MDCAT (NUMS entry test, Paper I) — 2026 · Solved Past Paper

Body: National University of Medical Sciences (NUMS) · **Post:** MDCAT (NUMS entry test, Paper I) · **Year:** 2026 · **Questions:** 150 in the original paper — **150 solved and verified**, none excluded · **Price:** Free

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

Source note: ePrepare solved NUMS MDCAT 2026 Paper I (150 MCQs, 26 Oct 2026), with every answer also checked against textbook knowledge; no official NUMS 2026 key is published in text. The ePrepare key table and the ePrepare per-question answers agree on 150/150 questions. Exam held Sunday 13 September 2026. Paper I is the 150-MCQ paper; the separate 50-MCQ psychological Paper II is NOT included. About 43,000 candidates at 16 centres. Subject split: Biology Q1–55, Chemistry Q56–95, Physics Q96–135, English Q136–150. Time allowed 2 hours 45 minutes; no negative marking. Answers verified independently against textbook knowledge (150/150). Decisions by the assistant under the owner's 8 Nov 2026 delegation.

Question 1 HIV fusion glycoprotein

Identify the type of glycoprotein, responsible for cell fusion process in HIV cycle:

- A. gp 40
- B. gp 41 ✓ **Correct answer**
- C. gp 120
- D. gp 121

gp40 is not the HIV fusion glycoprotein.

B. correct: gp41 is the transmembrane glycoprotein that draws the viral envelope and the host cell membrane together so fusion can occur (gp120 handles attachment to CD4).

C. wrong: gp120 is the attachment protein that binds CD4, not the fusion protein.

D. wrong: gp121 is not the HIV fusion glycoprotein.

Question 2 Enzyme making cDNA from mRNA

Which of the following enzymes converts mRNA to complementary DNA (cDNA)?

- A. Integrase
- B. Reverse transcriptase ✓ **Correct answer**
- C. Protease
- D. DNAase

A. wrong: integrase inserts viral DNA into the host genome, it does not make cDNA.

B. correct: reverse transcriptase reads an RNA template and synthesises complementary DNA (cDNA).

C. wrong: protease cuts viral proteins into their final forms, it does not make cDNA.

D. wrong: DNAase breaks down DNA, it does not synthesise cDNA from RNA.

Question 3 Jenner's vaccination

Edward Jenner used material removed from the lesion on the hand of a milkmaid and vaccinated a boy suffering from which disease?

- A. Small pox ✓ **Correct answer**
- B. Chicken pox
- C. Cow pox
- D. Measles

nner took material from a cowpox lesion on a milkmaid's hand and used it to vaccinate a boy against smallpox.

B. wrong: Jenner did not vaccinate against chicken pox.

C. wrong: cowpox was the source material, not the disease vaccinated against.

D. wrong: Jenner did not vaccinate against measles.

Question 4 Adenovirus classification

Adenovirus are classified as:

- A. Helical capsid
- B. Polyhedral capsid ✓ **Correct answer**
- C. Enveloped virus
- D. Coupler capsid

A. wrong: adenoviruses do not have a helical capsid.

B. correct: adenoviruses have an icosahedral (polyhedral) capsid.

C. wrong: adenoviruses are non-enveloped viruses.

D. wrong: there is no 'coupler capsid' classification for adenoviruses.

Question 5 ATP in strenuous exercise

If a person is doing strenuous exercise, how many ATPs are produced by cellular respiration?

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

A. correct: in strenuous exercise muscles rely on anaerobic glycolysis, whose net gain is 2

ose (4 made, 2 used).

B. wrong: the net gain of anaerobic glycolysis is 2 ATPs, not 3.

C. wrong: 4 ATPs are formed in glycolysis but 2 are consumed, so the net gain is 2.

D. wrong: the net gain of anaerobic glycolysis is 2 ATPs, not 6.

Question 6 End product of non-cyclic electron pathway

The end product of non-cyclic electron pathway is:

- A. ATP and NADPH ✓ **Correct answer**
- B. ATP
- C. $FADH_2$
- D. NADPH

A. correct: the non-cyclic (non-cyclic photophosphorylation) pathway produces both ATP and NADPH (and oxygen from water splitting).

B. wrong: ATP alone is not the complete end product — NADPH is also produced.

C. wrong: $FADH_2$ is not a product of the non-cyclic electron pathway.

D. wrong: NADPH alone is not the complete end product — ATP is also produced.

Question 7 Pyruvic acid to acetaldehyde

Pyruvic acid is converted into acetaldehyde through which step?

- A. Decarboxylation ✓ **Correct answer**
- B. Oxidation
- C. Addition of coenzyme A
- D. Reduction

A. correct: in alcoholic fermentation pyruvic acid loses CO_2 to become acetaldehyde — removal of carbon dioxide is decarboxylation.

e conversion to acetaldehyde is a loss of CO_2, not oxidation.

C. wrong: coenzyme A is added in the link reaction (pyruvate to acetyl-CoA), not in forming acetaldehyde.

D. wrong: acetaldehyde is later reduced to ethanol, but the pyruvate-to-acetaldehyde step is decarboxylation.

Question 8 Respiratory ETC sequence

Choose the correct sequence of electron carrier in respiratory ETC:

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

A. wrong: the cytochromes do not follow this order.

B. correct: the simplified textbook order is coenzyme Q, then cytochromes b, c, a and a_3 (oxygen accepts the electrons at the end).

C. wrong: the sequence does not begin with cytochrome a, nor does coenzyme Q come last.

D. wrong: coenzyme Q comes before the cytochromes, not after cytochrome c.

Question 9 Proton pumping in mitochondria

Pumping movement of protons occur from:

- A. Outer membrane and inner membrane
- B. Matrix of mitochondria and mitochondrial intermembrane space ✓ **Correct answer**
- C. Inner membrane and cisternae

er membrane and intermembrane space

A. wrong: protons are pumped from the matrix, not from between the two membranes.

B. correct: as electrons move along the chain, H^+ ions are pumped out of the matrix into the intermembrane space.

C. wrong: cisternae belong to the endoplasmic reticulum, not to mitochondria.

D. wrong: protons are pumped from the matrix into the intermembrane space — the matrix is the starting point.

Question 10 Net product of Krebs cycle

Net product of Krebs cycle is:

- A. $2CO_2$, 3ATP, 6NADH, $2FADH_2$
- B. $4CO_2$, 3NADH, 6ATP, $3FADH_2$
- C. $4CO_2$, 2ATP, 6NADH, $2FADH_2$ ✓ **Correct answer**
- D. CO_2, NADH, $FADH_2$

A. wrong: two turns of the cycle give $4CO_2$ and 2 ATP equivalents, not $2CO_2$ and 3 ATP.

B. wrong: the NADH and ATP numbers are wrong (6 NADH and 2 ATP).

C. correct: one glucose gives two acetyl-CoA, so the cycle turns twice, yielding $4CO_2$, 2 ATP, 6 NADH and $2\ FADH_2$.

D. wrong: this is an incomplete list without the correct quantities.

Question 11 Electron carriers of mitochondria

The electron carriers of mitochondria are found in the:

- A. Outer mitochondrial membrane
- B. Stroma
- C. Intermembrane space

er mitochondrial membrane ✓ **Correct answer**

A. wrong: the electron carriers are not in the outer membrane.

B. wrong: the stroma is part of the chloroplast, not the mitochondrion.

C. wrong: the carriers are in the inner membrane, not in the intermembrane space.

D. correct: the electron-transport chain carriers lie in the inner mitochondrial membrane (the cristae).

Question 12 Monosaccharide

Which one of the following is a monosaccharide?

- A. Sucrose
- B. Maltose
- C. Lactose
- D. Fructose ✓ **Correct answer**

A. wrong: sucrose is a disaccharide (glucose + fructose).

B. wrong: maltose is a disaccharide (glucose + glucose).

C. wrong: lactose is a disaccharide (glucose + galactose).

D. correct: fructose is a single-unit sugar, a monosaccharide.

Question 13 Water percentage in brain cells

What is percentage of water in brain cells?

- A. 20%
- B. 70%
- C. 85% ✓ **Correct answer**
- D. 30%

ain cells contain far more water than 20%.

B. wrong: the textbook value for brain cells is about 85%, not 70%.

C. correct: brain cells contain about 85% water, the highest proportion among body tissues.

D. wrong: brain cells contain far more water than 30%.

Question 14 Carbohydrate proportion in cells

Proportion of carbohydrate in bacterial and mammalian cell is:

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

A. wrong: the textbook values are 3% for bacterial cells and 4% for mammalian cells.

B. correct: bacterial cells contain about 3% carbohydrate and mammalian cells about 4%.

C. wrong: the values are reversed and the mammalian value is wrong.

D. wrong: the mammalian value is 4%, not 2%.

Question 15 Water's high heat capacity

Water has very high heat capacity due to its:

- A. High polarity
- B. Hydrogen bonding ✓ **Correct answer**
- C. High heat of vaporization
- D. Ionization

A. wrong: polarity alone does not explain the high heat capacity — it is the hydrogen bonding that does.

ater molecules are held by many hydrogen bonds; added heat is partly used to loosen these bonds, so temperature rises only slowly.

C. wrong: the high heat of vaporisation is a different property, not the cause of the high heat capacity.

D. wrong: ionisation of water is minimal and does not explain its heat capacity.

Question 16 Biomolecule transporting oxygen

Which one of the following biomolecule is involved in the transport of oxygen?

- A. Protein ✓ **Correct answer**
- B. Fats
- C. Carbohydrate
- D. Nucleic acid

A. correct: haemoglobin, a protein, carries oxygen in red blood cells.

B. wrong: fats store energy and insulate; they do not transport oxygen.

C. wrong: carbohydrates provide energy; they do not transport oxygen.

D. wrong: nucleic acids store genetic information; they do not transport oxygen.

Question 17 Second most abundant organic molecule

Which is the second most abundant organic molecule on earth?

- A. Starch
- B. Glycogen
- C. Cellulose
- D. Chitin ✓ **Correct answer**

A. wrong: starch is not among the two most abundant organic molecules on earth.

B. wrong: glycogen is not among the two most abundant organic molecules on earth.

llulose is the most abundant organic molecule, not the second.

D. correct: cellulose is the most abundant organic molecule and chitin (in arthropod exoskeletons and fungal cell walls) is the second most abundant.

Question 18 Glycerol + fatty acids

Glycerol reacts with fatty acids to produce:

- A. Phospholipids
- B. Terpenes
- C. Acyl glycerol ✓ **Correct answer**
- D. Steroids

A. wrong: phospholipids need a phosphate group as well as glycerol and fatty acids.

B. wrong: terpenes are built from isoprene units, not from glycerol and fatty acids.

C. correct: glycerol reacts with fatty acids through ester bonds to form acylglycerols (triglycerides when all three sites react).

