SI unit of angular displacement.

D. Wrong: the steradian measures solid angle, not plane angular displacement.

137 Physics

How much phase difference is required between two waves to form destructive interference?

- A. 0°
- B. 45°
- C. 90°
- D. 180° ✓ **Correct answer**

A. Wrong: a phase difference of 0° gives constructive interference, not destructive.

B. Wrong: 45° gives partial interference, not complete cancellation.

C. Wrong: 90° gives partial interference, not complete cancellation.

D. Correct: a phase difference of 180° (path difference of λ/2) puts a crest over a trough, cancelling the waves.

Question 138 Physics

In any electric circuit, the power output (Pout) will be maximum when_____. (R = external resistance, r = internal resistance)

- A. R = 0 but r ≠0
- B. r = 0 but R ≠0
- C. R = ∞ and r = 0
- D. R = r ✓ **Correct answer**

A. Wrong: with R = 0 the output power is zero (all power is lost inside the source).

B. Wrong: with r = 0 the efficiency is 100% but the output power is not at its maximum for a given source.

C. Wrong: with R infinite no current flows, so the output power is zero.

D. Correct: the maximum power transfer theorem says output power peaks when the load

quals the internal resistance of the source.

Question 139 Physics

If 60 A of current passes through a wire in 60 seconds, what will be the value of charge existing in the wire?

- A. 4.6×10^{-3} C
- B. 3.6×10^{-3} C
- C. 2.6×10^{3} C
- D. 3.6×10^{3} C ✓ **Correct answer**

A. Wrong: that is far too small and uses the wrong number.

B. Wrong: that is 3.6 thousandths of a coulomb; the correct value is 3.6 thousand coulombs.

C. Wrong: Q = I × t = 60 × 60 = 3600 C, not 2600 C.

D. Correct: Q = I × t = 60 × 60 = 3600 C = 3.6×10^{3} C.

Question 140 Physics

Electron-volt is the unit of _____.

- A. Charge
- B. Current
- C. Electric potential
- D. Energy ✓ **Correct answer**

A. Wrong: charge is measured in coulombs, not electron-volts.

B. Wrong: current is measured in amperes, not electron-volts.

C. Wrong: electric potential is measured in volts; the electron-volt is an energy (1 eV = 1.6×10^{-19} J).

eV is the energy gained by one electron accelerated through 1 volt.

Question 141 Physics

Which material has a negative temperature coefficient of resistance?

- A. Copper
- B. Germanium ✓ **Correct answer**
- C. Sulphur
- D. Zinc

A. Wrong: copper is a metal; its resistance rises with temperature (positive coefficient).

B. Correct: germanium is a semiconductor — heating frees more charge carriers, so its resistance falls as temperature rises.

C. Wrong: sulphur is an insulator; it is not the material with a negative temperature coefficient in this list.

D. Wrong: zinc is a metal; its resistance rises with temperature (positive coefficient).

Question 142 Physics

A rotating pulley completes twelve revolutions in 4 seconds. Calculate the average angular velocity in revolutions per second.

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

A. Correct: ω = 12 rev ÷ 4 s = 3 revolutions per second.

B. Wrong: that is the time in seconds, not the angular velocity.

C. Wrong: no division of 12 by 4 gives 5.

o division of 12 by 4 gives 6.

Question 143 Physics

The kinetic energy of emitted electrons in the photoelectric effect can be increased by increasing _____.

- A. applied potential of electrodes
- B. frequency of electromagnetic wave ✓ **Correct answer**
- C. intensity of incident light
- D. momentum of incident photon

A. Wrong: the applied potential affects whether electrons reach the collector, not their maximum kinetic energy.

B. Correct: KEmax = hf − Φ — raising the frequency raises the photon energy and hence the electrons' kinetic energy.

C. Wrong: intensity only increases the number of emitted electrons, not their kinetic energy.

D. Wrong: the photon's momentum does not set the electrons' kinetic energy; its frequency does.

Question 144 Physics

Which series of the hydrogen spectrum lies in the visible region?

- A. Balmer ✓ **Correct answer**
- B. Bracket
- C. Lyman
- D. Paschen

A. Correct: transitions ending at n = 2 (Balmer) give the visible red, blue-green and violet hydrogen lines.

e Brackett series lies in the infrared.

C. Wrong: the Lyman series lies in the ultraviolet.

D. Wrong: the Paschen series lies in the infrared.

Question 145 Physics

The rate of change of linear momentum is equal to_____.

