PMDC MDCAT (NUMS) — GUESS PAPER 2027 · Predicted Questions

Body: Pakistan Medical & Dental Council (PMDC, NUMS) · **Post:** MDCAT (Medical & Dental College Admission Test) · **Questions:** 200 predicted (Biology 74, Chemistry 53, Physics 53, English 20) — 20 repeated questions, 160 verified facts predicted to recur, 20 syllabus anchors · **Price:** Free

GUESS PAPER — predicted questions for the next sitting, MDCAT 2027 (NUMS), NOT a past paper. Every question below is a prediction: it is here because the same question, the same fact, or the same topic appeared in verified MDCAT (PMDC, NUMS) past papers. **No pass guarantee.** A guess paper raises the odds; it does not promise a result. Answers are the best-supported answers, not exam keys.
Flag — this board's own sitting: the general all-boards MDCAT 2027 guess paper already exists and is live — THIS paper predicts NUMS's own 2027 sitting, built ONLY on verified NUMS past papers (2023, 2025, 2026 Paper 1). NUMS Paper-I has no Logical Reasoning section.

> **How to use this paper:** study the basis under each question, not just the answer — the real paper will ask the same topics in different words. Revise the underlying topic, not only the four options. Do not quote any item as "asked in the 2027 exam" — nothing here has been asked yet.

Question 1 Biology

Select an example of fibrous protein:

- A. Collagen ✓ **Predicted answer**
- B. Hemoglobin
- C. Hormones
- D. Enzymes

swer? A long, rope-like structural fibrous protein of connective tissue; correct.

Why predicted [A] — Repeated question: repeated — 37o Q67, 37s Q54 and 37s Q106 all key Collagen. Also asked as: 37o Q67: “Which of the following protein establishes the matrix of bone and cartilage?”; 37s Q54: “Protein present in connective tissues of human body is:”; 37s Q106: “Which protein is present in the walls of alveoli?”

Question 2 Biology

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

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

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

Why predicted [B] — Verified fact, predicted to recur: 37adb Q21 (VERIFIED) — Mitochondria.

Question 3 Biology

Microscopic gap between the two neurons is called:

- A. Synaptic knob
- B. Synapsis
- C. Synapse ✓ **Predicted answer**
- D. Collapse

Why this answer? The junction/gap across which one neuron signals the next; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q64 (VERIFIED) — Synapse.

4 Biology

The cells which play very important role in developing immunity are:

- A. Thrombocytes
- B. Monocytes
- C. Neutrophils
- D. Lymphocytes ✓ **Predicted answer**

Why this answer? B cells produce antibodies and T cells mediate cell-mediated immunity and memory — the cells of specific, adaptive immunity; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q56 (VERIFIED) — Lymphocytes.

Question 5 Biology

The organs perform same functions in different groups of organism but are different in this internal structure called as:

- A. Homologous organs
- B. Bisymmetry
- C. Analogous organs ✓ **Predicted answer**
- D. Radial symmetry

Why this answer? correct: analogous organs perform the same function in different groups but differ in internal structure.

Why predicted [B] — Verified fact, predicted to recur: 37o Q52 (VERIFIED) — Analogous organs.

Question 6 Biology

A hormone that plays a major role in social bonding, childbirth, milk ejection and sexual reproduction is:

actin

- B. Secretin
- C. Estrogen
- D. Oxytocin ✓ **Predicted answer**

Why this answer? Uterine contractions, milk ejection, pair/social bonding; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q41 (VERIFIED) — Oxytocin.

Question 7 Biology

Which hormone is chemically a steroid?

- A. Cortisone ✓ **Predicted answer**
- B. Insulin
- C. ADH
- D. Thyroxin

Why this answer? A glucocorticoid steroid hormone derived from cholesterol, with the four-ring steroid structure; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q65 (VERIFIED) — Cortisone.

Question 8 Biology

Cell membrane also contains _____ through which the movement of materials takes place by active and passive transport:

- A. Charged pores
- B. Carbohydrates
- C. Lipids
- D. Carrier proteins ✓ **Predicted answer**

Why this answer? Carrier proteins bind a substance on one side, change shape, and release it on the other; they mediate BOTH facilitated diffusion (passive) and active

umps use ATP to move substances against their gradient) — the only option covering both mechanisms named in the stem; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q89 (VERIFIED) — Carrier proteins.

Question 9 Biology

The process by which unwanted structures are engulfed and digested within the lysosome is termed as:

- A. Endocytosis
- B. Exocytosis
- C. Autophagy ✓ **Predicted answer**
- D. Autolysis

Why this answer? The cell wraps its own worn-out organelles or material in a membrane and delivers them to lysosomes for digestion ("self-eating"); correct.

Why predicted [B] — Verified fact, predicted to recur: 37s Q120 (VERIFIED) — Autophagy.

Question 10 Biology

Ions involved in synaptic transmission of nerve impulse:

- A. K^+, Ca^{2+}
- B. K^+, Ca^{2+}, Na^+
- C. Na^+, K^+
- D. Na^+, Ca^{2+} ✓ **Predicted answer**

Why this answer? The marked key: the textbook's transmission pair — Na^+ for the presynaptic action potential and Ca^{2+} influx for vesicle release.

Why predicted [B] — Verified fact, predicted to recur: 37s Q129 (VERIFIED) — Na^+, Ca^{2+}.

11 Biology

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

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

Why this answer? correct: in strenuous exercise muscles rely on anaerobic glycolysis, whose net gain is 2 ATP per glucose (4 made, 2 used).

Why predicted [B] — Verified fact, predicted to recur: 37adb Q5 (VERIFIED) — 2 ATPs.

Question 12 Biology

Which organelle is the site of protein synthesis in the cell?

- A. Lysosome
- B. Nucleus
- C. Ribosome ✓ **Predicted answer**
- D. Golgi apparatus

Why this answer? Ribosomes translate mRNA into protein; the Golgi apparatus modifies and packages proteins, and the nucleus stores the genetic instructions.

Why predicted [C] — Syllabus anchor: syllabus anchor — cell organelles recur (37adb Q24: toxin disrupting the Golgi apparatus). Standard textbook fact.

Question 13 Biology

Which organelle is known as the powerhouse of the cell because it generates most of the cell's ATP?

- A. Ribosome

- C. Nucleus
- D. Mitochondria ✓ **Predicted answer**

Why this answer? Mitochondria carry out aerobic respiration and produce most of the cell's ATP; the nucleus stores genetic information and ribosomes make proteins.

Why predicted [C] — Syllabus anchor: syllabus anchor — mitochondria/ATP recur (37adb Q9: proton pumping in mitochondria). Standard textbook fact.

Question 14 Biology

Na+ (sodium ions) are nearly how many times greater in the fluid outside the cell than inside?

- A. 2
- B. 5
- C. 10 ✓ **Predicted answer**
- D. 20

Why this answer? Sodium is about ten times more concentrated outside the cell than inside, maintained by the sodium-potassium pump.

Why predicted [B] — Verified fact, predicted to recur: 37o Q40 (VERIFIED) — 10.

Question 15 Biology

Which hormone is secreted in bulk when the water content of the blood decreases?

- A. Aldosterone
- B. Thyroxine
- C. Insulin
- D. Anti-diuretic hormone (ADH) ✓ **Predicted answer**

Why this answer? When blood water falls, ADH is released in bulk to increase water

…n in the kidneys.

Why predicted [B] — Verified fact, predicted to recur: 37o Q42 (VERIFIED) — Anti-Diuretic Hormone (ADH).

Question 16 Biology

The site of production of neurotransmitters is the:

- A. Cell body
- B. Axon hillock
- C. Postsynaptic neuron
- D. Presynaptic neuron ✓ **Predicted answer**

Why this answer? Neurotransmitters are made and stored in the presynaptic neuron, then released into the synapse.

Why predicted [B] — Verified fact, predicted to recur: 37o Q43 (VERIFIED) — Presynaptic neuron.