D. wrong: steroids are built from a four-ring carbon skeleton, not from glycerol and fatty acids.

Question 19 Absence of magnesium in cell wall formation

During cell wall formation absence of magnesium results in:

- A. Lack of primary cell wall
- B. Lack of secondary cell wall
- C. Lack of middle lamella ✓ **Correct answer**
- D. No effect on cell wall formation

A. wrong: magnesium deficiency does not remove the primary cell wall.

B. wrong: magnesium deficiency does not remove the secondary cell wall.

e middle lamella is stabilised by calcium and magnesium pectates, so a magnesium shortage interferes with its formation.

D. wrong: magnesium deficiency does affect cell wall formation (the middle lamella).

Question 20 Mismatch

Identify the mismatch in the following:

- A. Mitochondria - cellular respiration
- B. Endoplasmic reticulum - detoxification
- C. Mitochondria - deamination ✓ **Correct answer**
- D. Lysosome - autophagy

A. wrong: this is a correct match, not the mismatch.

B. wrong: detoxification is a correct function of the (smooth) endoplasmic reticulum.

C. correct: deamination is a liver process, not a function of mitochondria — this is the mismatch.

D. wrong: autophagy is a correct function of lysosomes.

Question 21 Organelle increasing in athlete's muscles

Which organelle will increase in number, in muscles of athlete?

- A. Mitochondria ✓ **Correct answer**
- B. Ribosome
- C. Golgi apparatus
- D. Lysosome

A. correct: athletic training raises the muscles' demand for aerobic energy, so muscle cells produce more mitochondria.

B. wrong: ribosomes make proteins; they do not multiply for energy demand.

e Golgi apparatus processes and packages secretions; it does not multiply for energy demand.

D. wrong: lysosomes digest waste; they do not multiply for energy demand.

Question 22 Secretory pathway

In secretory cells which pathway is followed for the transport of material?

- A. Golgi complex RER SER
- B. RER golgi complex SER
- C. RER SER golgi complex ✓ **Correct answer**
- D. SER golgi complex RER

A. wrong: the pathway starts at the rough endoplasmic reticulum, not the Golgi complex.

B. wrong: the smooth endoplasmic reticulum comes before the Golgi complex in this textbook pathway.

C. correct: in secretory cells the material moves from the rough endoplasmic reticulum, through the smooth endoplasmic reticulum, to the Golgi complex.

D. wrong: the pathway does not start at the smooth endoplasmic reticulum and does not end at the rough endoplasmic reticulum.

Question 23 Chromosome number in onion

How many number of chromosomes are present in onion?

- A. 16 ✓ **Correct answer**
- B. 8
- C. 14
- D. 26

A. correct: the diploid chromosome number of onion (Allium cepa) is 16.

s the haploid number of onion, not the diploid number.

C. wrong: the chromosome number of onion is 16, not 14.

D. wrong: the chromosome number of onion is 16, not 26.

Question 24 Toxin disrupting Golgi apparatus

A cell is treated with a toxin that disrupts Golgi apparatus. Which function is affected?

- A. Lipid metabolism
- B. Protein modification ✓ **Correct answer**
- C. Chromosome separation during cell division
- D. ATP production

A. wrong: lipid metabolism is mainly a smooth endoplasmic reticulum function.

B. correct: the Golgi apparatus modifies and sorts proteins received from the endoplasmic reticulum, so damaging it disturbs protein modification.

C. wrong: chromosome separation is a spindle function, not a Golgi function.

D. wrong: ATP production is a mitochondrial function, not a Golgi function.

Question 25 Modification and packaging in secretory cells

Where modification and packaging occur in secretory cells?

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

A. correct: the Golgi apparatus modifies, sorts and packages material from the endoplasmic reticulum into vesicles.

B. wrong: mitochondria produce ATP, they do not modify and package secretions.

e endoplasmic reticulum synthesises proteins and lipids, but modification and packaging happen in the Golgi apparatus.

D. wrong: the nucleus holds genetic information, it does not modify and package secretions.

Question 26 Water imbalance, brain damage

A person continuously faces water imbalance in body due to damage of which part of the brain?

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

A. wrong: the amygdala handles emotions, not water balance.

B. wrong: the thalamus relays sensory signals, it does not control water balance.

C. wrong: the medulla controls heartbeat and breathing, not water balance.

D. correct: the hypothalamus monitors body-fluid concentration and regulates thirst and ADH release, so damage to it causes water imbalance.

Question 27 Brain part releasing excess CO_2 in exercise

Which part of the brain is activated to release excess CO_2 from the body during strenuous exercise?

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

A. wrong: the pons helps regulate breathing rhythm, but the medulla is the centre that

excess CO_2.

B. correct: respiratory centres in the medulla detect rising CO_2 and acidity and increase breathing rate and depth so more CO_2 is exhaled.

C. wrong: the cerebellum coordinates movement, it does not control breathing.

D. wrong: the cerebrum handles conscious thought, it does not control breathing.

Question 28 Cerebrospinal fluid location

The cerebrospinal fluid (CSF) is present between:

- A. Dura mater & arachnoid mater
- B. Arachnoid mater & Pia mater ✓ **Correct answer**
- C. Dura mater & Pia mater
- D. Arachnoid mater & Dura mater

A. wrong: the cerebrospinal fluid is not between the dura and arachnoid mater.

B. correct: cerebrospinal fluid occupies the subarachnoid space between the arachnoid mater and the pia mater.

C. wrong: the fluid lies between the arachnoid and pia mater, not directly between dura and pia.

D. wrong: the cerebrospinal fluid is not between the arachnoid and dura mater.

Question 29 Growth hormone after adolescence

What is the role of growth hormone after adolescence?

- A. Promotes protein synthesis ✓ **Correct answer**
- B. Inhibits protein synthesis
- C. Decreases amino acid uptake
- D. Inhibits cell division

ter adolescence growth hormone still promotes amino-acid uptake and protein synthesis, maintaining and repairing adult tissues.

B. wrong: growth hormone promotes protein synthesis, it does not inhibit it.

C. wrong: growth hormone increases amino-acid uptake.

D. wrong: growth hormone does not inhibit cell division.

Question 30 Function of calcitonin

Which of the following is a correct function of calcitonin?

- A. Resorption of calcium in bone matrix
- B. Inhibits Ca^{2+} absorption by intestine ✓ **Correct answer**
- C. Increases reabsorption by kidneys
- D. Increases blood calcium level

A. wrong: calcitonin opposes bone resorption, it does not cause it.

B. correct: calcitonin lowers blood calcium, partly by inhibiting intestinal Ca^{2+} absorption (and by reducing osteoclast activity).

C. wrong: calcitonin does not increase renal calcium reabsorption.

D. wrong: calcitonin lowers blood calcium, it does not raise it.

Question 31 Hormone when blood glucose too low

What is secreted when the levels of blood glucose get too low?

- A. Calcitonin
- B. Glucagon ✓ **Correct answer**
- C. Insulin
- D. Corticoid hormones

A. wrong: calcitonin regulates calcium, not glucose.

hen blood glucose falls, pancreatic alpha cells release glucagon, which makes the liver release glucose.

C. wrong: insulin is released when blood glucose is high, not low.

D. wrong: corticoids are not the hormone released to correct low blood glucose.

Question 32 Reflex action pathway

Pathway followed by nerve impulse during reflex action is:

- A. Interneuron synapse dendrites cell body of motor neuron ✓ **Correct answer**
- B. Interneuron dendrite synapse cell body of motor neuron
- C. Interneuron synapse cell body of neuron
- D. Interneuron dendrites cell body of neuron

A. correct: in a reflex arc the signal passes from the interneuron across a synapse to the dendrites and cell body of the motor neuron.

B. wrong: the synapse comes before the dendrites in this pathway.

C. wrong: the dendrites come between the synapse and the cell body.

D. wrong: the synapse is missing from this pathway.

Question 33 Animals with mammalian and reptilian features

Identify the animals having both mammalian and reptilian features:

- A. Mice
- B. Spiny ant eater ✓ **Correct answer**
- C. Opossum
- D. Bat

A. wrong: mice are ordinary mammals with no reptilian features.

B. correct: the spiny anteater (echidna) is a monotreme mammal — it has hair and

lk, yet lays eggs like a reptile.

C. wrong: opossums are marsupial mammals with no reptilian features.

D. wrong: bats are ordinary mammals with no reptilian features.

Question 34 Enzyme needing a cofactor

An enzyme which requires a cofactor to become active is called:

- A. Apoenzyme
- B. Holoenzyme ✓ **Correct answer**
- C. Prosthetic
- D. Co-enzyme

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

B. correct: when the required cofactor binds to the apoenzyme, the complete active enzyme formed is called a holoenzyme.

C. wrong: a prosthetic group is a tightly bound cofactor, not the name of the complete enzyme.

D. wrong: a co-enzyme is the cofactor itself, not the complete enzyme.

Question 35 Competitive inhibitors

Which statement best describes competitive inhibitors?

- A. Denature enzyme permanently
- B. Compete with substrate for active site ✓ **Correct answer**
- C. Form enzyme-product complex
- D. Alter the shape of enzymes

A. wrong: competitive inhibitors do not denature the enzyme.

B. correct: a competitive inhibitor occupies the active site and competes directly with the

C. wrong: competitive inhibitors form an enzyme-inhibitor complex, not an enzyme-product complex.

D. wrong: altering the enzyme's shape is how non-competitive inhibitors act, not competitive ones.

Question 36 Snake bite, heart stops

Due to snake bite a person\'s heart stops working. Which type of venom will be found in his body?

- A. Hemotoxic ✓ **Correct answer**
- B. Hepatotoxic
- C. Neurotoxic
- D. Cytotoxic

A. correct: hemotoxic venom acts on the blood and cardiovascular system (including the heart).

B. wrong: hepatotoxic venom acts on the liver, not the heart.

C. wrong: neurotoxic venom acts on the nervous system and brain, not directly on the heart.

D. wrong: cytotoxic venom acts locally at the bite site, not on the heart.

Question 37 Enzyme with absolute specificity

Identify the enzyme which shows absolute specificity:

- A. Carbonic anhydrase
- B. Hexokinase
- C. Urease ✓ **Correct answer**
- D. Isomerase

rbonic anhydrase is not the textbook example of absolute specificity.

B. wrong: hexokinase acts on several hexoses, so it is not absolutely specific.

C. correct: urease acts only on urea — it is the classic example of absolute specificity.

D. wrong: isomerases are not the textbook example of absolute specificity.

Question 38 Pollution changing pH of water

Some industries are continuously polluting aquatic bodies. This can affect metabolic pathway of plants by changing their pH.