- A. Force ✓ **Correct answer**
- B. Impulse
- C. Torque
- D. Velocity

A. Correct: Newton's second law in its general form — $F = \Delta p/\Delta t$.

B. Wrong: impulse is the change in momentum itself ($F \times \Delta t$), not its rate of change.

C. Wrong: torque is the rate of change of angular momentum, not linear momentum.

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

Question 146 Physics

If the half-life of a radioactive nucleus is 0.693 year, what will be the value of the decay constant?

- A. 0.001 s^{-1}
- B. 0.01 s^{-1}
- C. 0.1 s^{-1}
- D. 1 s^{-1} ✓ **Correct answer**

A. Wrong: $\lambda = 0.693/0.693 = 1$, not 0.001.

B. Wrong: $\lambda = 0.693/0.693 = 1$, not 0.01.

= 0.693/0.693 = 1, not 0.1.

D. Correct: $\lambda = 0.693/T_{1/2} = 0.693/0.693 = 1$. (The board printed the unit as s^{-1}, but the intended numerical answer is 1 — the unit should be $year^{-1}$, since the half-life is given in years; the numerical value is what the options test.)

Question 147 Physics

The acceleration can be determined by the gradient of_____.

- A. Displacement-time graph
- B. Force-time graph
- C. Speed-time graph
- D. Velocity-time graph ✓ **Correct answer**

A. Wrong: the gradient of a displacement-time graph gives velocity, not acceleration.

B. Wrong: the area under a force-time graph gives impulse; its gradient does not give acceleration.

C. Wrong: a speed-time graph gives the magnitude of acceleration but not the vector acceleration; the standard answer is the velocity-time graph.

D. Correct: acceleration is the rate of change of velocity, so it is the slope of a velocity–time graph.

Question 148 Physics

The gradient/slope of an I-V (current-potential) graph provides _____.

- A. Conductance ✓ **Correct answer**
- B. Conductivity
- C. Resistance
- D. Resistivity

A. Correct: plotting I against V gives slope I/V = 1/R = conductance (siemens); the

ot would give resistance.

B. Wrong: conductivity is a property of the material, not the slope of an I-V graph.

C. Wrong: resistance is the slope of a V-I graph, not an I-V graph.

D. Wrong: resistivity is a property of the material, not the slope of an I-V graph.

Question 149 Physics

If the slope of a velocity-time graph gradually decreases, then the body is said to be moving with _____.

- A. Negative acceleration
- B. Positive acceleration
- C. Uniform velocity
- D. Variable acceleration ✓ **Correct answer**

A. Wrong: a decreasing slope means the acceleration is changing; it is not necessarily negative (the slope may still be positive but getting smaller).

B. Wrong: a decreasing slope means the acceleration is changing, not staying positive and constant.

C. Wrong: uniform velocity means a constant slope (zero acceleration), not a decreasing one.

D. Correct: a changing slope means the acceleration itself is changing — non-uniform (variable) acceleration.

Question 150 Physics

There is no net transfer of energy by particles of the medium in _____.

- A. Longitudinal wave
- B. Progressive wave

idinary wave ✓ **Correct answer**

- D. Transverse wave

A. Wrong: a longitudinal progressive wave does transfer energy through the medium.

B. Wrong: a progressive wave carries energy along the medium by definition.

C. Correct: in a stationary wave the two opposite travelling waves trap the energy between nodes; no energy is transported along the medium.

D. Wrong: a transverse progressive wave does transfer energy through the medium.

Question 151 Physics

The SI unit of capacitance of a capacitor is farad. It can also be expressed as _____.

- A. A^2 s^2 / N·m ✓ **Correct answer**
- B. A^2 / N·m
- C. A^3 s / N·m
- D. A^2 s / N·m

A. Correct: $C = Q/V = C^2/J = (A \cdot s)^2/(N \cdot m) = A^2 s^2\ N^{-1} m^{-1}$.

B. Wrong: that is missing the s^2 factor.

C. Wrong: that has A^3 instead of $A^2 s^2$.

D. Wrong: that is missing one factor of s. (The options are garbled in the reproduction's typesetting and are transcribed here in the standard forms; the answer is unaffected.)

Question 152 Physics

Under which condition did Newton perform his experiment for calculation of the speed of sound in air?

- A. Adiabatic
- B. Isobaric

- D. Isothermal ✓ **Correct answer**

A. Wrong: Laplace corrected Newton's result by treating the changes as adiabatic; Newton himself assumed isothermal conditions.

B. Wrong: Newton did not assume constant pressure for his sound-speed calculation.

C. Wrong: Newton did not assume constant volume for his sound-speed calculation.

D. Correct: Newton assumed isothermal compressions, which gave too low a value; Laplace corrected it by treating the changes as adiabatic.

Question 153 Physics

At what angle made by a projectile with the x-axis can we get 1/4th of the maximum height achieved by the projectile?