Question 17 Biology

Endorphins are produced in the:

- A. Pituitary gland
- B. Adrenal gland
- C. Liver
- D. Brain ✓ **Predicted answer**

Why this answer? Endorphins, the body's natural painkillers, are produced in the brain (and pituitary).

Why predicted [B] — Verified fact, predicted to recur: 37o Q44 (VERIFIED) — Brain.

18 Biology

The hormone responsible for the production of sperm cells and male secondary sexual characteristics is:

- A. Oestrogen
- B. Progesterone
- C. Testosterone ✓ **Predicted answer**
- D. Prolactin

Why this answer? Testosterone drives sperm production and the development of male secondary sexual characteristics.

Why predicted [B] — Verified fact, predicted to recur: 37o Q45 (VERIFIED) — Testosterone.

Question 19 Biology

Leydig cells are responsible for:

- A. Nourishing sperm
- B. Producing semen
- C. Sperm production
- D. Testosterone production ✓ **Predicted answer**

Why this answer? The Leydig (interstitial) cells of the testes secrete testosterone.

Why predicted [B] — Verified fact, predicted to recur: 37o Q46 (VERIFIED) — Testosterone production.

Question 20 Biology

The secretion of oestrogen during oogenesis is stimulated by:

- A. Progesterone
- B. Prolactin

- D. Follicle-stimulating hormone ✓ **Predicted answer**

Why this answer? FSH stimulates the ovarian follicle, which secretes oestrogen.

Why predicted [B] — Verified fact, predicted to recur: 37o Q47 (VERIFIED) — Follicle Stimulating Hormone.

Question 21 Biology

Which pituitary hormones regulate the menstrual cycle?

- A. FSH and LH ✓ **Predicted answer**
- B. ADH and oxytocin
- C. TSH and ACTH
- D. GH and prolactin

Why this answer? Follicle-stimulating hormone and luteinising hormone together regulate the menstrual cycle.

Why predicted [B] — Verified fact, predicted to recur: 37o Q48 (VERIFIED) — Follicle Stimulating Hormone and Luteinizing hormone.

Question 22 Biology

Which trait is transmitted directly from an affected father to only his son?

- A. Autosomal dominant
- B. Autosomal recessive
- C. X-linked
- D. Y-linked ✓ **Predicted answer**

Why this answer? A father passes his Y chromosome only to his sons, so Y-linked traits go father to son.

Why predicted [B] — Verified fact, predicted to recur: 37o Q49 (VERIFIED) — Y-linked

23 Biology

When both alleles of a gene pair are the same, the organism is said to be:

- A. Hemizygous
- B. Hybrid
- C. Heterozygous
- D. Homozygous ✓ **Predicted answer**

Why this answer? Two identical alleles at a locus make the organism homozygous for that gene.

Why predicted [B] — Verified fact, predicted to recur: 37o Q50 (VERIFIED) — Homozygous.

Question 24 Biology

The theory that mitochondria and chloroplasts are, in effect, ancient bacteria now living inside eukaryotic cells is the:

- A. Germ theory
- B. Gene theory
- C. Cell theory
- D. Endosymbiotic theory ✓ **Predicted answer**

Why this answer? The endosymbiotic theory holds that mitochondria and chloroplasts were once free-living bacteria.

Why predicted [B] — Verified fact, predicted to recur: 37o Q51 (VERIFIED) — Endosymbiotic theory.

Question 25 Biology

Which of the following may NOT be a mode of action of an antibody?

- A. Neutralising toxins

- C. Secretion of cytokines ✓ **Predicted answer**
- D. Agglutination

Why this answer? Antibodies neutralise, opsonise and agglutinate, but they do not secrete cytokines (immune cells do).

Why predicted [B] — Verified fact, predicted to recur: 37o Q53 (VERIFIED) — Secretion of cytokines.

Question 26 Biology

Pepsinogen is converted into its active form, pepsin, by:

- A. Enterokinase
- B. Lipase
- C. Bile salts
- D. Hydrochloric acid ✓ **Predicted answer**

Why this answer? HCl in the stomach activates pepsinogen to pepsin.

Why predicted [B] — Verified fact, predicted to recur: 37o Q54 (VERIFIED) — Hydrochloric acid.

Question 27 Biology

Digestion of which food component starts in the oral cavity?

- A. Proteins
- B. Lipids
- C. Carbohydrates ✓ **Predicted answer**
- D. Nucleic acids

Why this answer? Salivary amylase begins carbohydrate digestion in the mouth.

Why predicted [B] — Verified fact, predicted to recur: 37o Q57 (VERIFIED) —

Question 28 Biology

Which protein establishes the matrix of bone and cartilage?

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

Why this answer? Collagen fibres form the matrix of bone and cartilage.

Why predicted [A] — Repeated question: repeated — 37o Q67 and 37s Q54 and 37s Q106 all key Collagen. Also asked as: 37o Q67: “Which of the following protein establishes the matrix of bone and cartilage?”; 37s Q54: “Protein present in connective tissues of human body is:”; 37s Q106: “Which protein is present in the walls of alveoli?”

Question 29 Biology

Which molecules are released after the light reactions and then used in the dark reactions of photosynthesis?

- A. ATP and NADPH ✓ **Predicted answer**
- B. ADP and NADP+
- C. Glucose and oxygen
- D. ATP and oxygen

Why this answer? The light reactions produce ATP and NADPH, which power the Calvin cycle (dark reactions).

Why predicted [A] — Repeated question: repeated — 37o Q73 and 37o Q74 and 37adb Q6 all key ATP and NADPH. Also asked as: 37o Q73: “Which of the following molecules are released after completion of light reaction and then utilized in the dark”; 37o Q74: “Which are the end products of light reactions of photosynthesis?”; 37adb Q6: “The end product of

ectron pathway is:

Question 30 Biology

Which hormone is known as the emergency hormone?

- A. Insulin
- B. Thyroxine
- C. Adrenaline ✓ **Predicted answer**
- D. Oestrogen

Why this answer? Adrenaline (epinephrine) prepares the body for fight or flight in emergencies.

Why predicted [C] — Syllabus anchor: syllabus anchor — hormones recur (37o Q41: oxytocin induces labour pains; 37o Q45: testosterone and male secondary sexual characteristics). Standard textbook fact.

Question 31 Biology

The structural and functional unit of the nervous system is the:

- A. Axon
- B. Synapse
- C. Nephron
- D. Neuron ✓ **Predicted answer**

Why this answer? The neuron is the structural and functional unit of the nervous system.

Why predicted [C] — Syllabus anchor: syllabus anchor — neurons recur (37o Q43: neurotransmitters are produced in the presynaptic neuron; 37o Q64: the junction between two neurons is the synapse). Standard textbook fact.

32 Biology

Which enzyme converts single-stranded RNA into double-stranded DNA?

- A. Reverse transcriptase ✓ **Predicted answer**
- B. DNA polymerase
- C. RNA polymerase
- D. Ligase

Why this answer? Reverse transcriptase copies RNA into DNA, the key step of retroviruses such as HIV.

Why predicted [A] — Repeated question: repeated — 37s Q138 and 37adb Q2 all key reverse transcriptase. Also asked as: 37s Q138: “Reverse transcriptase converts:”; 37adb Q2: “Which of the following enzymes converts mRNA to complementary DNA (cDNA)?”

Question 33 Biology

Most enzymes work best at which temperature?

- A. 60 °C
- B. 80 °C
- C. 20 °C
- D. 40 °C ✓ **Predicted answer**

Why this answer? Most human enzymes work best near body temperature, around 37–40 °C.

Why predicted [B] — Verified fact, predicted to recur: 37o Q69 (VERIFIED) — 40°C.

Question 34 Biology

In terms of enzyme action, "maximum temperature" refers to the temperature at which:

- A. Enzymes are produced
- B. Substrates melt

- D. Enzymes start to denature ✓ **Predicted answer**

Why this answer? Above the optimum, heat denatures the enzyme and activity falls.

Why predicted [B] — Verified fact, predicted to recur: 37o Q70 (VERIFIED) — Enzymes start to denature.