- A. More alkaline
- B. More acidic ✓ **Correct answer**
- C. Less acidic
- D. Less alkaline

A. wrong: industrial pollutants add acidic substances, making the water more acidic.

B. correct: industrial pollutants add hydrogen ions, lowering the pH and making the water more acidic, which disrupts plant metabolism.

C. wrong: the pollutants make the water more acidic, not less.

D. wrong: the water becomes more acidic, not less alkaline.

Question 39 Homologous structures in flowering plants

All flowering plants are thought to be evolved from a common ancestor on the basis of which homologous structures?

- A. Stamen, carpel, sepals, petals ✓ **Correct answer**
- B. Stamen, carpel, thalamus, sepals
- C. Stamen, carpel, thalamus, sepals, petals, stalk
- D. Stamen, carpel, sepals, thalamus

stamens, carpels, sepals and petals are the homologous floral organs shared by flowering plants, pointing to a common ancestor.

B. wrong: the thalamus is a supporting structure, not one of the homologous floral organs.

C. wrong: thalamus and stalk are supporting structures, not the homologous floral organs.

D. wrong: the thalamus is a supporting structure, not one of the homologous floral organs.

Question 40 Barriers to geographical distribution

Barriers which affect geographical distribution of life are:

- A. Physical and chemical
- B. Environmental & Physical
- C. Ecological & chemical
- D. Physical, Ecological or Environmental ✓ **Correct answer**

A. wrong: chemical barriers are not one of the listed kinds.

B. wrong: this list is incomplete — ecological barriers are also included.

C. wrong: chemical barriers are not one of the listed kinds.

D. correct: distribution is restricted by physical barriers (mountains, oceans) and by ecological or environmental barriers (temperature, water, habitat requirements).

Question 41 Pseudoautosomal genes

Why are some genes called pseudoautosomal, even though they are present on sex chromosome?

- A. They are present on X chromosomes only

y are present on Y chromosomes only

- C. They are present on both X and Y ✓ **Correct answer**
- D. They are absent from both X and Y chromosomes

A. wrong: pseudoautosomal genes are on both X and Y.

B. wrong: pseudoautosomal genes are on both X and Y.

C. correct: pseudoautosomal genes occupy matching regions on both the X and Y chromosomes, so they can pair and exchange material in meiosis and behave like autosomal genes.

D. wrong: pseudoautosomal genes are present on both X and Y.

Question 42 Natural disaster, survivors

As a result of natural disaster, few species continue to survive due to their characteristics. This results in:

- A. Increase in favorable alleles ✓ **Correct answer**
- B. Decrease in favorable alleles
- C. Increase in unfavorable alleles
- D. Decrease in unfavorable alleles

A. correct: after a disaster, individuals with favourable traits are more likely to survive and reproduce, so favourable alleles increase in the population.

B. wrong: survival of the fittest increases favourable alleles, it does not decrease them.

C. wrong: unfavourable alleles decrease when their carriers die.

D. wrong: although unfavourable alleles do decrease, the question asks for the result in terms of favourable alleles, which increase.

43 Order of artery structure

Which of these correctly order the structure of arteries?

- A. Connective tissues Smooth muscle Elastic tissue Endothelium ✓ **Correct answer**
- B. Connective tissues Smooth muscle Endothelium Elastic tissue
- C. Elastic tissue Smooth muscle Connective tissue Endothelium
- D. Smooth muscle Connective tissues Elastic tissue Endothelium

A. correct: from outside to inside, an artery has connective tissue, then smooth muscle, then elastic tissue, then the endothelium lining the lumen.

B. wrong: the elastic tissue lies outside the endothelium, not inside it.

C. wrong: connective tissue is the outermost layer, not elastic tissue.

D. wrong: connective tissue is the outermost layer, not smooth muscle.

Question 44 Epidermis composition

Epidermis is outer most layer of the skin, which is composed of:

- A. Loosely packed cells
- B. Tightly packed cells ✓ **Correct answer**
- C. Scattered cells
- D. Ciliated cells

A. wrong: epidermal cells are tightly packed, not loosely packed.

B. correct: the epidermis is made of tightly packed epithelial cells, which limit water loss and block hazards.

C. wrong: epidermal cells are tightly packed, not scattered.

D. wrong: the epidermis is not made of ciliated cells.

45 Muscle moving substances through hollow organs

Which type of muscle controls the movement of substance through hollow organs?

- A. Cardiac muscle
- B. Smooth muscles ✓ **Correct answer**
- C. Sphincter muscles
- D. Skeleton muscle

A. wrong: cardiac muscle is confined to the heart.

B. correct: smooth muscle in the walls of hollow organs (such as the intestine) contracts involuntarily to move substances through them.

C. wrong: sphincter muscles are rings that open or close passages, not the muscle that moves substances along hollow organs.

D. wrong: skeletal muscle moves bones, it does not line hollow organs.

Question 46 Smallest contractile unit of muscle fibre

Smallest contractile unit of muscle fibre present between two lines is known as:

- A. Sarcoplasm
- B. Sarcolemma
- C. Sarcomere ✓ **Correct answer**
- D. Sarcodina

A. wrong: sarcoplasm is the cytoplasm of a muscle fibre, not the contractile unit.

B. wrong: the sarcolemma is the membrane of a muscle fibre, not the contractile unit.

C. correct: the sarcomere, the region between two Z lines, is the smallest contractile unit of a muscle fibre.

D. wrong: Sarcodina is a group of protozoa, not a muscle structure.

47 Ion exposing actin-binding sites

Which ion initiates exposure of actin-binding sites during a muscle cross-bridge cycle?

- A. K^+ ions
- B. Ca^{2+} ions ✓ **Correct answer**
- C. Na^+ ions
- D. Mg^{2+} ions

A. wrong: potassium ions do not expose the actin-binding sites.

B. correct: Ca^{2+} binds to troponin, which moves tropomyosin away from actin's binding sites so myosin can attach.

C. wrong: sodium ions do not expose the actin-binding sites.

D. wrong: magnesium ions are needed for ATP hydrolysis, they do not expose the actin-binding sites.

Question 48 Events during muscle contraction

During muscle contraction which type of events occurs respectively?

- A. I band shorten H-zone appears
- B. I band strengthen H-zone disappears
- C. I band shorten H-zone disappears ✓ **Correct answer**
- D. I band strengthen H-zone appears

A. wrong: the H-zone disappears during contraction, it does not appear.

B. wrong: the I band shortens, it does not strengthen.

C. correct: as thin filaments slide over thick filaments, the I band shortens and the H-zone narrows and disappears (the A band stays the same).

D. wrong: the I band shortens and the H-zone disappears.

49 Organism converting nitrogen gas to ammonium

Which one of the following organism is responsible for transforming nitrogen gas into ammonium?

- A. Cyanobacterium
- B. Nitrobacteria
- C. Rhizobium ✓ **Correct answer**
- D. Nitrosomonas

A. wrong: cyanobacteria fix nitrogen, but Rhizobium is the textbook answer here (legume root nodules).

B. wrong: nitrobacteria convert nitrite to nitrate, they do not fix nitrogen gas.

C. correct: Rhizobium in legume root nodules uses nitrogenase to reduce atmospheric N_2 to ammonia, which becomes ammonium.

D. wrong: Nitrosomonas converts ammonia to nitrite, it does not fix nitrogen gas.

Question 50 Chemotherapeutic agent against bacteria

Identify one of the following chemo-therapeutic agent used to control bacterial infections:

- A. Nitrofurans ✓ **Correct answer**
- B. Hydrogen peroxide
- C. Sodium hypochlorite
- D. Potassium sorbate

A. correct: nitrofurans are chemotherapeutic agents (antibacterial drugs) that act inside the body against bacteria.

B. wrong: hydrogen peroxide is a disinfectant, not a chemotherapeutic agent.

C. wrong: sodium hypochlorite is a disinfectant, not a chemotherapeutic agent.

otassium sorbate is a food preservative, not a chemotherapeutic agent.

Question 51 Why male gonads are outside the body

Why male gonads are present outside the body?

- A. They need a temperature equal to human body temperature
- B. They need a temperature 2°C higher than human body temperature
- C. They need a temperature 2°C lower than human body temperature ✓ **Correct answer**
- D. They need environmental conditions for sperm production

A. wrong: the testes need a temperature below body temperature.

B. wrong: the testes need a temperature 2°C lower, not higher.

C. correct: sperm production needs a temperature about 2°C below core body temperature, so the testes are held outside the body in the scrotum.

D. wrong: the reason is the lower temperature, not environmental conditions in general.

Question 52 No fusion of gametes

Which set of events will occur if fusion of gametes does NOT take place?

- A. Corpus luteum degenerate, LH increase, progesterone increase
- B. Corpus luteum degenerate, LH decline, progesterone increase
- C. Corpus luteum degenerate, LH increase, progesterone decline
- D. Corpus luteum degenerate, LH decline, progesterone decline ✓ **Correct answer**

A. wrong: progesterone falls, it does not increase.

B. wrong: progesterone falls, it does not increase.

C. wrong: LH declines, it does not increase.

D. correct: without fertilisation the corpus luteum degenerates, so progesterone falls, and

also declines as the cycle moves toward menstruation.

Question 53 Transport of bicarbonate from blood to lungs

Which of the following is correct order of the transport of bicarbonate from blood to lungs?

- A. Capillaries → alveoli → red blood cells
- B. Red blood cells → alveoli → capillaries
- C. Alveoli → capillaries → red blood cells
- D. Red blood cells → capillaries → alveoli ✓ **Correct answer**

A. wrong: bicarbonate re-enters red blood cells first, it does not go to the alveoli first.

B. wrong: CO_2 crosses the capillaries before reaching the alveoli.

C. wrong: the sequence starts in the red blood cells, not the alveoli.

D. correct: near the lungs, bicarbonate re-enters red blood cells and is converted back to CO_2, which crosses the pulmonary capillaries into the alveoli for exhalation.

Question 54 Enzymes breaking down protein

Which set of digestive enzymes play a vital role in breakdown of protein?

- A. Pepsin, maltase, erepsin
- B. Pepsin, trypsin, amylase
- C. Pepsin, trypsin, erepsin ✓ **Correct answer**
- D. Pepsin, amylase, lipase

A. wrong: maltase digests maltose, not protein.

B. wrong: amylase digests starch, not protein.

C. correct: pepsin begins protein digestion in the stomach, trypsin continues it in the small intestine, and erepsin (intestinal peptidases) completes it.

nylase digests starch and lipase digests fat, not protein.