- A. 30° ✓ **Correct answer**
- B. 45°
- C. 60°
- D. 90°

A. Correct: $H = u^2\sin^2\theta/2g$ is greatest at 90°. For H/4 we need $\sin^2\theta = 1/4$, so $\sin\theta = 0.5$ and $\theta = 30°$.

B. Wrong: at 45° $\sin^2\theta = 1/2$, giving half the maximum height, not a quarter.

C. Wrong: at 60° $\sin^2\theta = 3/4$, giving three-quarters of the maximum height.

D. Wrong: at 90° the height is maximum, not a quarter of it.

Question 154 Physics

The SI unit of relative permittivity is/has_____.

- A. C^2 / $N{\cdot}m^2$

- C. C^{-2} / N·m
- D. no Unit ✓ **Correct answer**

A. Wrong: that is the unit of permittivity (ε), not of relative permittivity.

B. Wrong: that is not the unit of relative permittivity.

C. Wrong: that is not the unit of relative permittivity.

D. Correct: relative permittivity is a ratio of two permittivities ($\varepsilon/\varepsilon_0$), so it is a pure number with no unit.

Question 155 Physics

The rate of change of magnetic flux is measured in _____.

- A. Coulomb
- B. Ohm
- C. Volt ✓ **Correct answer**
- D. Watt

A. Wrong: the coulomb is the unit of charge, not of the rate of change of flux.

B. Wrong: the ohm is the unit of resistance, not of the rate of change of flux.

C. Correct: by Faraday's law the rate of change of flux is the induced emf, measured in volts (1 Wb/s = 1 V).

D. Wrong: the watt is the unit of power, not of the rate of change of flux.

Question 156 Physics

Cancerous thyroid is treated with _____.

- A. Chlorine-36
- B. Coblt-60

ne-131 ✓ **Correct answer**

- D. Radium-226

A. Wrong: chlorine-36 is not used to treat thyroid cancer.

B. Wrong: cobalt-60 is used in radiotherapy generally, but the thyroid-specific treatment is iodine-131.

C. Correct: the thyroid selectively absorbs iodine, so radioactive I-131 concentrates in the gland and destroys the malignant tissue.

D. Wrong: radium-226 is not used to treat thyroid cancer.

Question 157 Physics

The electrostatic force between two point charges is independent of which one of the following quantities?

- A. Distance between charges
- B. Magnitude of charges
- C. Medium between charges
- D. Temperature of charges ✓ **Correct answer**

A. Wrong as the answer: Coulomb's law DOES depend on the distance (F varies as $1/r^2$).

B. Wrong as the answer: Coulomb's law DOES depend on the magnitudes of the charges.

C. Wrong as the answer: Coulomb's law DOES depend on the medium (through its permittivity).

D. Correct: Coulomb's law involves charge magnitudes, separation and the permittivity of the medium — temperature does not appear.

Question 158 Physics

Which is the best condition for performing maximum work by any thermodynamic

- A. Adiabatic condition
- B. Isobaric condition
- C. Isochoric condition
- D. Isothermal condition ✓ **Correct answer**

A. Wrong: in an adiabatic expansion no heat flows in, so the work is limited by the internal energy; isothermal expansion delivers more work.

B. Wrong: isobaric expansion does work, but the textbook answer for maximum work is the isothermal process.

C. Wrong: at constant volume no work is done at all.

D. Correct: in isothermal expansion heat keeps flowing in, so the gas can keep pushing — it delivers more work than the same expansion done adiabatically.

Question 159 Physics

Which rule helps us detect the direction of angular velocity?

- A. Head to tail rule
- B. Kirchhoff rule
- C. Left hand rule
- D. Right hand rule ✓ **Correct answer**

A. Wrong: the head-to-tail rule is for adding vectors, not for the direction of angular velocity.

B. Wrong: Kirchhoff's rules are for electric circuits, not angular velocity.

C. Wrong: the left-hand rule is for the force on a current-carrying conductor, not for angular velocity.

D. Correct: curl the right hand's fingers along the rotation; the extended thumb points

guiar velocity vector.

Question 160 Physics

Kilowatt hour is the commercial unit of electrical energy. 1 kWh is equal to _____.

- A. 3.6 meV
- B. 3.6 MeV
- C. 3.6 J
- D. 3.6 MJ ✓ **Correct answer**

A. Wrong: a milli-electron-volt is a tiny energy, nothing like a kilowatt-hour.

B. Wrong: 3.6 MeV is about 5.8×10^{-13} J, nothing like a kilowatt-hour.

C. Wrong: 3.6 J is a million times too small.

D. Correct: 1 kWh = 1000 W × 3600 s = 3.6×10^{6} J = 3.6 MJ.

Question 161 Physics

What will be the time period of a wave generator if it produces 1000 waves in 10 seconds?