Question 35 Biology

The heart chamber from which the aorta originates is the:

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

Why this answer? The aorta carries oxygenated blood from the left ventricle to the body.

Why predicted [B] — Verified fact, predicted to recur: 37o Q59 (VERIFIED) — Left ventricle.

Question 36 Biology

The pubic symphysis and intervertebral disc are examples of:

- A. Synovial joints
- B. Ball-and-socket joints
- C. Fibrous joints
- D. Cartilaginous joints ✓ **Predicted answer**

Why this answer? These joints are joined by cartilage, which allows slight movement.

Why predicted [B] — Verified fact, predicted to recur: 37o Q60 (VERIFIED) — Cartilaginous joints.

37 Biology

Cartilage is more difficult to heal than bone because cartilage:

- A. Is too hard
- B. Has no matrix
- C. Has too many cells
- D. Lacks vascular supply ✓ **Predicted answer**

Why this answer? Cartilage has no blood vessels, so nutrients and repair cells reach it slowly.

Why predicted [B] — Verified fact, predicted to recur: 37o Q61 (VERIFIED) — Lacks vascular supply.

Question 38 Biology

Which feature is absent from cardiac muscles?

- A. Striations
- B. Intercalated discs
- C. Multinucleate cells ✓ **Predicted answer**
- D. Involuntary control

Why this answer? Cardiac muscle cells are typically uninucleate (one nucleus), unlike skeletal muscle fibres.

Why predicted [B] — Verified fact, predicted to recur: 37o Q62 (VERIFIED) — Multinucleate cells.

Question 39 Biology

The sarcoplasmic reticulum of muscle fibres is mainly responsible for:

- A. Calcium storage ✓ **Predicted answer**
- B. Protein synthesis

gen storage

- D. ATP production

Why this answer? The sarcoplasmic reticulum stores Ca2+ and releases it to trigger muscle contraction.

Why predicted [B] — Verified fact, predicted to recur: 37o Q63 (VERIFIED) — Calcium storage.

Question 40 Biology

Underactivity of the parathyroid glands causes a drop in blood levels of:

- A. Na+
- B. K+
- C. Ca2+ ✓ **Predicted answer**
- D. Mg2+

Why this answer? Parathyroid hormone raises blood calcium, so underactivity lowers it.

Why predicted [B] — Verified fact, predicted to recur: 37o Q66 (VERIFIED) — Ca2+.

Question 41 Biology

Non-competitive inhibitors react with enzymes at the:

- A. Substrate
- B. Cofactor
- C. Active site
- D. Allosteric site ✓ **Predicted answer**

Why this answer? Non-competitive inhibitors bind away from the active site, changing the enzyme's shape.

Why predicted [B] — Verified fact, predicted to recur: 37o Q68 (VERIFIED) — Allosteric site.

42 Biology

When light falls on P-700, which event is likely to occur?

- A. It is oxidised ✓ **Predicted answer**
- B. It is destroyed
- C. It fluoresces
- D. It is reduced

Why this answer? P-700 (the reaction centre of photosystem I) loses an electron when excited by light.

Why predicted [B] — Verified fact, predicted to recur: 37o Q72 (VERIFIED) — It is oxidised.

Question 43 Biology

Synthesis of ATP during photosynthesis takes place at the:

- A. Grana
- B. Cytoplasm
- C. Stroma
- D. Thylakoid ✓ **Predicted answer**

Why this answer? Photophosphorylation, the synthesis of ATP in photosynthesis, occurs on the thylakoid membrane.

Why predicted [B] — Verified fact, predicted to recur: 37o Q75 (VERIFIED) — Thylakoid.

Question 44 Biology

The complete, mature and infectious virus particle is known as a:

- A. Virion ✓ **Predicted answer**
- B. Capsid
- C. Prion

Why this answer? A virion is the complete infectious virus particle (nucleic acid plus capsid).

Why predicted [B] — Verified fact, predicted to recur: 37o Q76 (VERIFIED) — Virion.

Question 45 Biology

All viruses are:

- A. Parasites ✓ **Predicted answer**
- B. Autotrophs
- C. Decomposers
- D. Saprophytes

Why this answer? Viruses are obligate parasites that reproduce only inside host cells.

Why predicted [B] — Verified fact, predicted to recur: 37o Q77 (VERIFIED) — Parasites.

Question 46 Biology

Which structure increases the pathogenicity of bacteria?

- A. Pilus
- B. Mesosome
- C. Flagellum
- D. Capsule ✓ **Predicted answer**

Why this answer? The capsule protects bacteria from phagocytosis, increasing their pathogenicity.

Why predicted [B] — Verified fact, predicted to recur: 37o Q78 (VERIFIED) — Capsule.

47 Biology

What distinguishes the concept of special creation from the concept of evolution?

- A. Special creation relies on inspiration and meditation for the origin of life ✓ **Predicted answer**
- B. Special creation uses fossil evidence
- C. Evolution relies on scripture
- D. Both rely on experiments

Why this answer? Special creation explains life's origin by divine inspiration, while evolution rests on evidence and natural processes.

Why predicted [B] — Verified fact, predicted to recur: 37s Q94 (VERIFIED) — Rely on inspiration and meditation for life origin.

Question 48 Biology

Which of the following ideas is a part of Lamarckism?

- A. Use and disuse of organs ✓ **Predicted answer**
- B. Survival of the fittest
- C. Genetic drift
- D. Natural selection

Why this answer? Lamarck proposed that organs develop through use and weaken through disuse, and that acquired traits are inherited.

Why predicted [B] — Verified fact, predicted to recur: 37s Q95 (VERIFIED) — Use and disuse of organs.

Question 49 Biology

Choose the correct pair for homology:

- A. Eyes of octopus and eyes of humans

of fish and flippers of whales

- C. Wings of birds and wings of insects
- D. Forelimbs of birds and fins of whales ✓ **Predicted answer**

Why this answer? Bird forelimbs and whale fins share the same bone plan from a common ancestor — they are homologous.

Why predicted [B] — Verified fact, predicted to recur: 37s Q96 (VERIFIED) — Forelimbs of birds and fins of whales.

Question 50 Biology

Which chronological sequence is correct among the classes of vertebrates as evidence of evolution?

- A. Fish → amphibians → reptiles → birds ✓ **Predicted answer**
- B. Amphibians → fish → birds → reptiles
- C. Reptiles → fish → birds → amphibians
- D. Birds → reptiles → amphibians → fish

Why this answer? The fossil record shows vertebrates appearing in the order fish, amphibians, reptiles, then birds.

Why predicted [B] — Verified fact, predicted to recur: 37s Q97 (VERIFIED) — Fish → amphibians → reptiles → birds.

Question 51 Biology

The light reactions of photosynthesis produce ATP and NADPH for use in the:

- A. Glycolysis
- B. Electron transport chain
- C. Krebs cycle
- D. Calvin cycle ✓ **Predicted answer**

swer? ATP and NADPH from the light reactions drive the Calvin cycle, which fixes carbon dioxide into carbohydrate.

Why predicted [A] — Repeated question: repeated — 37o Q73 and 37o Q74 and 37adb Q6 all key ATP and NADPH. Also asked as: 37o Q73: “Which of the following molecules are released after completion of light reaction and then utilized in the dark”; 37o Q74: “Which are the end products of light reactions of photosynthesis?”; 37adb Q6: “The end product of non-cyclic electron pathway is:”

Question 52 Biology

Competitive inhibitors reduce enzyme activity by:

- A. Competing with the substrate for the active site ✓ **Predicted answer**
- B. Denaturing the enzyme
- C. Destroying the substrate
- D. Binding to the allosteric site

Why this answer? Competitive inhibitors resemble the substrate and compete for the active site.

Why predicted [A] — Repeated question: repeated — 37o Q71 and 37adb Q35 all key competing with the substrate for the active site. Also asked as: 37o Q71: “_____ reduce the enzymes productivity by blocking the substrate from entering into the active site due to similar shape”; 37adb Q35: “Which statement best describes competitive inhibitors?”

Question 53 Biology

Which blood cells are responsible for the clotting of blood?