Question 55 Gene inhibiting another gene at a different locus

Gene of one allele which inhibits the effect of other allele at different locus is called as:

- A. Hypostatic gene
- B. Hylostatic gene
- C. Polystatic gene
- D. Epistatic gene ✓ **Correct answer**

A. wrong: the hypostatic gene is the one whose effect is masked.

B. wrong: there is no 'hylostatic' gene.

C. wrong: there is no 'polystatic' gene.

D. correct: the gene at one locus that inhibits (masks) the effect of a gene at a different locus is called the epistatic gene.

Question 56 1 mole of Na^+ ions

Which of the following is equal to 1 mole of Na^+ ions?

- A. 6.02×10^{23} atoms
- B. 6.02×10^{23} ions ✓ **Correct answer**
- C. 3.01×10^{23} atoms
- D. 6.02×10^{24} ions

A. wrong: Na^+ refers to ions, not atoms.

B. correct: one mole of Na^+ contains Avogadro's number (6.02×10^{23}) of ions.

C. wrong: one mole contains 6.02×10^{23} ions, not half that number of atoms.

D. wrong: one mole contains 6.02×10^{23} ions, not ten times that number.

57 e/m of positive rays depends on gas

The e/m value for positive rays depends upon nature of gas used because:

- A. Number of electrons
- B. Number of neutrons
- C. Number of protons ✓ **Correct answer**
- D. Number of electrons and protons

A. wrong: positive rays are positive ions; their e/m depends on the gas because the ions differ in proton number (and hence mass).

B. wrong: the listed property is the number of protons, not neutrons.

C. correct: positive rays are made of positive ions of the gas in the tube; changing the gas changes the ions (their proton number and mass), so e/m depends on the nature of the gas.

D. wrong: the listed property is the number of protons alone.

Question 58 Increasing energy order of orbitals

Select the correct increasing energy order of orbitals?

- A. 4s < 3d < 4p < 5s ✓ **Correct answer**
- B. 3d < 4s < 4p < 5s
- C. 3d < 4p < 4s < 5s
- D. 4p < 3d < 4s < 5s

A. correct: by the (n + l) rule, 4s = 4, 3d = 5, 4p = 5 and 5s = 5; where (n + l) ties, the lower n is lower in energy, giving 4s < 3d < 4p < 5s.

B. wrong: 4s (n + l = 4) is lower in energy than 3d (n + l = 5).

C. wrong: 4s is the lowest-energy orbital here.

D. wrong: 4s is the lowest-energy orbital here, not 4p.

Question 59 Boyle's law expression

Which of the following expressions represent Boyle's law?

- A. $P_1V_1 = P_2/V_2$
- B. $P_1/V_1 = P_2V_2$
- C. $P_1/V_1 = P_2/V_2$
- D. $P_1V_1 = P_2V_2$ ✓ **Correct answer**

A. wrong: Boyle's law states $P_1V_1 = P_2V_2$.

B. wrong: Boyle's law states $P_1V_1 = P_2V_2$.

C. wrong: Boyle's law states $P_1V_1 = P_2V_2$.

D. correct: at constant temperature the product of pressure and volume is constant, so $P_1V_1 = P_2V_2$.

Question 60 Celsius temperature of absolute zero

Which Celsius temperature represents zero kelvin or absolute zero?

- A. 0°C
- B. 273.16°C
- C. −273.15°C ✓ **Correct answer**
- D. 25°C

A. wrong: 0°C is 273.15 K, not absolute zero.

B. wrong: absolute zero is −273.15°C, not +273.16°C.

C. correct: 0 K = 0 − 273.15 = −273.15°C.

D. wrong: 25°C is room temperature, not absolute zero.

61 Egg boils slower at Murree hills

An egg takes 5 to boil at sea level while 10 minutes at Murree hills because of:

- A. Low vapour pressure
- B. High vapour pressure
- C. High external pressure
- D. Low external pressure ✓ **Correct answer**

A. wrong: the cause is the low external (atmospheric) pressure at altitude.

B. wrong: the cause is the low external pressure at altitude.

C. wrong: the external pressure is lower at altitude, not higher.

D. correct: at the Murree hills the atmospheric pressure is low, so water boils at a lower temperature and the egg takes longer to cook.

Question 62 Fluorine gas, iodine solid

Fluorine is a gas and Iodine is a solid at room temperature due to:

- A. High electronegativity
- B. Low electronegativity
- C. High polarizability ✓ **Correct answer**
- D. Low polarizability

A. wrong: electronegativity does not explain why iodine is a solid and fluorine a gas.

B. wrong: electronegativity does not explain the difference in physical state.

C. correct: iodine has a much larger, more easily distorted electron cloud (high polarizability), so its molecules develop stronger London dispersion forces and iodine is a solid at room temperature.

D. wrong: iodine's high polarizability (not low) is what makes it a solid.

63 Ionic solids bad conductors

Ionic solids are bad conductors of heat and electricity because:

- A. They have strong covalent bonds
- B. They have strong intermolecular forces
- C. Ions can only vibrate about their fixed ✓ **Correct answer**
- D. Ions are free to move

A. wrong: ionic solids have ionic bonds, not covalent bonds.

B. wrong: strong forces alone do not explain poor conduction — the ions are fixed in place.

C. correct: the ions in an ionic solid are locked in the crystal lattice and can only vibrate about fixed positions, so there are no mobile charge carriers to conduct heat or electricity.

D. wrong: the ions are not free to move in the solid state.

Question 64 Shape of NaCl crystals with 10% urea

If 10% urea is present in aqueous solution of sodium chloride, What will be the shape of crystals obtained?

- A. Octahedral ✓ **Correct answer**
- B. Triclinic
- C. Cubic
- D. Hexagonal

A. correct: urea changes the growth pattern of sodium chloride crystals, so the crystals obtained are octahedral (instead of the usual cubic habit).

B. wrong: the crystals obtained are octahedral, not triclinic.

C. wrong: pure sodium chloride forms cubic crystals, but with 10% urea the habit becomes octahedral.

e crystals obtained are octahedral, not hexagonal.

Question 65 Kc = Kp when Δn equals

Kc = Kp when Δn is equal to:

- A. 1
- B. −1
- C. 2
- D. 0 ✓ **Correct answer**

A. wrong: when Δn = 1, Kp = Kc(RT), so they are not equal.

B. wrong: when Δn = −1, Kp = Kc/(RT), so they are not equal.

C. wrong: when Δn = 2, Kp = Kc$(RT)^2$, so they are not equal.

D. correct: Kp = Kc(RT)^Δn, so when Δn = 0 the factor becomes 1 and Kp = Kc.

Question 66 pH of human blood

The pH of human blood is maintained at:

- A. 5.37
- B. 5.73
- C. 7.53
- D. 7.35 ✓ **Correct answer**

A. wrong: blood pH is about 7.35, not 5.37.

B. wrong: blood pH is about 7.35, not 5.73.

C. wrong: blood pH is about 7.35 (7.53 is above the normal range).

D. correct: human blood pH is maintained at about 7.35 (the slightly alkaline end of the normal range).

67 Rate constant unit equals rate unit

The unit of the rate constant is the same as the unit of reaction rate in:

- A. Third-order reaction
- B. Second-order reaction
- C. First-order reaction
- D. Zero-order reaction ✓ **Correct answer**

A. wrong: for a third-order reaction the rate constant has units of $mol^{-2}\ L^{2}\ s^{-1}$.

B. wrong: for a second-order reaction the rate constant has units of $mol^{-1}\ L\ s^{-1}$.

C. wrong: for a first-order reaction the rate constant has units of s^{-1}.

D. correct: for a zero-order reaction the rate law is rate = k, so the rate constant has the same units as the reaction rate.

Question 68 Arrhenius constant expression

Which of the following represents Arrhenius constant expression?

- A. k = Ae^(−E_a/T)
- B. k = Ae^(−E_a/RT) ✓ **Correct answer**
- C. k = Ae^(−RT/E_a)
- D. k = e^(−E_a/RT)

A. wrong: the exponent must contain the gas constant R (E_a/RT).

B. correct: the Arrhenius equation is k = Ae^(−E_a/RT), where A is the pre-exponential factor and E_a is the activation energy.

C. wrong: the exponent is inverted — it must be E_a/RT.

D. wrong: the pre-exponential factor A is missing.

69 Hess's law expression

Which expression is according to the Hess's law?

- A. ΔH_cycle = 0 ✓ **Correct answer**
- B. ΔH = 2
- C. ΔH_cycle = 3
- D. ΔH_cycle = 1

A. correct: enthalpy is a state function, so the total enthalpy change around a complete cycle is zero.

B. wrong: the enthalpy change around a cycle is zero, not 2.

C. wrong: the enthalpy change around a cycle is zero, not 3.

D. wrong: the enthalpy change around a cycle is zero, not 1.

Question 70 Internal energy expression

Which of the represents the expression of internal energy?

- A. ΔU = q + t
- B. ΔU = q + w ✓ **Correct answer**
- C. ΔU = q + v
- D. ΔU = q + p

A. wrong: the first law is ΔU = q + w.

B. correct: the change in internal energy equals the heat absorbed plus the work done on the system (ΔU = q + w).

C. wrong: the first law is ΔU = q + w.

D. wrong: the first law is ΔU = q + w.

71 Balancing oxidation half-equation

Which terms must be placed on the product side to balance the oxidation half-equation?

$HSO_3^- + H_2O \rightarrow HSO_4^-$

- A. $1e^-$ and H^+
- B. $2e^-$ and $2H^+$ ✓ **Correct answer**
- C. $5e^-$
- D. $3e^-$

A. wrong: one electron and one H^+ do not balance the hydrogen or the charge.

B. correct: $HSO_3^- + H_2O \rightarrow HSO_4^- + 2H^+ + 2e^-$ balances both hydrogen atoms and charge (sulfur goes from +4 to +6, losing 2 electrons).

C. wrong: the oxidation of S(IV) to S(VI) involves 2 electrons, not 5.

D. wrong: the oxidation of S(IV) to S(VI) involves 2 electrons, not 3.

Question 72 Oxidation state of Mn in $KMnO_4$

The oxidation state of Mn in $KMnO_4$ is:

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

A. wrong: +1 + x − 8 = 0 gives x = +7, not +6.

B. wrong: the oxidation state of manganese in $KMnO_4$ is +7.

C. correct: K is +1 and four O atoms are −8, so Mn is +7 (+1 + x − 8 = 0).

D. wrong: the oxidation state of manganese in $KMnO_4$ is +7.

73 Atoms approaching for bond formation

When atoms approaches each other for chemical bond formation, it leads to:

- A. Decrease in energy ✓ **Correct answer**
- B. Increase in energy
- C. Energy remains same
- D. Increase in bond length

A. correct: as atoms approach, attractive forces lower the potential energy of the system until the equilibrium bond distance is reached.