- A. 0.001s
- B. 0.01s ✓ **Correct answer**
- C. 0.02s
- D. 0.1s

A. Wrong: that would be the period for 10,000 waves in 10 seconds.

B. Correct: f = 1000/10 = 100 Hz, so T = 1/f = 0.01 s.

C. Wrong: that would be the period for 500 waves in 10 seconds.

D. Wrong: that would be the period for 100 waves in 10 seconds.

162 Physics

In an isothermal condition of any thermodynamic system, the change in internal energy_____.

- A. becomes maximum
- B. becomes minimum but greater than zero
- C. becomes zero ✓ **Correct answer**
- D. remains constant

A. Wrong: the internal energy change is zero in an isothermal process, not maximum.

B. Wrong: the change is zero, not a small positive value.

C. Correct: the internal energy of an ideal gas depends only on temperature; if T is constant then ΔE = 0 and q = W.

D. Wrong: the internal energy itself remains constant, but the question asks about the change in internal energy, which becomes zero.

Question 163 Physics

In which condition does a thermodynamic system NOT perform any work?

- A. Adiabatic condition
- B. Isobaric condition
- C. Isochoric condition ✓ **Correct answer**
- D. Isothermal condition

A. Wrong: work IS done in an adiabatic process (at the expense of internal energy).

B. Wrong: work IS done in an isobaric process (W = PΔV).

C. Correct: work = PΔV; in an isochoric (constant-volume) process ΔV = 0, so no work is done.

D. Wrong: work IS done in an isothermal process.

164 Physics

If the kinetic energy of a body becomes four times its initial value, then the new momentum will _____.

- A. become twice of its initial value ✓ **Correct answer**
- B. become three times of its initial value
- C. become four times of its initial value
- D. remain constant

A. Correct: p = √(2m·KE), so momentum varies as the square root of KE — four times the energy doubles the momentum.

B. Wrong: momentum varies as the square root of KE, not as 3×.

C. Wrong: momentum varies as the square root of KE, not directly with KE.

D. Wrong: the momentum changes when the kinetic energy changes.

Question 165 Physics

The turns ratio of a step-up transformer is 5. A current of 20 A is passed through its primary coil at 220 V. Calculate the voltage in the secondary coil.

- A. 1000V
- B. 1025V
- C. 1050V
- D. 1100V ✓ **Correct answer**

A. Wrong: 220 × 5 = 1100, not 1000.

B. Wrong: no calculation with 220 V and a turns ratio of 5 gives 1025 V.

C. Wrong: no calculation with 220 V and a turns ratio of 5 gives 1050 V.

D. Correct: Vs = Vp × (Ns/Np) = 220 × 5 = 1100 V.

166 Physics

The electric flash attachment for a camera contains a capacitor for storing the energy used to produce the flash. In one such unit the potential difference between the plates of a 20 F capacitor is 5 V. Calculate the energy used to produce the flash.

- A. 250 J ✓ **Correct answer**
- B. 310 J
- C. 500 J
- D. 650 J

A. Correct: $E = \frac{1}{2}CV^2 = \frac{1}{2} \times 20 \times 5^2 = 250$ J.

B. Wrong: no calculation with C = 20 F and V = 5 V gives 310 J.

C. Wrong: that is CV^2 without the half (20 × 25 = 500).

D. Wrong: no calculation with C = 20 F and V = 5 V gives 650 J.

Question 167 Physics

At what angle made by the scattered photon with the x-axis can we get the maximum value of Compton's shift?

- A. 0°
- B. 45°
- C. 90°
- D. 180° ✓ **Correct answer**

A. Wrong: at 0° there is no scattering and the shift is zero.

B. Wrong: the shift at 45° is less than the maximum.

C. Wrong: the shift at 90° is one Compton wavelength, less than the maximum of two.

D. Correct: $\Delta\lambda \propto (1 - \cos\theta)$ is largest when $\cos\theta = -1$, i.e. $\theta = 180°$ (back-scattering), giving twice the Compton wavelength.

168 Physics

An alternating current generator is a device which is used to convert_____into_____.

- A. Chemical energy, Electrical energy
- B. Chemical energy, Mechanical energy
- C. Electrical energy, Mechanical energy
- D. Mechanical energy, Electrical energy ✓ **Correct answer**

A. Wrong: that describes a battery (cell), not a generator.

B. Wrong: no generator converts chemical energy into mechanical energy.

C. Wrong: that describes a motor, the reverse of a generator.

D. Correct: a generator rotates a coil in a magnetic field, turning mechanical energy into electrical energy.

Question 169 Physics

A coil of 100 turns is linked by a flux of 20 mWb. If this flux is reversed in a time of 2 ms, calculate the average induced emf in the coil.