- A. Red blood cells
- B. White blood cells
- C. Platelets ✓ **Predicted answer**
- D. Plasma cells

swer? Platelets gather at a wound and start the clotting process.

Why predicted [C] — Syllabus anchor: syllabus anchor — blood components recur (37s Q101: CO2, glucose and water are present in both blood and lymph; 37o Q59: the aorta originates from the left ventricle). Standard textbook fact.

Question 54 Biology

In which organ does gaseous exchange take place in humans?

- A. Liver
- B. Kidney
- C. Heart
- D. Lungs ✓ **Predicted answer**

Why this answer? Oxygen and carbon dioxide are exchanged in the lungs, across the alveoli.

Why predicted [C] — Syllabus anchor: syllabus anchor — respiration recurs (37adb Q53: bicarbonate is transported from blood to the lungs; 37s Q100: the mitral valve lies between the left atrium and left ventricle). Standard textbook fact.

Question 55 Biology

The smallest known bacteria belong to the genus:

- A. Mycoplasma ✓ **Predicted answer**
- B. Bacillus
- C. Staphylococcus
- D. Escherichia

Why this answer? Mycoplasma are the smallest known bacteria, lacking even a cell wall.

Why predicted [B] — Verified fact, predicted to recur: 37o Q79 (VERIFIED) — Mycoplasma.

56 Biology

Mesenteric veins drain the blood from the:

- A. Kidney
- B. Spleen
- C. Liver
- D. Large intestine ✓ **Predicted answer**

Why this answer? The mesenteric veins drain blood from the intestines towards the liver.

Why predicted [B] — Verified fact, predicted to recur: 37o Q80 (VERIFIED) — Large intestine.

Question 57 Biology

The secondary cell wall in plants is present:

- A. Between the primary cell wall and plasma membrane ✓ **Predicted answer**
- B. Inside the vacuole
- C. In the nucleus
- D. Outside the primary cell wall

Why this answer? The secondary wall is laid down inside the primary wall, next to the plasma membrane.

Why predicted [B] — Verified fact, predicted to recur: 37o Q81 (VERIFIED) — Between the primary cell wall and plasma membrane.

Question 58 Biology

What distinguishes a prokaryotic cell wall from a fungal cell wall?

- A. Fungal cell wall contains peptidoglycan
- B. Both contain chitin
- C. Prokaryotic cell wall contains cellulose

karyotic cell wall contains peptidoglycan ✓ **Predicted answer**

Why this answer? Bacterial walls are made of peptidoglycan, while fungal walls are made of chitin.

Why predicted [B] — Verified fact, predicted to recur: 37o Q82 (VERIFIED) — Prokaryotic cell wall contains peptidoglycan.

Question 59 Biology

The tonoplast is the membrane separating the:

- A. Vacuole and cytoplasm ✓ **Predicted answer**
- B. Chloroplast and cytoplasm
- C. Mitochondrion and cytoplasm
- D. Nucleus and cytoplasm

Why this answer? The tonoplast surrounds the vacuole.

Why predicted [B] — Verified fact, predicted to recur: 37o Q84 (VERIFIED) — Vacuole and Cytoplasm.

Question 60 Biology

Each centriole is composed of how many triplets of microtubules?

- A. Nine triplets ✓ **Predicted answer**
- B. Nine doublets
- C. Three triplets
- D. Twelve triplets

Why this answer? A centriole is made of nine triplets of microtubules arranged in a ring.

Why predicted [B] — Verified fact, predicted to recur: 37o Q85 (VERIFIED) — Nine Triplets.

61 Biology

The folds of the inner membrane of mitochondria are called:

- A. Thylakoids
- B. Cisternae
- C. Grana
- D. Cristae ✓ **Predicted answer**

Why this answer? Cristae increase the surface area of the inner mitochondrial membrane.

Why predicted [B] — Verified fact, predicted to recur: 37o Q86 (VERIFIED) — Cristae.

Question 62 Biology

According to the fluid mosaic model of the cell membrane, which zone is embedded inside?

- A. Hydrophobic ✓ **Predicted answer**
- B. Glycoprotein
- C. Cholesterol
- D. Hydrophilic

Why this answer? The hydrophobic tails of the phospholipids face inward, away from water.

Why predicted [B] — Verified fact, predicted to recur: 37o Q87 (VERIFIED) — Hydrophobic.

Question 63 Biology

Which organelles are spherical sacs, surrounded by a single membrane and containing hydrolytic enzymes?

- A. Ribosomes

- C. Mitochondria
- D. Lysosomes ✓ **Predicted answer**

Why this answer? Lysosomes are single-membrane sacs of digestive enzymes.

Why predicted [B] — Verified fact, predicted to recur: 37o Q90 (VERIFIED) — Lysosomes.

Question 64 Biology

The most abundant organic compound in mammalian cells is:

- A. Carbohydrates
- B. Lipids
- C. Proteins ✓ **Predicted answer**
- D. Nucleic acids

Why this answer? Proteins are the most abundant organic compounds in mammalian cells.

Why predicted [B] — Verified fact, predicted to recur: 37o Q91 (VERIFIED) — Proteins.

Question 65 Biology

Thermal stability of organisms in the environment is because of which characteristic of water?

- A. Heat capacity ✓ **Predicted answer**
- B. Surface tension
- C. Transparency
- D. Low density

Why this answer? Water's high heat capacity buffers organisms against temperature swings.

ed [B] — Verified fact, predicted to recur: 37o Q92 (VERIFIED) — Heat capacity.

Question 66 Biology

C-H bonds in lipids are important because they provide:

- A. No energy
- B. Structural support only
- C. Less energy
- D. More energy ✓ **Predicted answer**

Why this answer? C–H bonds are energy-rich, so lipids store more energy per gram than carbohydrates.

Why predicted [B] — Verified fact, predicted to recur: 37o Q93 (VERIFIED) — Providing more energy.

Question 67 Biology

Which carbohydrates are the sweetest among all carbohydrates?

- A. Polysaccharides
- B. Disaccharides
- C. Monosaccharides ✓ **Predicted answer**
- D. Oligosaccharides

Why this answer? Monosaccharides (such as fructose) are the sweetest carbohydrates.

Why predicted [B] — Verified fact, predicted to recur: 37o Q94 (VERIFIED) — Monosaccharides.

Question 68 Biology

The induced-fit model of enzyme activity suggests that an enzyme:

- B. Is rigid and unchanging
- C. Can catalyse a related specific reaction ✓ **Predicted answer**
- D. Works on any substrate

Why this answer? In the induced-fit model the active site moulds itself around the substrate, so the enzyme can act on closely related substrates.

Why predicted [B] — Verified fact, predicted to recur: 37s Q88 (VERIFIED) — Can catalyze related specific reaction.

Question 69 Biology

Which ion is used by hexokinase as an activator?

- A. Mg2+ ✓ **Predicted answer**
- B. Zn2+
- C. Fe2+
- D. Ca2+

Why this answer? Hexokinase needs Mg2+ as an activator (as the Mg-ATP complex).

Why predicted [B] — Verified fact, predicted to recur: 37s Q89 (VERIFIED) — Mg^{2+}.

Question 70 Biology

Reversible inhibitors affect an enzyme-catalysed reaction by:

- A. Forming weak linkages with enzymes ✓ **Predicted answer**
- B. Destroying the enzyme
- C. Binding permanently
- D. Removing the substrate

Why this answer? Reversible inhibitors bind weakly, so their effect can be reversed by raising the substrate concentration.

ed [B] — Verified fact, predicted to recur: 37s Q92 (VERIFIED) — Forming weak linkages with enzymes.

Question 71 Biology

Pepsin, the protein-digesting enzyme of the stomach, works best in a:

- A. Acidic medium ✓ **Predicted answer**
- B. Basic medium
- C. Neutral medium
- D. Alkaline medium

Why this answer? Pepsin is activated by and works best in the acidic medium of the stomach.