B. wrong: bond formation releases energy, so the energy decreases.

C. wrong: the energy decreases as the bond forms.

D. wrong: the atoms settle at the equilibrium bond length, and the energy decreases.

Question 74 Bonds in O_2 molecule

The number and types of bonds in an O_2 molecule are:

- A. Two σ bonds
- B. Two π bonds
- C. One σ and one π bond ✓ **Correct answer**
- D. Two σ and one π bond

A. wrong: O_2 has one σ bond and one π bond, not two σ bonds.

B. wrong: O_2 has one σ bond and one π bond, not two π bonds.

C. correct: the O=O double bond consists of one σ bond and one π bond.

D. wrong: O_2 has one σ bond and one π bond, not two σ bonds.

75 Decreasing order of ionization energy

The decreasing order of ionization energy is:

- A. O < S < N
- B. F > Cl > Br ✓ **Correct answer**
- C. Br > Cl > F
- D. C < N < B

A. wrong: this is an increasing order for some elements, not the decreasing order asked for.

B. correct: ionisation energy decreases down the halogen group as size and shielding increase, so F > Cl > Br.

C. wrong: ionisation energy decreases down the group, so F > Cl > Br.

D. wrong: the correct decreasing order for these elements is N > C > B.

Question 76 Ar larger than Cl

The size of Ar is larger than Cl due to:

- A. Steric hindrance
- B. Inter-electronic repulsion ✓ **Correct answer**
- C. High ionization energy
- D. High shielding effect

A. wrong: steric hindrance is not the reason argon is larger than chlorine.

B. correct: argon's outer shell is completely filled, so inter-electronic repulsion among its valence electrons is at a maximum and offsets the extra nuclear charge, making Ar larger than Cl.

C. wrong: ionisation energy does not explain why argon is larger than chlorine.

D. wrong: shielding alone is not the textbook reason given — it is the inter-electronic

the filled shell.

Question 77 Element lighter than water

Which element is lighter than water?

- A. Cs
- B. Rb
- C. Fe
- D. K ✓ **Correct answer**

A. wrong: caesium is denser than water.

B. wrong: rubidium is denser than water.

C. wrong: iron is much denser than water.

D. correct: potassium has a density below 1 g cm^{-3}, so it is lighter than water (it floats).

Question 78 Decreases down Group IA/IIA

Which of the following decreases as we move from top to bottom in Group IA or IIA?

- A. Metallic bond strength ✓ **Correct answer**
- B. Electropositivity
- C. Reactivity
- D. Ionic radii

A. correct: moving down Group IA or IIA adds electron shells, so the atoms are larger and hold their outer electrons less strongly — metallic bonding becomes weaker.

B. wrong: electropositivity increases down the group, it does not decrease.

C. wrong: reactivity increases down Group IA/IIA, it does not decrease.

D. wrong: ionic radii increase down the group, they do not decrease.

79 Electronegativity order, Group IIA

Which one of following is the correct order of electronegativity of group II A elements?

- A. Be < Mg < Ca < Sr < Ba
- B. Be < Ca < Mg < Ba < Sr
- C. Ba < Sr < Ca < Mg < Be ✓ **Correct answer**
- D. Be Mg < Ca < Ba

A. wrong: electronegativity decreases down the group, so this order is reversed.

B. wrong: electronegativity decreases down the group, so beryllium is the highest.

C. correct: electronegativity decreases down Group IIA, so Ba < Sr < Ca < Mg < Be.

D. wrong: this is not the correct decreasing order (and it is not even written as a proper order).

Question 80 Heteroatom

Which one of the following is heteroatom?

- A. Pyrrole ✓ **Correct answer**
- B. Naphthalene
- C. Anthracene
- D. Cyclohexene

A. correct: pyrrole is a five-membered ring containing a nitrogen atom — nitrogen is the heteroatom in the ring.

B. wrong: naphthalene contains only carbon and hydrogen, with no heteroatom.

C. wrong: anthracene contains only carbon and hydrogen, with no heteroatom.

D. wrong: cyclohexene contains only carbon and hydrogen, with no heteroatom.

81 Functional group of primary acid amide

The functional group of a primary acid amide is:

- A. –C(=O)–N
- B. –C(=O)–NH
- C. –C(=O)–NH_2 ✓ **Correct answer**
- D. –C(OH)=NH_2

A. wrong: a primary amide has –NH_2 on the nitrogen, not just –N.

B. wrong: –NH belongs to a secondary amide, not a primary one.

C. correct: a primary acid amide has the functional group –C(=O)–NH_2 (a carbonyl carbon bonded to an –NH_2 group).

D. wrong: this is not the functional group of a primary acid amide.

Question 82 Alcohol heated at 170°C with H_2SO_4

When an alcohol is heated at 170°C in the presence of sulphuric acid, a water molecule is eliminated, resulting in the formation of:

- A. Alkyl halide
- B. Alkane
- C. Alkene ✓ **Correct answer**
- D. Alkyne

A. wrong: dehydration of an alcohol gives an alkene, not an alkyl halide.

B. wrong: dehydration of an alcohol gives an alkene, not an alkane.

C. correct: heating an alcohol at 170°C with concentrated sulphuric acid removes a water molecule (dehydration) to form an alkene.

D. wrong: dehydration of an alcohol gives an alkene, not an alkyne.

83 IUPAC name $CH_3–CH=CH–CH_2–CH_2–CH_3$

The IUPAC name of the following compound is: $CH_3–CH=CH–CH_2–CH_2–CH_3$

- A. Hex-2-ene ✓ **Correct answer**
- B. Hept-2-ene
- C. Hex-4-ene
- D. Hept-4-ene

A. correct: the longest chain has six carbons and the double bond starts at carbon 2, so the name is hex-2-ene.

B. wrong: the chain has six carbons, not seven.

C. wrong: numbering starts from the end nearest the double bond, giving hex-2-ene, not hex-4-ene.

D. wrong: the chain has six carbons, not seven.

Question 84 Reactions of alkenes

Most of the reactions shown by alkenes are:

- A. Nucleophilic substitution
- B. Nucleophilic addition
- C. Electrophilic substitution
- D. Addition reactions ✓ **Correct answer**

A. wrong: alkenes do not mainly undergo nucleophilic substitution.

B. wrong: alkenes mainly undergo electrophilic addition, not nucleophilic addition.

C. wrong: electrophilic substitution is characteristic of arenes, not alkenes.

D. correct: most reactions of alkenes are addition reactions across the carbon-carbon double bond (the π bond is replaced by two new σ bonds).

85 Polymerization of ethene conditions

What are the conditions required for polymerization of ethene to polyethene?

- A. 400°C and 1000 atm ✓ **Correct answer**
- B. 100°C and 400 atm
- C. 450°C and 1000 atm
- D. 450°C and 200 atm

A. correct: the textbook high-pressure polymerisation of ethene to polyethene uses about 400°C and 1000 atm.

B. wrong: the textbook conditions are 400°C and 1000 atm.

C. wrong: the textbook temperature is 400°C, not 450°C.

D. wrong: the textbook conditions are 400°C and 1000 atm.

Question 86 Reactivity order of alkyl halides

The reactivity order of alkyl halide is:

- A. R–F > R–Cl > R–Br > R–I
- B. R–Cl > R–Br > R–I > R–F
- C. R–Br > R–Cl > R–I > R–F
- D. R–I > R–Br > R–Cl > R–F ✓ **Correct answer**

A. wrong: the C–F bond is the strongest, so R–F is the least reactive.

B. wrong: the order is R–I > R–Br > R–Cl > R–F.

C. wrong: R–I is the most reactive, not R–Br.

D. correct: nucleophilic substitution is easiest where the carbon-halogen bond is weakest — the C–I bond breaks most readily, then C–Br, then C–Cl, then C–F.

87 $(CH_3)_3C–OH$ alcohol class

$(CH_3)_3C–OH$ is an example of:

- A. Primary alcohol
- B. Secondary alcohol
- C. Tertiary alcohol ✓ **Correct answer**
- D. Iso butyl alcohol

A. wrong: the –OH carbon is bonded to three other carbons, so it is not primary.

B. wrong: the –OH carbon is bonded to three other carbons, so it is not secondary.

C. correct: in $(CH_3)_3C–OH$ the carbon carrying the –OH group is bonded to three carbon groups, so it is a tertiary alcohol (2-methylpropan-2-ol).

D. wrong: isobutyl alcohol is $(CH_3)_2CH–CH_2OH$, a different compound.

Question 88 Used in manufacturing plastics

Which one of the following is used in the manufacturing of plastics?

- A. Methanol
- B. Ethanol
- C. Propanol
- D. Phenol ✓ **Correct answer**

A. wrong: methanol is not used to make plastics in this context.

B. wrong: ethanol is not used to make plastics in this context.

C. wrong: propanol is not used to make plastics in this context.

D. correct: phenol reacts with formaldehyde to form phenol-formaldehyde resins, which cross-link into the hard plastic Bakelite.

89 Ketone giving formic acid on oxidation

Which of the following will give formic acid as one of the product of oxidation?

- A. Butanone
- B. Propanone ✓ **Correct answer**
- C. Pentanone
- D. Hexanone

A. wrong: under the strong-oxidation cleavage convention used in the paper, butanone does not give formic acid.

B. correct: under the strong-oxidation cleavage convention used in the paper, propanone is cleaved into a two-carbon acid and a one-carbon acid — formic acid.

C. wrong: under the convention used in the paper, pentanone does not give formic acid.

D. wrong: under the convention used in the paper, hexanone does not give formic acid.

Question 90 IUPAC name of $CH_3–CH_2–CH(CH_3)–CH(CH_2CH_3)–CHO$

What is the IUPAC name of the following compound? $CH_3–CH_2–CH(CH_3)–CH(CH_2CH_3)–CHO$

- A. 1-Ethyl-2-methyl pentanal
- B. 2-Ethyl-3-methyl pentanal ✓ **Correct answer**
- C. 3-Methyl-4-ethyl pentanal
- D. 3-Methyl pentanal

A. wrong: the aldehyde carbon is carbon 1, so the substituent numbering is wrong here.

B. correct: the longest chain (with the aldehyde carbon as C1) has five carbons, with an ethyl group at C2 and a methyl group at C3 — 2-ethyl-3-methylpentanal.

C. wrong: the substituents are at carbons 2 and 3, not 3 and 4.

e compound also has an ethyl substituent at carbon 2.

Question 91 Common name of benzene-1,2-dicarboxylic acid

What is the common name of following compound?

- A. Benzoic acid
- B. Malonic acid
- C. Phthalic acid ✓ **Correct answer**
- D. Picric acid

A. wrong: benzoic acid has only one –COOH group on the benzene ring.

B. wrong: malonic acid is a three-carbon aliphatic dicarboxylic acid, not a benzene compound.

C. correct: benzene-1,2-dicarboxylic acid (two –COOH groups on adjacent carbons of a benzene ring, shown as a diagram in the paper) is phthalic acid.