- A. 1000 volts
- B. 2000 volts ✓ **Correct answer**
- C. 3000 volts
- D. 4000 volts

A. Wrong: that would be the emf for a flux change of 0.02 Wb, not the doubled change on reversal.

B. Correct: reversal means $\Delta\Phi = 2 \times 20$ mWb = 0.04 Wb; emf = $N\Delta\Phi/\Delta t = 100 \times 0.04 / 0.002 = 2000$ V.

C. Wrong: no calculation with N = 100, $\Delta\Phi = 0.04$ Wb and $\Delta t = 0.002$ s gives 3000 V.

D. Wrong: that would be the emf for a flux change of 0.08 Wb, double the actual change.

170 Physics

By increasing the temperature of the medium by about 1°C, the speed of sound is increased up to _____.

- A. 0.41 ms^{-1}
- B. 0.51 ms^{-1}
- C. 0.61 ms^{-1} ✓ **Correct answer**
- D. 0.71 ms^{-1}

A. Wrong: the standard figure is about 0.61 m/s per °C, not 0.41.

B. Wrong: the standard figure is about 0.61 m/s per °C, not 0.51.

C. Correct: the speed of sound in air rises by roughly 0.61 m/s for each 1°C rise in temperature.

D. Wrong: the standard figure is about 0.61 m/s per °C, not 0.71.

Question 171 Physics

How many electrons are there in one coulomb of charge?

- A. 6.25×10^{15}
- B. 6.25×10^{16}
- C. 6.25×10^{17}
- D. 6.25×10^{18} ✓ **Correct answer**

A. Wrong: that is a thousand times too small.

B. Wrong: that is a hundred times too small.

C. Wrong: that is ten times too small.

D. Correct: n = 1 C ÷ 1.6×10^{-19} C = 6.25×10^{18} electrons.

172 Physics

The SI unit of magnetic flux is weber. Weber can also be expressed as_____.

- A. Joule per ampere ✓ **Correct answer**
- B. Joule per coulomb
- C. Newton per ampere
- D. Newton per coulomb

A. Correct: Wb = T·m² = (N $A^{-1}m^{-1}$)·m² = N·m/A = J/A.

B. Wrong: joule per coulomb is the volt, not the weber.

C. Wrong: newton per ampere is not the weber (it lacks the metre factor).

D. Wrong: newton per coulomb is the unit of electric field, not of magnetic flux.

Question 173 Physics

Two bodies with kinetic energies in the ratio 4:1 are moving with equal linear momentum. The ratio of their masses is _____.

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

A. Wrong: equal momentum with different kinetic energies means different masses.

B. Wrong: the mass ratio is the inverse of the KE ratio, which is 1:4, not 1:2.

C. Correct: KE = $p^2/2m$, so with equal p the KE is inversely proportional to mass — a KE ratio of 4:1 means a mass ratio of 1:4.

D. Wrong: that is the KE ratio itself, not the mass ratio.

174 Physics

Lenz's law of electromagnetic induction is in accordance with the law of conservation of_____.

- A. Charge
- B. Energy ✓ **Correct answer**
- C. Mass
- D. Momentum

A. Wrong: Lenz's law is about energy, not charge conservation.

B. Correct: the induced current opposes the change producing it; work must be done against that opposition, which conserves energy.

C. Wrong: Lenz's law has nothing to do with mass conservation.

D. Wrong: Lenz's law has nothing to do with momentum conservation.

Question 175 Physics

What will be the fundamental frequency in a stretched string, when it is plucked at the central point while it has a speed of 48 ms^{-1} with a string length of 8 m?

- A. 3 Hz ✓ **Correct answer**
- B. 6 Hz
- C. 9 Hz
- D. 12 Hz

A. Correct: $f_1 = v/2L = 48/(2 \times 8) = 3$ Hz.

B. Wrong: that is v/L, not v/2L.

C. Wrong: no calculation with v = 48 m/s and L = 8 m gives 9 Hz.

D. Wrong: no calculation with v = 48 m/s and L = 8 m gives 12 Hz.

176 Physics

The quantity of motion present in a body can be measured by_____.