Why predicted [A] — Repeated question: repeated — 37o Q54 and 37s Q93 all key the acidic medium of the stomach (37o Q54 keys hydrochloric acid; 37s Q93 keys acidic medium for pepsin). Also asked as: 37o Q54: “Pepsinogen is converted into its active form pepsin by:”; 37s Q93: “What is the required medium for the maximum activity of the given enzymes? (Lipase / Pepsin)”

Question 72 Biology

Which of the following is an example of acquired artificial active immunity?

- A. Vaccination ✓ **Predicted answer**
- B. Antiserum injection
- C. Mother's milk
- D. Natural infection

Why this answer? Vaccination deliberately exposes the body to antigen, producing active immunity.

Why predicted [A] — Repeated question: repeated — vaccination recurs across NUMS papers (37o Q58: vaccination is acquired/artificial active immunity; 37s Q109:

um bovis is used for developing a vaccine against tuberculosis; 37adb Q3: Edward Jenner vaccinated a boy against smallpox). Also asked as: 37o Q58: “Vaccination is an example of:”

Question 73 Biology

Which organ in humans produces insulin?

- A. Spleen
- B. Kidney
- C. Liver
- D. Pancreas ✓ **Predicted answer**

Why this answer? The beta cells of the pancreatic islets secrete insulin.

Why predicted [C] — Syllabus anchor: syllabus anchor — glands and hormones recur (37s Q132: insulin is a protein hormone from the pancreas; 37o Q45: testosterone and male secondary sexual characteristics). Standard textbook fact.

Question 74 Biology

Which vitamin is needed for the normal clotting of blood?

- A. Vitamin A
- B. Vitamin C
- C. Vitamin D
- D. Vitamin K ✓ **Predicted answer**

Why this answer? Vitamin K is needed to make prothrombin and other clotting factors.

Why predicted [C] — Syllabus anchor: syllabus anchor — blood and vitamins recur (37s Q101: CO_2, glucose and water are present in both blood and lymph; 37adb Q53: bicarbonate transport in blood). Standard textbook fact.

75 Chemistry

Catalytic reduction of Aldehyde & Ketone forms:

- A. Alkane
- B. Aldehyde
- C. Alcohol ✓ **Predicted answer**
- D. Carboxylic acid

Why this answer? Catalytic hydrogenation reduces C=O to CH–OH: aldehydes → primary alcohols, ketones → secondary alcohols; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q137 (VERIFIED) — Alcohol.

Question 76 Chemistry

Energy of photon is directly proportional to:

- A. velocity
- B. wavelength
- C. temperature
- D. frequency ✓ **Predicted answer**

Why this answer? correct: photon energy E = hf is directly proportional to frequency.

Why predicted [A] — Repeated question: repeated — 37o Q142 and 37adb Q111 all key frequency. Also asked as: 37o Q142: “The amount of energy associated with quantum of radiation is directly proportional to:” Also asked as: 37adb Q111: “If a sound waves moves from air to water, there is NO change in:”

Question 77 Chemistry

By which of the following factors equilibrim state is attained earlier?

- A. Catalyst ✓ **Predicted answer**
- B. Temperature

- D. Concentration

Why this answer? Speeds forward and reverse reactions equally, reaching the SAME equilibrium sooner; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q117 (VERIFIED) — Catalyst.

Question 78 Chemistry

Homo-cyclic organic compounds are sub divided into two groups namely:

- A. Aromatic and non-aromatic
- B. Anti-aromatic
- C. Alicyclic and Aromatic ✓ **Predicted answer**
- D. Open chain and branched chain

Why this answer? Homocyclic (all-carbon rings) divide into alicyclic (saturated/unsaturated non-aromatic rings) and aromatic rings; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q131 (VERIFIED) — Alicyclic and Aromatic.

Question 79 Chemistry

Generic formula of cycloalkane is:

- A. CnCH2n−2
- B. CnH2n+2
- C. CnH2n ✓ **Predicted answer**
- D. CnH2n−1

Why this answer? Cycloalkanes (one ring, no double bonds) have two fewer hydrogens than the corresponding alkane; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q133 (VERIFIED) — CnH2n.

80 Chemistry

Hydrolysis of Nitriles produces:

- A. Aldehydes
- B. Ketones
- C. Esters
- D. Carboxylic acid ✓ **Predicted answer**

Why this answer? Acidic or alkaline hydrolysis of a nitrile (R–C≡N) passes through an amide intermediate and ends at the carboxylic acid R–COOH (plus ammonia/ammonium); correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q139 (VERIFIED) — Carboxylic acid.

Question 81 Chemistry

The SI unit of pressure is:

- A. Pascal ✓ **Predicted answer**
- B. mmHg
- C. Torr
- D. Atm

Why this answer? correct: the SI unit of pressure is the pascal.

Why predicted [B] — Verified fact, predicted to recur: 37o Q148 (VERIFIED) — Pascal.

Question 82 Chemistry

The fourth state of matter is:

- A. Liquid
- B. Gaseous liquid
- C. Plasma ✓ **Predicted answer**

Why this answer? An ionised gas of free electrons and ions, reached at very high temperatures, is conventionally called the fourth state of matter; correct.

Why predicted [B] — Verified fact, predicted to recur: 37s Q70 (VERIFIED) — Plasma.

Question 83 Chemistry

Which element has the highest electronegativity in the periodic table?

- A. Nitrogen
- B. Chlorine
- C. Oxygen
- D. Fluorine ✓ **Predicted answer**

Why this answer? Fluorine is the most electronegative element (about 4.0 on the Pauling scale); electronegativity increases across a period and decreases down a group.

Why predicted [C] — Syllabus anchor: syllabus anchor — electronegativity/periodic trends recur (37adb Q79: electronegativity order, Group IIA; 37adb Q75: decreasing order of ionization energy). Standard textbook fact.

Question 84 Chemistry

Human blood is slightly alkaline. Its normal pH is closest to:

- A. 7.4 ✓ **Predicted answer**
- B. 8.5
- C. 5.5
- D. 6.0

Why this answer? Normal human blood pH is about 7.35–7.45, i.e. slightly alkaline; below 7.35 is acidosis and above 7.45 is alkalosis.

Why predicted [C] — Syllabus anchor: syllabus anchor — pH items recur (37adb Q66: pH

ood is maintained at 7.35, 37adb Q38: pollution changing the pH of water). Standard textbook fact.

Question 85 Chemistry

Which functional group is present in a carboxylic acid?

- A. -COOH ✓ **Predicted answer**
- B. -OH
- C. -NH2
- D. -CHO

Why this answer? A carboxylic acid carries the carboxyl group -COOH; -CHO is the aldehyde group, -OH the alcohol group and -NH2 the amine group.

Why predicted [C] — Syllabus anchor: syllabus anchor — functional groups recur (37adb Q81: functional group of a primary acid amide). Standard textbook fact.

Question 86 Chemistry

Ethene reacts with bromine water and the brown colour of bromine disappears. This is an example of:

- A. Nucleophilic substitution
- B. Free-radical substitution
- C. Elimination
- D. Electrophilic addition ✓ **Predicted answer**

Why this answer? Alkenes such as ethene undergo electrophilic addition across the double bond — the bromine adds to the two carbons and the brown colour is discharged, the standard test for unsaturation.

Why predicted [C] — Syllabus anchor: syllabus anchor — alkene reactions recur (37adb Q84: reactions of alkenes). Standard textbook fact.

87 Chemistry

Vapour pressure is independent of which factor?

- A. Nature of liquid
- B. Intermolecular forces
- C. Temperature
- D. Surface area of liquid ✓ **Predicted answer**

Why this answer? Vapour pressure depends on temperature and the nature of the liquid, not on its surface area.

Why predicted [B] — Verified fact, predicted to recur: 37o Q110 (VERIFIED) — Surface area of liquid.

Question 88 Chemistry

The boiling point of ether is less as compared to alcohols and phenols due to:

- A. Ionic character
- B. Strong hydrogen bonding
- C. Intermolecular forces ✓ **Predicted answer**
- D. High molecular mass

Why this answer? Ethers have weaker intermolecular forces than alcohols and phenols, which hydrogen-bond, so they boil at lower temperatures.