D. wrong: picric acid is 2,4,6-trinitrophenol, not a dicarboxylic acid.

Question 92 Acetic anhydride preparation

Acetic anhydride can be prepared when two molecules of carboxylic acids are dehydrated on heating strongly in the presence of:

- A. V_2O_5
- B. P_2O_5 ✓ **Correct answer**
- C. H_2SO_4
- D. $HgSO_4$

A. wrong: vanadium pentoxide is not the dehydrating agent used here.

B. correct: phosphorus pentoxide is a strong dehydrating agent that removes water from two molecules of acetic acid to form acetic anhydride.

Sulphuric acid is not the dehydrating agent used to prepare acetic anhydride from two acid molecules.

D. wrong: mercury sulphate is not the dehydrating agent used here.

Question 93 Carboxylic acid + metal, gas evolved

Carboxylic acid react with metals to form salt with the evolution of which gas?

- A. CO_2
- B. CO
- C. H_2 ✓ **Correct answer**
- D. CH_4

A. wrong: the gas evolved is hydrogen, not carbon dioxide.

B. wrong: the gas evolved is hydrogen, not carbon monoxide.

C. correct: a reactive metal displaces the hydrogen of the carboxyl group — $2RCOOH + 2Na \rightarrow 2RCOONa + H_2$.

D. wrong: the gas evolved is hydrogen, not methane.

Question 94 Protein in muscle contraction and relaxation

Which protein helps in muscles contractions and relaxation in our body?

- A. Myosin ✓ **Correct answer**
- B. Albumin
- C. Globulin
- D. Collagen

A. correct: myosin is the motor protein of muscle fibres — it binds actin and uses ATP in cross-bridge cycling to produce contraction (and ATP-dependent detachment allows relaxation).

bulin is a blood plasma protein, not a muscle motor protein.

C. wrong: globulins are blood plasma proteins, not muscle motor proteins.

D. wrong: collagen is a structural protein of connective tissue, not a muscle motor protein.

Question 95 Haemoglobin polypeptide chains held together

Various polypeptide chains in haemoglobin remain intact due to:

- A. Chemical bonds
- B. London dispersion forces
- C. Salt bridges ✓ **Correct answer**
- D. Peptide bonds

A. wrong: the subunits are held by salt bridges (and other non-covalent interactions), not by ordinary chemical bonds.

B. wrong: London forces are not what holds the haemoglobin subunits together.

C. correct: salt bridges between charged side chains help hold the several polypeptide subunits of haemoglobin in their quaternary arrangement.

D. wrong: peptide bonds join amino acids within a chain, they do not hold the separate chains together.

Question 96 Projectile height = range angle

The vertical height and horizontal range of projectiles are equal at angle:

- A. 30°
- B. 45°
- C. 76° ✓ **Correct answer**
- D. 90°

A. wrong: at 30° the range is much larger than the height.

45° the range is maximum and larger than the height.

C. correct: equating maximum height $H = u^2\sin^2\theta/2g$ with range $R = u^2\sin2\theta/g$ gives $\tan\theta = 4$, so $\theta \approx 76°$.

D. wrong: at 90° the range is zero, not equal to the height.

Question 97 Maximum range angle

Range of projectile is maximum at:

- A. 30°
- B. 45° ✓ **Correct answer**
- C. 60°
- D. 90°

A. wrong: the range is not maximum at 30°.

B. correct: $R = u^2\sin2\theta/g$ is greatest when $\sin2\theta = 1$, i.e. $2\theta = 90°$, so $\theta = 45°$.

C. wrong: the range is not maximum at 60°.

D. wrong: at 90° the range is zero.

Question 98 Ball descends after being thrown up

A ball is thrown vertically upward, the ball descends towards earth after achieving a certain height because:

- A. Earth is exerting more gravitational force than ball
- B. The ball is exerting more gravitational force than earth
- C. The earth possesses more inertia ✓ **Correct answer**
- D. The ball possesses more inertia

A. wrong: the ball and the Earth exert equal gravitational forces on each other (Newton's third law).

e forces are equal in magnitude.

C. correct: the Earth has enormously greater mass and inertia, so its acceleration is negligible while the ball accelerates back toward the Earth.

D. wrong: the ball has far less inertia than the Earth.

Question 99 Bomb explodes into two fragments

A bomb is exploded into two fragments A and B moving in opposite direction. They conserve:

- A. Kinetic Energy
- B. Potential Energy
- C. Momentum ✓ **Correct answer**
- D. Both kinetic energy and potential energy

A. wrong: kinetic energy is not conserved in an explosion (chemical energy becomes kinetic energy).

B. wrong: potential energy is not conserved in an explosion.

C. correct: the internal forces of the explosion cannot change the total momentum (external impulse is negligible), so momentum is conserved.

D. wrong: neither kinetic energy nor potential energy is conserved in an explosion.

Question 100 Negative work angle

Work done is negative, when the angle between F and S is:

- A. 0°
- B. 60°
- C. 90°
- D. 180° ✓ **Correct answer**

0° the work is maximum and positive.

B. wrong: at 60° cos θ is positive, so the work is positive.

C. wrong: at 90° cos θ = 0, so the work is zero.

D. correct: W = Fs cos θ is negative when the force opposes the displacement — at 180°, cos θ = −1.

Question 101 Car speed doubled, kinetic energy

When the speed of a car is doubled, what will happen to its kinetic energy?

- A. Remains same
- B. Doubled
- C. Three times
- D. Four times ✓ **Correct answer**

A. wrong: kinetic energy depends on the square of the speed.

B. wrong: kinetic energy becomes four times, not twice.

C. wrong: kinetic energy becomes four times, not three.

D. correct: K.E. = ½mv², so doubling v makes the kinetic energy $(2)^2 = 4$ times as large.

Question 102 Work efficiency of a dry cell

The work efficiency of a dry cell battery is:

- A. 30%
- B. 40%
- C. 50%
- D. 90% ✓ **Correct answer**

A. wrong: the textbook efficiency value for a dry cell is 90%, not 30%.

e textbook efficiency value for a dry cell is 90%, not 40%.

C. wrong: the textbook efficiency value for a dry cell is 90%, not 50%.

D. correct: the work efficiency of a dry cell battery is taken as 90% in the textbook.

Question 103 Gravitational potential energy as r increases

With zero gravitational potential energy at infinity, when distance r from a massive body increases, the gravitational potential energy becomes:

- A. Less positive
- B. More negative
- C. Less negative ✓ **Correct answer**
- D. More positive

A. wrong: gravitational potential energy is negative (with zero at infinity), so it cannot become 'less positive'.

B. wrong: as r increases, U = −GMm/r becomes less negative.

C. correct: with zero at infinity, U = −GMm/r; increasing r reduces the magnitude of the negative value, so it becomes less negative (closer to zero).

D. wrong: U stays negative and moves toward zero, it does not become more positive.

Question 104 Joules in 3 kWh

How many Joules are there in 3KWh?

- A. 108MJ
- B. 10.8MJ ✓ **Correct answer**
- C. 1.08MJ
- D. 0.108MJ

A. wrong: 3 kWh is 10.8 MJ, not 108 MJ.

kWh = 3.6×10^6 J = 3.6 MJ, so 3 kWh = 3 × 3.6 = 10.8 MJ.

C. wrong: 3 kWh is 10.8 MJ, not 1.08 MJ.

D. wrong: 3 kWh is 10.8 MJ, not 0.108 MJ.

Question 105 Steeply banked curves

A car moving on a more steeply banked curves will require:

- A. Large speed and large radii
- B. Large speed and small radii ✓ **Correct answer**
- C. Small speed and large radii
- D. Small speed and small radii

A. wrong: a large radius reduces the required banking, so the combination is wrong.

B. correct: $\tan\theta = v^2/rg$ — a higher speed and a smaller radius both increase the required banking angle.

C. wrong: small speed and large radius need the least banking, not the most.

D. wrong: small speed reduces the required banking.

Question 106 Angular acceleration produced by

In a body angular acceleration is produced by:

- A. Net force
- B. Power
- C. Pressure
- D. Net torque ✓ **Correct answer**

A. wrong: a net force produces linear acceleration, not angular acceleration.

B. wrong: power does not produce angular acceleration.

essure does not produce angular acceleration.

D. correct: angular acceleration is produced by net torque (τ_net = Iα).

Question 107 Analogue of force in angular motion

The analogue of force in circular / angular motion is:

- A. Momentum
- B. Torque ✓ **Correct answer**
- C. Angular acceleration
- D. Angular velocity

A. wrong: momentum is the analogue of linear momentum, not of force.

B. correct: torque changes rotational motion (τ = Iα) just as force changes translational motion (F = ma).

C. wrong: angular acceleration is the analogue of linear acceleration, not of force.

D. wrong: angular velocity is the analogue of linear velocity, not of force.

Question 108 1° in radians

1° is equal to:

- A. π/90 radians
- B. π/180 radians ✓ **Correct answer**
- C. π radians
- D. 2π radians

A. wrong: 1° = π/180 radians, not π/90.

B. correct: one revolution is 360° = 2π radians, so 1° = 2π/360 = π/180 radians.

C. wrong: π radians is 180°, not 1°.

radians is 360°, not 1°.

Question 109 Angle between centripetal acceleration and velocity

In uniform circular motion, the angle between centripetal acceleration and linear velocity of a particle is:

- A. π/2 ✓ **Correct answer**
- B. π
- C. 2π
- D. Zero

A. correct: in uniform circular motion the velocity is tangent to the circle and the centripetal acceleration points toward the centre — a tangent is perpendicular to the radius, so the angle is π/2.

B. wrong: the angle is π/2, not π.

C. wrong: the angle is π/2, not 2π.

D. wrong: the angle is π/2, not zero.

Question 110 Distance between consecutive nodes

The distance between two consecutive nodes are:

- A. λ
- B. λ/2 ✓ **Correct answer**
- C. 2λ
- D. λ/4

A. wrong: consecutive nodes are λ/2 apart, not λ.

B. correct: in a stationary wave, two neighbouring nodes are separated by half a wavelength (λ/2).

nsecutive nodes are λ/2 apart, not 2λ.

D. wrong: λ/4 is the distance between a node and the nearest antinode, not between two nodes.

Question 111 Sound from air to water, no change in

If a sound waves moves from air to water, there is NO change in:

- A. Velocity
- B. Frequency ✓ **Correct answer**
- C. Wavelength
- D. Temperature

A. wrong: the speed of sound changes when the medium changes.

B. correct: the frequency is fixed by the source and does not change when the wave enters a new medium (the wavelength adjusts through v = fλ).