- A. Acceleration
- B. Momentum ✓ **Correct answer**
- C. Speed
- D. Velocity

A. Wrong: acceleration is the rate of change of velocity, not the quantity of motion.

B. Correct: Newton defined the quantity of motion as the product of mass and velocity, i.e. linear momentum.

C. Wrong: speed alone does not measure the quantity of motion (mass matters too).

D. Wrong: velocity alone does not measure the quantity of motion (mass matters too). **Passage for Q177–Q178 (summary supplied in the reproduction; the original SZABMU booklet prints the full extract):** On a blistering afternoon the narrator, Jess, has just walked half a mile uphill from his own home to his parents' house, carrying a basket of dishes for his mother. His father, pointing with his cane across the deep valley, insists on taking him to see something he has not seen for many years. Jess is unwilling: sweat keeps running into his eyes, two slips in the road have made it impossible to drive, and the thermometer reads "97 in the shade". He also knows his father is unwell. Between January and April the old man had visited eight different doctors, and one of them told him to take a taxi home; instead he walked the five miles home across the mountain and reported the advice to his wife. Forty years earlier another doctor had told him exactly the same thing — yet he went on to raise a family of five children and to do as much hard work in those years as any man.

Question 177 English

The sentence "It was 97 in the shade." refers to the_____.

- A. age

- C. temperature ✓ **Correct answer**
- D. year

A. Wrong: 97 here is not anyone's age.

B. Wrong: 97 here is not a distance.

C. Correct: "in the shade" is the standard way of quoting a temperature reading taken out of direct sun — it was 97°F that day.

D. Wrong: 97 here is not a year.

Question 178 English

The narrator has _____ siblings.

- A. four ✓ **Correct answer**
- B. five
- C. six
- D. no

A. Correct: the father raised five children in total, and the narrator is one of them — so he has four brothers and sisters.

B. Wrong: five is the total number of children, including the narrator himself.

C. Wrong: the family has five children in total, not six.

D. Wrong: the narrator is one of five children, so he has siblings.

Question 179 English

Supply the correct preposition: Have you been in this company _____ six weeks?

- A. during
- B. for ✓ **Correct answer**

- D. since

A. Wrong: "during six weeks" is not the correct form for a period of time with the present perfect.

B. Correct: "for" is used with a length of time (six weeks); "since" needs a starting point (since June).

C. Wrong: "just" is an adverb, not a preposition for a period of time.

D. Wrong: "since" needs a starting point in time, not a length of time.

Question 180 English

Supply the correct synonym for the capitalized word: An ORTHODOX is a _____ person.

- A. clever
- B. confident
- C. confused
- D. conservative ✓ **Correct answer**

A. Wrong: clever means intelligent, not orthodox.

B. Wrong: confident means self-assured, not orthodox.

C. Wrong: confused is the opposite of the settled certainty of orthodoxy.

D. Correct: orthodox means holding traditional, established beliefs — i.e. conservative.

Question 181 English

Identify the correct passive form: The guard did not open the gate.

- A. The gate did not open by the guard.
- B. The gate had not been opened by the guard.
- C. The gate was not being opened by the guard.

gate was not opened by the guard. ✓ **Correct answer**

A. Wrong: that is not a passive construction ("did not open" is active in form).

B. Wrong: that is past perfect passive, but the original is simple past.

C. Wrong: that is past continuous passive, but the original is simple past.

D. Correct: simple past active becomes "was/were + past participle".

Question 182 English

Supply the correct form of verb: We had taken our meal before we _____.

- A. had left
- B. have left
- C. left ✓ **Correct answer**
- D. were leaving

A. Wrong: with "before", the earlier action takes the past perfect and the later action takes the simple past — both actions cannot be past perfect.

B. Wrong: the present perfect does not fit after a past perfect main clause.

C. Correct: with "before", the earlier action takes the past perfect ("had taken") and the later action takes the simple past ("left").

D. Wrong: the past continuous does not fit the sequence of completed actions here.

Question 183 English

Supply the correct preposition: I was almost back _____ my classroom door when I heard a strange noise.

- A. at
- B. by
- C. in

A. Wrong: "back at" would mean already arrived, but the speaker had not reached the door yet.

B. Wrong: "back by" does not express returning towards a place.

C. Wrong: "back in" would mean already inside, but the speaker had not reached the door yet.

D. Correct: "back to" expresses motion returning towards a place; the speaker had not reached the door yet.

Question 184 English

Identify the correct indirect form: The speaker said to the audience, "Will you listen to me?"

- A. The speaker asked the audience if they had listened to him.
- B. The speaker asked the audience if they will listen to him.
- C. The speaker asked the audience if they would listen to him. ✓ **Correct answer**
- D. The speaker asked the audience to listen to him.

A. Wrong: "had listened" is the wrong tense — the original asks about the future, not the past.

B. Wrong: after a past reporting verb, "will" must shift back to "would".

C. Correct: a yes/no question becomes "asked … if", and "will" shifts back to "would" after a past reporting verb.

D. Wrong: that changes a question into a request (imperative), which is not the indirect form of a yes/no question.

185 English

Supply the correct form of verb: Had I known the answer I _____ it.