Why predicted [B] — Verified fact, predicted to recur: 37o Q111 (VERIFIED) — Intermolecular forces.

Question 89 Chemistry

When two ice cubes are pressed over each other, they unite to form one cube due to:

- A. H-bonding ✓ **Predicted answer**
- B. Covalent bonding

allic bonding

- D. Van der Waals forces

Why this answer? Pressure melts a thin layer at the contact, and hydrogen bonding re-freezes it into a single cube (regelation).

Why predicted [B] — Verified fact, predicted to recur: 37o Q112 (VERIFIED) — H-bonding.

Question 90 Chemistry

Which of the following shows the greater lattice energy?

- A. KCl
- B. KBr
- C. NaCl
- D. NaF ✓ **Predicted answer**

Why this answer? NaF has the smallest ions among these, so its lattice energy is the greatest.

Why predicted [B] — Verified fact, predicted to recur: 37o Q114 (VERIFIED) — NaF.

Question 91 Chemistry

Thermal conductivity of metals is due to:

- A. Freely moving electrons ✓ **Predicted answer**
- B. Lattice vibrations only
- C. Ions
- D. Photons

Why this answer? Free electrons in metals carry heat energy rapidly through the metal.

Why predicted [B] — Verified fact, predicted to recur: 37o Q115 (VERIFIED) — Freely moving electrons.

92 Chemistry

The high pressure of 200 atm in Haber's process is used for:

- A. Better yield ✓ **Predicted answer**
- B. Faster reaction only
- C. Catalyst activation
- D. Lower cost

Why this answer? High pressure shifts the equilibrium towards ammonia, giving a better yield.

Why predicted [B] — Verified fact, predicted to recur: 37o Q116 (VERIFIED) — Better yield.

Question 93 Chemistry

The minimum amount of energy required by the colliding particles for effective collisions is called:

- A. Kinetic energy
- B. Free energy
- C. Activation energy ✓ **Predicted answer**
- D. Internal energy

Why this answer? Only collisions with energy at least equal to the activation energy lead to reaction.

Why predicted [B] — Verified fact, predicted to recur: 37o Q119 (VERIFIED) — Activation energy.

Question 94 Chemistry

Which of the following is not a state function?

- A. Enthalpy

- C. Work (W) ✓ **Predicted answer**
- D. Internal energy

Why this answer? Work depends on the path taken, so it is not a state function.

Why predicted [B] — Verified fact, predicted to recur: 37o Q120 (VERIFIED) — Work (W).

Question 95 Chemistry

The equation $Mg^{2+}(g) + O^{2-}(g) \rightarrow MgO(s)$ represents which energy change?

- A. Lattice energy ✓ **Predicted answer**
- B. Hydration energy
- C. Bond energy
- D. Ionisation energy

Why this answer? Forming the solid ionic lattice from gaseous ions releases lattice energy.

Why predicted [B] — Verified fact, predicted to recur: 37o Q121 (VERIFIED) — Lattice energy.

Question 96 Chemistry

During electrolysis, reduction always occurs at the:

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

Why this answer? Reduction (gain of electrons) takes place at the cathode during electrolysis.

Why predicted [B] — Verified fact, predicted to recur: 37o Q123 (VERIFIED) — Cathode.

97 Chemistry

The reason for the highest electronegativity value of fluorine is:

- A. Smaller size and higher nuclear charge in the respective period ✓ **Predicted answer**
- B. Larger size and lower nuclear charge
- C. More shells
- D. Fewer protons

Why this answer? Fluorine's small size and high effective nuclear charge attract bonding electrons most strongly.

Why predicted [B] — Verified fact, predicted to recur: 37o Q124 (VERIFIED) — Smaller size and higher nuclear charge in the respective period.

Question 98 Chemistry

Valence shell electron pair repulsion (VSEPR) theory explains:

- A. Reaction rates
- B. Bond energies
- C. Shapes ✓ **Predicted answer**
- D. Bond lengths

Why this answer? VSEPR theory predicts molecular shapes from the repulsion between electron pairs around the central atom.

Why predicted [B] — Verified fact, predicted to recur: 37o Q125 (VERIFIED) — Shapes.

Question 99 Chemistry

Which of the following has sp3 hybridisation?

- A. CH4 ✓ **Predicted answer**
- B. CO2

- D. C2H4

Why this answer? Methane's carbon is sp3 hybridised, with four single bonds in a tetrahedral arrangement.

Why predicted [B] — Verified fact, predicted to recur: 37o Q126 (VERIFIED) — CH4.

Question 100 Chemistry

Which factor does not affect bond length?

- A. Size of atoms
- B. Bond order
- C. Ionisation energies of the two bonded atoms ✓ **Predicted answer**
- D. Hybridisation

Why this answer? Ionisation energies do not determine bond length; size, bond order and hybridisation do.

Why predicted [B] — Verified fact, predicted to recur: 37o Q127 (VERIFIED) — Ionization energies of the two bonded atoms.

Question 101 Chemistry

Which of the following substances is malleable and ductile?

- A. Diamond
- B. Iodine
- C. Sulphur
- D. Aluminium ✓ **Predicted answer**

Why this answer? Aluminium is a metal, so it can be hammered into sheets and drawn into wires.

Why predicted [B] — Verified fact, predicted to recur: 37o Q128 (VERIFIED) —

Question 102 Chemistry

The co-ordination number of sodium (Na) is:

- A. 4
- B. 6
- C. 8 ✓ **Predicted answer**
- D. 12

Why this answer? Sodium has a co-ordination number of 8 in its crystal structure.

Why predicted [B] — Verified fact, predicted to recur: 37o Q129 (VERIFIED) — 8.

Question 103 Chemistry

The cracking method used to obtain better quality gasoline is:

- A. Hydrocracking
- B. Thermal cracking
- C. Catalytic cracking ✓ **Predicted answer**
- D. Steam cracking

Why this answer? Catalytic cracking gives higher-octane (better quality) gasoline.

Why predicted [B] — Verified fact, predicted to recur: 37o Q130 (VERIFIED) — Catalytic.

Question 104 Chemistry

Acetophenone can be formed by which of the following reactions of benzene?

- A. Nitration
- B. Sulphonation
- C. Acylation ✓ **Predicted answer**
- D. Halogenation

swer? Friedel–Crafts acylation of benzene with acetyl chloride gives acetophenone.

Why predicted [B] — Verified fact, predicted to recur: 37o Q132 (VERIFIED) — Acylation.

Question 105 Chemistry

Which of the following reactions differentiates alcohol from phenol?

- A. Lucas test ✓ **Predicted answer**
- B. Iodoform test
- C. Tollens' test
- D. Fehling's test

Why this answer? The Lucas test distinguishes alcohols (which react at different rates) from phenol, which does not react.

Why predicted [B] — Verified fact, predicted to recur: 37o Q134 (VERIFIED) — Lucas test.

Question 106 Chemistry

The order of reactivity of alcohols when the C–O bond breaks is:

- A. Tertiary alcohol > secondary alcohol > primary alcohol ✓ **Predicted answer**
- B. Secondary alcohol > tertiary alcohol > primary alcohol
- C. Primary alcohol > tertiary alcohol > secondary alcohol
- D. Primary alcohol > secondary alcohol > tertiary alcohol

Why this answer? Tertiary alcohols form the most stable carbocations, so they react fastest when the C–O bond breaks.

Why predicted [A] — Repeated question: repeated — 37o Q135 and 37s Q65 all key tertiary > secondary > primary. Also asked as: 37o Q135: “The order of reactivity of alcohol when C-O bond breaks is:”; 37s Q65: “The order of reactivity of alcohol with respect to

C–O bond.

Question 107 Chemistry

What is the pH of a neutral solution at 25 °C?

- A. 14
- B. 1
- C. 0
- D. 7 ✓ **Predicted answer**

Why this answer? At 25 °C a neutral solution has equal H+ and OH− concentrations, giving pH 7.