C. wrong: the wavelength changes because the speed changes.

D. wrong: temperature is not a property of the wave.

Question 112 Star moving closer to Earth

The star moving closer to earth will experience:

- A. Blue shift ✓ **Correct answer**
- B. Red shift
- C. Orange shift
- D. Yellow shift

A. correct: light from an approaching star is compressed to shorter wavelengths, shifting its spectral lines toward the blue end (Doppler blue shift).

B. wrong: a red shift occurs for a receding star, not an approaching one.

ere is no 'orange shift' in the Doppler effect.

D. wrong: there is no 'yellow shift' in the Doppler effect.

Question 113 Amplitude doubled, intensity

If the amplitude of a wave is doubled, its intensity is:

- A. Doubled
- B. Halved
- C. Quadrupled ✓ **Correct answer**
- D. One quarter

A. wrong: intensity is proportional to the square of the amplitude, so it quadruples.

B. wrong: doubling the amplitude increases the intensity, it does not halve it.

C. correct: intensity $\propto A^2$, so doubling A makes the intensity $(2)^2 = 4$ times as large.

D. wrong: the intensity becomes four times as large, not one quarter.

Question 114 Example of first law of thermodynamics

Which of the following is an example of first law of thermodynamics?

- A. Thunderstorm
- B. Metabolism ✓ **Correct answer**
- C. Rusting
- D. Earthquake

A. wrong: a thunderstorm is not the textbook example of the first law.

B. correct: metabolism converts the chemical energy of food into work, stored energy and heat, conserving total energy — an example of the first law of thermodynamics.

C. wrong: rusting is not the textbook example of the first law.

earthquake is not the textbook example of the first law.

Question 115 Thermos flask tea shaken

Thermos flask tea as a system is shaken vigorously then there will be:

- A. Increase in temperature only
- B. Increase in kinetic energy only
- C. Increase in temperature & kinetic energy ✓ **Correct answer**
- D. No change in temperature & kinetic energy

A. wrong: both the temperature and the molecular kinetic energy increase.

B. wrong: both the temperature and the molecular kinetic energy increase.

C. correct: shaking does mechanical work on the tea, and in the insulated thermos the work raises the internal energy — the molecules move faster, so both temperature and kinetic energy increase.

D. wrong: the work done on the tea increases its internal energy.

Question 116 Cp − Cv equals

Difference between molar specific heat at constant pressure and molar specific heat at constant volume is equal to:

- A. Boltzmann constant
- B. Universal gas constant ✓ **Correct answer**
- C. Plank's constant
- D. Rydberg constant

A. wrong: Cp − Cv is the universal gas constant, not the Boltzmann constant.

B. correct: for an ideal gas, Cp − Cv = R (the universal gas constant) — Cp includes the expansion work that Cv does not.

— Cv is the universal gas constant, not Planck's constant.

D. wrong: Cp − Cv is the universal gas constant, not the Rydberg constant.

Question 117 Coulomb's law valid for

Coulomb's law of electrostatics is valid for:

- A. Point charges
- B. Stationary charges
- C. Stationary & point charges ✓ **Correct answer**
- D. Accelerated point charges

A. wrong: the charges must also be stationary — 'point charges' alone is incomplete.

B. wrong: the charges must also be point charges — 'stationary charges' alone is incomplete.

C. correct: Coulomb's law is valid for stationary point charges.

D. wrong: Coulomb's law does not apply to accelerating charges.

Question 118 Positive charge in uniform electric field

If the positive charge is placed in a uniform electric field, the charge will move in the:

- A. Opposite direction of electric field
- B. Direction of electric field ✓ **Correct answer**
- C. Perpendicular to the direction of electric field
- D. Remains at rest

A. wrong: a positive charge moves in the direction of the field, not opposite to it.

B. correct: the field direction is defined as the force direction on a positive test charge, so a positive charge moves in the direction of the field.

C. wrong: a positive charge moves along the field, not perpendicular to it.

e field exerts a force on the charge, so it does not remain at rest.

Question 119 Half-life for each element

For each element, value of half-life is:

- A. Variable
- B. Constant ✓ **Correct answer**
- C. Decrease
- D. Increase

A. wrong: the half-life of a given radionuclide is constant, it does not vary.

B. correct: the half-life is a characteristic property of a particular radionuclide and does not depend on the amount of the sample.

C. wrong: the half-life does not decrease.

D. wrong: the half-life does not increase.

Question 120 Unit of RC

The unit of RC is:

- A. Ohm
- B. Farad
- C. Second ✓ **Correct answer**
- D. Ohm/Farad

A. wrong: RC has the unit of time, not ohm.

B. wrong: RC has the unit of time, not farad.

C. correct: resistance × capacitance (Ω × F) reduces to seconds — RC is a time quantity (the time constant).

D. wrong: RC has the unit of seconds, not ohm per farad.

121 Fractional change in resistance per kelvin

The fractional change in resistance per kelvin is known as the temperature coefficient of:

- A. Conductance
- B. Resistance ✓ **Correct answer**
- C. Inductance
- D. Conductivity

A. wrong: the quantity described is the temperature coefficient of resistance.

B. correct: the fractional change in resistance per kelvin is the temperature coefficient of resistance ($\alpha = \Delta R/(R_0 \Delta T)$).

C. wrong: inductance is not involved here.

D. wrong: the quantity described is the temperature coefficient of resistance, not of conductivity.

Question 122 Ohmic in nature

Which of the following is an example of Ohmic in nature?

- A. Thermistor
- B. Filament lamp
- C. Semiconductor
- D. Conductor ✓ **Correct answer**

A. wrong: a thermistor is non-ohmic (its resistance changes with temperature).

B. wrong: a filament lamp is non-ohmic (its resistance rises as it heats up).

C. wrong: a semiconductor is non-ohmic.

D. correct: a metallic conductor obeys V = IR at constant temperature — it is ohmic in nature.

123 Resistance decreases with temperature

The material whose resistance decreases with increase in temperature have:

- A. Positive temperature coefficient
- B. Negative temperature coefficient ✓ **Correct answer**
- C. Thermal coefficient
- D. Coefficient of friction

A. wrong: a falling resistance with rising temperature means the coefficient is negative.

B. correct: if resistance decreases as temperature increases, the temperature coefficient is negative (as in semiconductors and thermistors).

C. wrong: the correct term is the negative temperature coefficient.

D. wrong: the coefficient of friction is unrelated to electrical resistance.

Question 124 Field lines per unit area

The number of field lines passing through unit area is called:

- A. Magnetic field
- B. Magnetic flux
- C. Magnetic flux density ✓ **Correct answer**
- D. Magnetization

A. wrong: the magnetic field is not defined as field lines per unit area.

B. wrong: magnetic flux is the total field through a surface, not per unit area.

C. correct: the number of field lines passing through unit area is the magnetic flux density (B).

D. wrong: magnetisation is a different quantity (magnetic moment per unit volume).

125 Magnetic force on charged particle depends on

The magnetic force of a charged particle moving in a uniform magnetic fields depends on:

- A. Velocity, area & magnetic field
- B. Charge, current & velocity
- C. Magnetic field, voltage & charge
- D. Velocity, magnetic field & charge ✓ **Correct answer**

A. wrong: area is not involved — charge is.

B. wrong: current is not involved — the magnetic field is.

C. wrong: voltage is not involved — velocity is.

D. correct: $F = qvB \sin \theta$ — the force depends on the charge, the velocity and the magnetic field (and the angle between v and B).

Question 126 Magnetic force maximum angle

The magnetic force acting on a charged particle is maximum when the angle between v and B is:

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

A. wrong: at 0° $\sin \theta = 0$, so the force is zero.

B. wrong: sin 45° is less than 1, so the force is not maximum.

C. correct: the magnetic force contains $\sin \theta$, which is maximum (1) when the velocity is perpendicular to the field, at 90°.

D. wrong: at 180° $\sin \theta = 0$, so the force is zero.

127 Generator effect application

Generator effect is practical application of:

- A. Static e.m.f.
- B. Dynamic e.m.f. ✓ **Correct answer**
- C. Mutual induction
- D. Back emf

A. wrong: a generator produces motional (dynamic) emf, not static emf.

B. correct: a generator creates emf by moving a conductor through a magnetic field — the practical application of dynamic (motional) emf.

C. wrong: mutual induction is the principle of transformers, not generators.

D. wrong: back emf occurs in motors, not as the principle of a generator.

Question 128 Turns doubled, induced emf

If number of turns of coil becomes double, the induced emf will be:

- A. Double ✓ **Correct answer**
- B. Reduced to half
- C. Remain same
- D. Quadruple

A. correct: by Faraday's law $\varepsilon = N|\Delta\Phi|/\Delta t$, the induced emf is directly proportional to the number of turns, so doubling N doubles the emf.

B. wrong: the emf increases with the number of turns, it does not halve.

C. wrong: the emf is proportional to the number of turns.

D. wrong: the emf doubles, it does not quadruple.

129 Seismograph sensor converts to

Electromagnetic sensor in seismograph converts ground movement into:

- A. Magnetic signals
- B. Electric signals ✓ **Correct answer**
- C. Audio signals
- D. Vibratory signals

A. wrong: the sensor produces electrical signals, not magnetic signals.

B. correct: the electromagnetic sensor in a seismograph converts ground movement into electric signals that can be recorded.

C. wrong: the sensor produces electric signals, not audio signals.

D. wrong: the ground movement itself is vibratory; the sensor converts it into electric signals.

Question 130 Full wave bridge rectifier

A full wave bridge rectifier consists of:

- A. No diode
- B. Four diodes ✓ **Correct answer**
- C. Two diodes
- D. One diode

A. wrong: a bridge rectifier uses diodes.

B. correct: a full-wave bridge rectifier consists of four diodes — one pair conducts on each half-cycle while keeping the load current in the same direction.

C. wrong: a centre-tapped full-wave rectifier uses two diodes; a bridge rectifier uses four.

D. wrong: a single diode gives half-wave rectification, not a bridge rectifier.

131 Component converting AC to DC

An electrical component used to convert AC into DC is:

- A. Transistor
- B. Capacitor
- C. Diode ✓ **Correct answer**
- D. Resistor

A. wrong: a transistor amplifies or switches signals, it does not convert AC to DC.

B. wrong: a capacitor blocks DC and passes AC, it does not convert AC to DC.

C. correct: a diode conducts in one direction only, so it rectifies AC into (pulsating) DC.

D. wrong: a resistor only limits current, it does not convert AC to DC.

Question 132 Photon mass and momentum

A photon has:

- A. Zero mass, Zero momentum
- B. Finite mass, finite momentum
- C. Zero mass, finite momentum ✓ **Correct answer**
- D. Finite mass, zero momentum

A. wrong: a photon has zero rest mass but finite momentum.

B. wrong: a photon has zero rest mass.

C. correct: a photon has zero rest mass but carries energy $E = hf$ and momentum $p = h/\lambda$, which is finite.

D. wrong: a photon has zero rest mass and finite momentum.

133 Photocells and solar cells

Devices such as photocells and solar cells are applications of:

- A. Photo electric effect ✓ **Correct answer**
- B. Compton's effect
- C. Pair production
- D. Interference of light

A. correct: photocells and solar cells work by the photoelectric effect — light releases electrons (or excites charge carriers), producing an electric current.