- A. got written
- B. have written
- C. would have written ✓ **Correct answer**
- D. wrote

A. Wrong: "got written" does not complete the third conditional.

B. Wrong: the present perfect does not fit the third conditional ("Had I known ...").

C. Correct: third conditional (inverted) — "Had I known ..., I would have written it."

D. Wrong: the simple past does not complete the third conditional.

Question 186 English

Identify the correct spelling:

- A. Discremination
- B. Discrimenation
- C. Discrimination ✓ **Correct answer**
- D. Disscrimnation

A. Wrong: misspelled (missing the "i" after "discr").

B. Wrong: misspelled (missing the "i" before "nation").

C. Correct: from "discriminate", with an "i" in every unstressed slot and a single "s".

D. Wrong: misspelled (double "s" and missing "i").

Question 187 English

Identify the type of sentence given below: The caliph noticed the merchant.

- B. Compound
- C. Compound-complex
- D. Simple ✓ **Correct answer**

A. Wrong: a complex sentence needs a subordinate clause; this sentence has none.

B. Wrong: a compound sentence needs two independent clauses joined together; this has one.

C. Wrong: that needs two independent clauses plus a subordinate clause; this has one clause only.

D. Correct: one subject, one finite verb, one independent clause and no subordinate clause — a simple sentence.

Question 188 English

Identify the figure of speech: He is considered the black sheep of the family.

- A. Alliteration
- B. Imagery
- C. Metaphor ✓ **Correct answer**
- D. Simile

A. Wrong: alliteration is the repetition of initial sounds; there is none here.

B. Wrong: imagery is descriptive language appealing to the senses; "black sheep" is a comparison, not imagery.

C. Correct: a person is called a black sheep directly, with no "like" or "as" — an implied comparison, so a metaphor.

D. Wrong: a simile needs "like" or "as"; this sentence has neither.

189 English

Supply the correct antonym for the capitalized word: What can be done to ALLEVIATE the situation?

- A. Aggravate ✓ **Correct answer**
- B. Anticipate
- C. Clear
- D. Manipulate

A. Correct: alleviate means to ease or lessen; its opposite, aggravate, means to make worse.

B. Wrong: anticipate means to expect beforehand, not the opposite of alleviate.

C. Wrong: clear means to remove or make plain, not the opposite of alleviate.

D. Wrong: manipulate means to handle or control skilfully, not the opposite of alleviate.

Question 190 English

Complete the sentence using the appropriate punctuation mark: Punishment brings wisdom ___ it is the healing art of wickedness.

- A. ,
- B. -
- C. ; ✓ **Correct answer**
- D. :

A. Wrong: a comma alone joining two independent clauses would be a comma splice.

B. Wrong: a hyphen does not join two independent clauses.

C. Correct: two closely related independent clauses joined without a conjunction take a semicolon.

D. Wrong: a colon introduces an explanation or list; here the second clause is a parallel

of an explanation introduced by a colon.

Question 191 English

The underlined part in the sentence given below is an adverbial clause of _____:

Although Mehran is hardworking, yet he failed.

- A. Concession ✓ **Correct answer**
- B. Condition
- C. Manner
- D. Reason

A. Correct: "although / though / even if" introduces a clause of concession — it admits a fact that works against the main clause.

B. Wrong: a clause of condition uses "if / unless"; "although" does not set a condition.

C. Wrong: a clause of manner describes how something is done (using "as / as if"); "although" does not do that.

D. Wrong: a clause of reason uses "because / since"; "although" does not give a reason.

Question 192 English

Supply the correct form of verb: Farah has planned _____ before the next term.

- A. resign
- B. resignation
- C. resigning
- D. to resign ✓ **Correct answer**

A. Wrong: "has planned resign" is ungrammatical; "plan" needs an infinitive or a gerund.

B. Wrong: "has planned resignation" is ungrammatical; a noun does not follow "planned" here.

lan" is followed by the infinitive, not the gerund, in this construction.

D. Correct: "plan" is followed by the infinitive — plan to do something.

Question 193 English

Supply the correct antonym for the capitalized word: Your RECKLESS behaviour is not acceptable. You have to be more _____.

- A. careful ✓ **Correct answer**
- B. happy
- C. hardworking
- D. kind

A. Correct: reckless means acting without care for consequences; its antonym is careful.

B. Wrong: happy is not the opposite of reckless.

C. Wrong: hardworking is not the opposite of reckless.

D. Wrong: kind is not the opposite of reckless.

Question 194 English

Supply the correct synonym for the capitalized word: The new government brought STUPENDOUS changes in the economy and _____ its critics.