Why predicted [C] — Syllabus anchor: syllabus anchor — pH recurs (37adb Q66: the pH of human blood is maintained at 7.35; reuse [C]: human blood pH is closest to 7.4). Standard textbook fact.

Question 108 Chemistry

What is the mass of sulphur in 24.5 g of H2SO4?

- A. 32 g
- B. 4 g
- C. 8 g ✓ **Predicted answer**
- D. 16 g

Why this answer? H2SO4 has a molar mass of 98 g/mol, of which sulphur is 32 g; in 24.5 g (0.25 mol) the sulphur is 0.25 × 32 = 8 g.

Why predicted [B] — Verified fact, predicted to recur: 37o Q140 (VERIFIED) — 8 g.

Question 109 Chemistry

From the equation N2 + 3H2 → 2NH3, how many moles of NH3 are produced from 2.5

- A. 5 moles ✓ **Predicted answer**
- B. 7.5 moles
- C. 10 moles
- D. 2.5 moles

Why this answer? One mole of N2 gives two moles of NH3, so 2.5 moles of N2 give 5 moles of NH3.

Why predicted [B] — Verified fact, predicted to recur: 37o Q141 (VERIFIED) — 5 moles.

Question 110 Chemistry

If the value of the azimuthal quantum number is 2, the total number of values of the magnetic quantum number will be:

- A. 7
- B. 9
- C. 3
- D. 5 ✓ **Predicted answer**

Why this answer? For l = 2, m takes the values −2, −1, 0, +1, +2 — five values in all.

Why predicted [B] — Verified fact, predicted to recur: 37o Q143 (VERIFIED) — 05.

Question 111 Chemistry

The total number of directions of f-orbitals in space is:

- A. 3
- B. 5
- C. 7 ✓ **Predicted answer**
- D. 9

Why this answer? f-orbitals (l = 3) have seven orientations, m = −3 to +3.

ed [B] — Verified fact, predicted to recur: 37o Q144 (VERIFIED) — 07.

Question 112 Chemistry

Which of the following quantum numbers is not obtained from the Schrödinger wave equation?

- A. Principal quantum number
- B. Azimuthal quantum number
- C. Magnetic quantum number
- D. Spin quantum number ✓ **Predicted answer**

Why this answer? The spin quantum number is not obtained from the Schrödinger equation; it was introduced separately.

Why predicted [B] — Verified fact, predicted to recur: 37o Q145 (VERIFIED) — Spin Quantum Number.

Question 113 Chemistry

The electronic configuration for degenerate orbitals is explained by:

- A. Heisenberg's uncertainty principle
- B. Aufbau principle
- C. Hund's rule ✓ **Predicted answer**
- D. Pauli's exclusion principle

Why this answer? Hund's rule states that degenerate orbitals are filled singly first, with parallel spins.

Why predicted [B] — Verified fact, predicted to recur: 37o Q146 (VERIFIED) — Hund's rule.

114 Chemistry

The idea that molecules in gases are in constant movement is called:

- A. Kinetic theory of gases ✓ **Predicted answer**
- B. Dalton's law
- C. Boyle's law
- D. Avogadro's law

Why this answer? The kinetic theory of gases assumes gas molecules are in constant random motion.

Why predicted [B] — Verified fact, predicted to recur: 37o Q147 (VERIFIED) — Kinetic theory of gases.

Question 115 Chemistry

If both the temperature and volume of a gas are doubled, the pressure:

- A. Doubles
- B. Halves
- C. Remains unchanged ✓ **Predicted answer**
- D. Becomes four times

Why this answer? From PV = nRT, doubling both T and V leaves P unchanged.

Why predicted [B] — Verified fact, predicted to recur: 37o Q149 (VERIFIED) — Remains unchanged.

Question 116 Chemistry

Most molecular crystals melt below:

- A. 100 °C
- B. 200 °C ✓ **Predicted answer**
- C. 500 °C

0 °C

Why this answer? Molecular crystals are held by weak forces and generally melt below 200 °C.

Why predicted [B] — Verified fact, predicted to recur: 37s Q37 (VERIFIED) — 200°C.

Question 117 Chemistry

How much heavier is the hydrogen atom as compared to the electron?

- A. 918 times
- B. 1837 times ✓ **Predicted answer**
- C. 3674 times
- D. 100 times

Why this answer? The hydrogen atom is about 1837 times heavier than an electron.

Why predicted [B] — Verified fact, predicted to recur: 37s Q38 (VERIFIED) — 1837.

Question 118 Chemistry

The value of the equilibrium constant for the decomposition of ozone at 25 °C is:

- A. 10^10
- B. 10^25
- C. 10^55 ✓ **Predicted answer**
- D. 10^100

Why this answer? The decomposition of ozone has a very large equilibrium constant, about 10^55 at 25 °C.

Why predicted [B] — Verified fact, predicted to recur: 37s Q39 (VERIFIED) — 10^{55}.

119 Chemistry

A reaction is first order with respect to A and third order with respect to B. The rate equation is:

- A. Rate = K[A][B]
- B. Rate = K[A][B]^3 ✓ **Predicted answer**
- C. Rate = K[A]^3[B]
- D. Rate = K[A]^2[B]^2

Why this answer? The rate law is rate = k[A]^1[B]^3 for first order in A and third order in B.

Why predicted [B] — Verified fact, predicted to recur: 37s Q40 (VERIFIED) — Rate = K[A][B]^3.

Question 120 Chemistry

For a reaction A → Product, if the concentration of A is doubled and the rate of the reaction increases four times, the order of the reaction is:

- A. Zero
- B. 1st
- C. 2nd ✓ **Predicted answer**
- D. 3rd

Why this answer? Rate ∝ [A]^2, so doubling [A] multiplies the rate by $2^2 = 4$ — a second-order reaction.

Why predicted [A] — Repeated question: repeated — reaction order of 2 recurs across NUMS papers (37o Q122: the order of the reaction of nitric oxide with ozone is 2nd; 37s Q41: doubling the concentration of A gives four times the product, so the order is 2nd). Also asked as: 37o Q122: “When nitric oxide reacts with ozone, the order of reaction will be:”; 37s Q41: “For a reaction A → Product, if concentration of A is doubled, product increases 4 times. The order of reaction will be:”

121 Chemistry

Select the spontaneous reaction from the following:

- A. Melting of ice at −10 °C
- B. Emission of α-particles from polonium ✓ **Predicted answer**
- C. Electrolysis of water
- D. Photosynthesis

Why this answer? Radioactive decay is a spontaneous process; the others need energy input.

Why predicted [B] — Verified fact, predicted to recur: 37s Q42 (VERIFIED) — Emission of α-particles from polonium.

Question 122 Chemistry

Select the exothermic reaction among the following:

- A. Melting of ice
- B. Evaporation of water
- C. Burning of methane ✓ **Predicted answer**
- D. Dissolving ammonium nitrate in water

Why this answer? Burning methane releases heat, so it is exothermic.

Why predicted [B] — Verified fact, predicted to recur: 37s Q43 (VERIFIED) — Burning of methane.

Question 123 Chemistry

The oxidation number of chlorine in HClO2 is:

- A. +1
- B. +3 ✓ **Predicted answer**
- C. +5

Why this answer? In $HClO_2$, H is +1 and each O is −2, so Cl is +3.

Why predicted [B] — Verified fact, predicted to recur: 37s Q44 (VERIFIED) — +3.

Question 124 Chemistry

Bond order is equal to:

- A. Half of the sum of bonding and antibonding electrons
- B. Half of the difference between the number of bonding electrons and antibonding electrons ✓ **Predicted answer**
- C. The number of bonding electrons
- D. The number of antibonding electrons

Why this answer? Bond order = ½ (bonding electrons − antibonding electrons).

Why predicted [B] — Verified fact, predicted to recur: 37s Q45 (VERIFIED) — Half of the difference between number of bonding electrons and antibonding electrons.

Question 125 Chemistry

Which of the following alcohols will give an oily layer upon heating?