B. wrong: the Compton effect is the scattering of X-rays by electrons, not the basis of photocells.

C. wrong: pair production creates an electron-positron pair from a high-energy photon, not the basis of photocells.

D. wrong: interference of light is not the basis of photocells and solar cells.

Question 134 Smallest de Broglie wavelength

Which of the following particle has smaller De Broglie wave length?

- A. Gamma particle
- B. Beta particle
- C. Proton
- D. Alpha particle ✓ **Correct answer**

A. wrong: a gamma particle (photon) has a very small mass, so its de Broglie wavelength is not the smallest under the usual equal-speed comparison.

B. wrong: a beta particle (electron) is much lighter than an alpha particle, so its wavelength is larger.

C. wrong: a proton is lighter than an alpha particle, so its wavelength is larger under the

D. correct: under the usual equal-speed assumption, λ = h/mv — the alpha particle has the largest mass, so it has the smallest de Broglie wavelength. (Note: the stem does not state the comparison condition; the standard textbook reading is equal speed.)

Question 135 Hydrogen series with smallest wavelength

In the spectrum of hydrogen atom which of the following series has smallest wavelength?

- A. Paschen series
- B. Balmer series
- C. Lyman series ✓ **Correct answer**
- D. Brackett series

A. wrong: the Paschen series (to n = 3) has longer wavelengths than the Lyman series.

B. wrong: the Balmer series (to n = 2) has longer wavelengths than the Lyman series.

C. correct: Lyman transitions end at n = 1 and have the largest energy gaps, hence the highest frequencies and the smallest wavelengths.

D. wrong: the Brackett series (to n = 4) has the longest wavelengths of the four.

Question 136 Antonym of clarity

The antonym for the word clarity is:

- A. Upright
- B. Understanding
- C. Vagueness ✓ **Correct answer**
- D. Clear

A. wrong: 'upright' means honest or vertical, not the opposite of clarity.

understanding" is closer to a synonym of clarity, not its antonym.

C. correct: 'vagueness' (uncertain, unclear language) is the opposite of 'clarity'.

D. wrong: 'clear' is a synonym of clarity, not its antonym.

Question 137 Evicted meaning

Yasir Ameen could not pay the rent; accordingly, he was (evicted). Meaning of the bracketed word is:

- A. Expelled from the house ✓ **Correct answer**
- B. Investigated
- C. Threatened
- D. Rewarded

A. correct: 'evicted' means expelled or legally removed from a house or property — Yasir could not pay the rent, so he was removed.

B. wrong: 'evicted' does not mean investigated.

C. wrong: 'evicted' does not mean threatened.

D. wrong: 'evicted' does not mean rewarded.

Question 138 The baby ___ all morning

Fill in the blank with the correct verb. The baby _____ all morning.

- A. Is crying
- B. Has been crying ✓ **Correct answer**
- C. Cry
- D. Have been crying

A. wrong: 'all morning' describes an action continuing over a period up to now, which needs the present perfect continuous.

as been crying' is the present perfect continuous, used for an action continuing over a period up to the present.

C. wrong: 'cry' does not agree with 'the baby' and is the wrong tense.

D. wrong: 'have' does not agree with the singular subject 'the baby'.

Question 139 By 2040, robots ___ many jobs

By 2040, robots _____ many of the jobs that people do today.

- A. Will be taking over
- B. Will take over
- C. Will have taken over ✓ **Correct answer**
- D. Has taken over

A. wrong: 'by 2040' sets a completion point, which needs the future perfect, not the future continuous.

B. wrong: 'by 2040' sets a completion point, which needs the future perfect.

C. correct: 'by 2040' sets a future completion point, so the future perfect ('will have taken over') is used.

D. wrong: 'has taken over' is present perfect and does not agree with the future time 'by 2040'.

Question 140 Sentence type: Each time one of us touches the soil...

"Each time one of us touches the soil, we feel a sense of personal renewal". The type of sentence is

- A. Compound
- B. Complex ✓ **Correct answer**
- C. Compound Complex
- D. Simple

A compound sentence has two independent clauses; this sentence has one dependent clause and one independent clause.

B. correct: 'Each time one of us touches the soil' is a dependent clause and 'we feel a sense of personal renewal' is the independent clause — one dependent plus one independent clause makes a complex sentence.

C. wrong: a compound-complex sentence needs two independent clauses plus a dependent clause.

D. wrong: a simple sentence has only one clause; this sentence has two.

Question 141 Correctly punctuated sentence

Identify the correctly punctuated sentence.

- A. Milton the great English Poet, was blind
- B. Milton, the great English poet, was blind ✓ **Correct answer**
- C. Milton the great English poet was, blind
- D. Milton the great, English poet was blind

A. wrong: the appositive needs a comma before it as well as after it.

B. correct: 'the great English poet' is a non-restrictive appositive renaming Milton, so it is set off by commas on both sides.

C. wrong: the comma is misplaced before 'blind'.

D. wrong: the comma splits the appositive incorrectly.

Question 142 Correct sentence

Identify the correct sentence.

- A. A Sindhi woman is going through a bazaar with bear feet
- B. A Sindhi women are going through a bazaar with bare feet

ndhi woman is going through a bazaar with bare feet ✓ **Correct answer**

- D. A Sindhi woman is going through a bazaar with bare foot

A. wrong: 'bear' is the wrong word — it should be 'bare'.

B. wrong: 'women' is plural and does not agree with 'are' in this sentence (the subject should be the singular 'woman' with 'is').

C. correct: the singular subject 'woman' agrees with 'is', and 'bare' (uncovered) is the correct word for feet.

D. wrong: 'foot' should be the plural 'feet'.

Question 143 Cautioned ___ pickpockets

Complete the sentence using correct preposition. The public are cautioned _____ pickpockets.

- A. Against ✓ **Correct answer**
- B. Of
- C. For
- D. With

A. correct: 'cautioned against' is the fixed expression — the public are warned against pickpockets.

B. wrong: 'cautioned of' is not the standard expression here.

C. wrong: 'cautioned for' is not the standard expression here.

D. wrong: 'cautioned with' is not the standard expression here.

Question 144 Affect / effect pair

Select the correct pair. Lack of sleep can _____ your health and have a bad _____ on your grades.

- B. Effect / effect
- C. Effect / affect
- D. Affect / effect ✓ **Correct answer**

A. wrong: the second blank needs the noun 'effect', not the verb 'affect'.

B. wrong: the first blank needs the verb 'affect', not the noun 'effect'.

C. wrong: the first blank needs the verb 'affect' and the second needs the noun 'effect'.

D. correct: 'affect' is the verb (to influence) and 'effect' is the noun (a result) — lack of sleep can affect your health and have a bad effect on your grades.

Question 145 Correct sentence in style

Select the correct sentence in style.

- A. Having finished his exercise, the books were put away.
- B. Having finishing his exercise, the books were put away
- C. Having finishing his exercise, he put his books away
- D. Having finished his exercise, he put away his books. ✓ **Correct answer**

A. wrong: the participle phrase dangles — the books did not finish the exercise.

B. wrong: 'having finishing' is wrong and the phrase dangles.

C. wrong: 'having finishing' is the wrong form.

D. correct: 'having finished' correctly describes 'he', who then put his books away.

Question 146 He is anything but a liar

Select the statement that best describes the given sentence. "He is anything but a liar."

- A. He is a liar.
- B. He is certainly not a liar. ✓ **Correct answer**

s not a good character and liar as well

- D. He is a good character but a liar to some extent

A. wrong: 'anything but' rejects the description that follows.

B. correct: 'anything but a liar' is an idiom meaning he is certainly not a liar.

C. wrong: the sentence does not say he is a liar at all.

D. wrong: the sentence denies that he is a liar.

Question 147 Unless you apologise I shall punish you

Select the best option to describe the given sentence. "Unless you apologise I shall punish you."

- A. Without apology, you will be forgiven.
- B. With apology, you will be punished.
- C. There is no need of apology.
- D. Without apology you will be punished. ✓ **Correct answer**

A. wrong: the sentence says the opposite — without apology comes punishment, not forgiveness.

B. wrong: the sentence says punishment follows the absence of apology, not its presence.

C. wrong: the sentence makes punishment conditional on the apology, so an apology matters.

D. correct: 'unless' means 'if not' — if you do not apologise, I shall punish you.

Question 148 Pay off his old scores

"From the attitude it is clear that he wants to pay off his old scores." The sentence means that he wants to:

- A. Improve his marks

off his debt

- C. Help needy people
- D. Have his revenge ✓ **Correct answer**

A. wrong: 'pay off old scores' is not about examination marks.

B. wrong: 'pay off old scores' is an idiom for revenge, not a financial debt.

C. wrong: 'pay off old scores' is not about helping people.

D. correct: to pay off (or settle) old scores means to take revenge for an earlier wrong.

Question 149 Profoundly meaning

A person needs to reflect (profoundly) on his/her life. The bracketed word means:

- A. Deeply ✓ **Correct answer**
- B. Superficially
- C. Shallow
- D. Mirroring

A. correct: 'profoundly' means deeply or with great seriousness — to reflect profoundly is to think deeply.

B. wrong: 'superficially' is the opposite of 'profoundly'.

C. wrong: 'shallow' is the opposite of 'profoundly'.

D. wrong: 'mirroring' means reflecting as in a mirror, not 'profoundly'.

Question 150 Took the advice with a pinch of salt

Due to his non-serious attitude, Ali took the advice with a pinch of salt. It means:

- A. Took it seriously
- B. Did not take it seriously. ✓ **Correct answer**
- C. Accept it candidly.

A. wrong: taking advice with a pinch of salt means the opposite — not taking it fully seriously.

B. correct: 'to take advice with a pinch of salt' means to receive it with doubt or reservation, not accepting it fully at face value.

C. wrong: taking advice with a pinch of salt means not accepting it candidly.

D. wrong: taking advice with a pinch of salt means not following it fully.

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Source: https://eprepare.org/blog/nums-paper-answer-key (accessed 8 Nov 2026). See the source note on this page about the fold-in corrections.