- A. destroyed
- B. fooled
- C. involved
- D. surprised ✓ **Correct answer**

A. Wrong: stupendous changes would surprise critics, not destroy them.

B. Wrong: stupendous changes would surprise critics, not fool them.

C. Wrong: stupendous changes would surprise critics, not involve them.

tupendous means astonishingly great; changes of that size would surprise the critics.

Question 195 Logical Reasoning

Read the following information. The high school mathematics department needs to appoint a new chairperson on the basis of seniority. Ms. Madiha is less senior than Mr. Tanvir but more senior than Ms. Aiyza. Mr. Rehan is more senior than Ms. Madiha but less senior than Mr. Tanvir. Mr. Tanvir does not want the job. Who will be the new chairperson of the math department?

- A. Mr. Rehan ✓ **Correct answer**
- B. Mr. Tanvir
- C. Ms. Aiyza
- D. Ms. Madiha

A. Correct: the order is Tanvir > Rehan > Madiha > Aiyza. Tanvir refuses, so the next most senior — Rehan — takes the post.

B. Wrong: Tanvir is the most senior, but he does not want the job.

C. Wrong: Aiyza is the least senior of the four.

D. Wrong: Madiha is less senior than Rehan, so Rehan takes the post before her.

Question 196 Logical Reasoning

What are the missing letters in the sequence EZFA, GBHY, IXJC,_____?

- A. KDLW ✓ **Correct answer**
- B. KLDW
- C. KWLD
- D. LDKW

A. Correct: positions 1 and 3 move forward by 2 each time (E,F → G,H → I,J → K,L). Positions

nate — position 2 runs Z, B, X, D and position 4 runs A, Y, C, W — giving KDLW.

B. Wrong: the third letter must be L (F, H, J, L), not D.

C. Wrong: the second letter must be D and the third L; KWLD has them the wrong way round.

D. Wrong: the first letter must be K (E, G, I, K), not L.

Question 197 Logical Reasoning

"All practical numbers are even" is a false statement. Then the true statement is_____.

- A. all practical numbers are odd
- B. some practical numbers are not even ✓ **Correct answer**
- C. some practical numbers are even
- D. some practical numbers are not odd

A. Wrong: the falsity of "all are even" does not prove "all are odd".

B. Correct: the contradictory of a universal affirmative ("All S are P") is the particular negative ("Some S are not P") — nothing stronger can be concluded.

C. Wrong: that does not contradict "all are even"; it is consistent with it.

D. Wrong: that is equivalent to "some are even", which does not contradict "all are even".

Question 198 Logical Reasoning

In a group of 100 players, 70 play football, 50 play hockey and 55 play cricket. 30 play both hockey and cricket, 25 play both football and hockey, and 20 play all three games. How many players play both football and cricket?

- A. 25
- B. 30

- D. 40 ✓ **Correct answer**

A. Wrong: 25 is the number who play both football and hockey, not football and cricket.

B. Wrong: 30 is the number who play both hockey and cricket, not football and cricket.

C. Wrong: inclusion–exclusion gives 40, not 35.

D. Correct: inclusion–exclusion — 100 = 70 + 50 + 55 − 25 − 30 − x + 20, giving 100 = 140 − x, so x = 40.

Question 199 Logical Reasoning

A customer has filed a complaint about your product, stating it does NOT meet his expectation. What is your course of action?

- A. Argue with the customer about the validity of their complaint
- B. Customer complaint is not filed within the time limit
- C. Offer a replacement ✓ **Correct answer**
- D. Tell the customer it's his fault for not using the product correctly

A. Wrong: arguing escalates the complaint instead of resolving it.

B. Wrong: that is an evasion, not a course of action that resolves the complaint.

C. Correct: only this option resolves the complaint constructively; the others are defensive or evasive.

D. Wrong: blaming the customer does not resolve the complaint.

Question 200 Logical Reasoning

Statements: I. Large numbers of people have fallen sick after consuming sweets from a particular shop in the locality. II. Major part of the locality is flooded and has become inaccessible.

ement I is the cause and statement II is its effect.

- B. Statement II is the cause and statement I is its effect.
- C. Both the statements I and II are independent causes.
- D. Both the statements I and II are effects of independent causes. ✓ **Correct answer**

A. Wrong: sickness from sweets does not cause flooding.

B. Wrong: flooding does not cause people to fall sick from sweets.

C. Wrong: the two statements are effects (sickness, flooding), not causes.

D. Correct: illness from contaminated sweets and flooding of the locality are two separate events, each produced by its own cause — neither one explains the other.

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