- A. Ethanol
- B. 2-Methyl-2-butanol ✓ **Predicted answer**
- C. Methanol
- D. Propan-1-ol

Why this answer? On heating, 2-methyl-2-butanol (a tertiary alcohol) gives an oily layer of alkene.

Why predicted [B] — Verified fact, predicted to recur: 37s Q47 (VERIFIED) — 2-Methyl-2-butanol.

126 Chemistry

Formalin is a mixture of:

- A. 40% HCHO, 8% CH3OH, 52% H2O ✓ **Predicted answer**
- B. 37% HCHO, 63% H2O
- C. 50% HCHO, 50% H2O
- D. 10% HCHO, 90% H2O

Why this answer? Formalin is an aqueous solution of formaldehyde (40%) with methanol (8%) as stabiliser.

Why predicted [B] — Verified fact, predicted to recur: 37s Q48 (VERIFIED) — 40% HCHO, 8% CH_3OH, 52% H_2O.

Question 127 Chemistry

Polymerisation of HCHO and CH3CHO occurs in the presence of:

- A. Dilute HCl
- B. Conc. H2SO4 ✓ **Predicted answer**
- C. NaOH
- D. ZnCl2

Why this answer? Concentrated sulphuric acid catalyses the polymerisation of formaldehyde and acetaldehyde.

Why predicted [B] — Verified fact, predicted to recur: 37s Q49 (VERIFIED) — Conc. H_2SO_4.

Question 128 Physics

Lenz’s law is also a statement of law of conservation of:

- A. Energy ✓ **Predicted answer**
- B. Momentum

- D. Charge

Why this answer? Lenz's law (induced effects oppose the change) prevents energy being created from nothing; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q3 (VERIFIED) — Energy.

Question 129 Physics

Measure of displacement covered with passage of time is called:

- A. Speed
- B. Velocity ✓ **Predicted answer**
- C. Deceleration
- D. Acceleration

Why this answer? correct: velocity is the displacement covered per unit time.

Why predicted [B] — Verified fact, predicted to recur: 37o Q24 (VERIFIED) — Velocity.

Question 130 Physics

The SI unit of capacitance is:

- A. Watts
- B. Henry
- C. Farad ✓ **Predicted answer**
- D. Joules

Why this answer? correct: the SI unit of capacitance is the farad.

Why predicted [B] — Verified fact, predicted to recur: 37o Q6 (VERIFIED) — Farad.

131 Physics

Stability of radioactivity element is determined by:

- A. Decay constant ✓ **Predicted answer**
- B. Rate of the radioactive decay
- C. Time of decay
- D. Number of radioactive nuclei

Why this answer? λ is the intrinsic property of the nuclide: a large λ means rapid decay (unstable), a small λ means slow decay (stable), and half-life is t½ = ln 2 / λ; correct.

Why predicted [B] — Verified fact, predicted to recur: 37s Q5 (VERIFIED) — Decay constant.

Question 132 Physics

An electric motor turns at 400 revolutions per minute. Its angular velocity in rad/s will be:

- A. 40π/3 ✓ **Predicted answer**
- B. 30π/4
- C. 20π/3
- D. 30π/3

Why this answer? ω = 400 rev/min × 2π rad/rev ÷ 60 s/min = (400 × 2π)/60 = 40π/3 rad/s; correct.

Why predicted [B] — Verified fact, predicted to recur: 37o Q34 (VERIFIED) — 40π/3.

Question 133 Physics

A car doubles its speed from 20 m/s to 40 m/s. Its kinetic energy becomes:

- A. Eight times
- B. Two times

- D. Four times ✓ **Predicted answer**

Why this answer? Kinetic energy = ½mv², so it depends on the square of the speed: doubling v multiplies the energy by $2^2 = 4$.

Why predicted [C] — Syllabus anchor: syllabus anchor — kinetic energy recurs (37adb Q101: car speed doubled, kinetic energy). Standard textbook fact.

Question 134 Physics

According to Ohm's law, the voltage V across a resistor is equal to:

- A. I × R ✓ **Predicted answer**
- B. I ÷ R
- C. $I^2 \times R$
- D. R ÷ I

Why this answer? Ohm's law is V = IR (voltage = current × resistance), for a conductor at constant temperature.

Why predicted [C] — Syllabus anchor: syllabus anchor — Ohm's law/resistance recur (37adb Q122: ohmic in nature). Standard textbook fact.

Question 135 Physics

Two projectiles are fired with the same speed, one at 30° and the other at 60° to the horizontal. How do their horizontal ranges compare?

- A. Both have the same maximum height
- B. The 30° projectile goes further
- C. The 60° projectile goes further
- D. Both have the same range ✓ **Predicted answer**

Why this answer? Range $R = v^2 \cdot \sin(2\theta)/g$; sin(60°) = sin(120°), so complementary angles

nges (the 60° projectile reaches a greater height, but not a greater range).

Why predicted [C] — Syllabus anchor: syllabus anchor — projectile motion recurs (37adb Q96: projectile height = range angle). Standard textbook fact.

Question 136 Physics

In an isochoric process:

- A. Pressure is kept constant
- B. Volume is kept constant ✓ **Predicted answer**
- C. Temperature is kept constant
- D. Heat is kept constant

Why this answer? An isochoric process takes place at constant volume.

Why predicted [B] — Verified fact, predicted to recur: 37o Q1 (VERIFIED) — Volume is kept constant.

Question 137 Physics

If 42 J of heat is transferred to a system during expansion and the work done is 32 J, what is the change in internal energy?

- A. 74 J
- B. 10 J ✓ **Predicted answer**
- C. 116 J
- D. 106 J

Why this answer? By the first law, $\Delta U = Q - W = 42 - 32 = 10$ J.

Why predicted [B] — Verified fact, predicted to recur: 37o Q2 (VERIFIED) — 10 J.

Question 138 Physics

The first law of thermodynamics is a generalisation of the law of conservation of:

- B. Momentum
- C. Energy ✓ **Predicted answer**
- D. Charge

Why this answer? The first law states that energy can neither be created nor destroyed, only converted.

Why predicted [B] — Verified fact, predicted to recur: 37o Q3 (VERIFIED) — Energy.

Question 139 Physics

While studying the charging and discharging of a capacitor, RC (Resistance × Capacitance) is known as the:

- A. Time constant ✓ **Predicted answer**
- B. Decay constant
- C. Dielectric constant
- D. Force constant

Why this answer? The product RC is the time constant of the charging or discharging circuit.

Why predicted [B] — Verified fact, predicted to recur: 37o Q4 (VERIFIED) — Time constant.

Question 140 Physics

In a parallel combination of two capacitors, their equivalent capacitance is equal to:

- A. C1 × C2
- B. C1 + C2 ✓ **Predicted answer**
- C. C1 − C2
- D. 1/C1 + 1/C2

swer? In parallel, capacitances add directly.

Why predicted [B] — Verified fact, predicted to recur: 37o Q5 (VERIFIED) — C1 + C2.

Question 141 Physics

Volt × Ampere is the unit of:

- A. Energy
- B. Power ✓ **Predicted answer**
- C. Charge
- D. Resistance

Why this answer? Power = voltage × current, so volt × ampere = watt.

Why predicted [B] — Verified fact, predicted to recur: 37o Q8 (VERIFIED) — Power.

Question 142 Physics

When a charged particle enters a magnetic field parallel to it, it will:

- A. Move in a circle
- B. Move straight ✓ **Predicted answer**
- C. Move in a helix
- D. Come to rest

Why this answer? With velocity parallel to the field, the magnetic force is zero, so the particle continues straight.

Why predicted [B] — Verified fact, predicted to recur: 37o Q10 (VERIFIED) — Move straight.

Question 143 Physics

The dimension of magnetic field strength is the same as that of:

gnetic flux

- B. Magnetic induction ✓ **Predicted answer**
- C. Electric field
- D. Current density

Why this answer? Magnetic field strength and magnetic induction share the same dimensions.

Why predicted [B] — Verified fact, predicted to recur: 37o Q11 (VERIFIED) — Magnetic induction.

Question 144 Physics

In Fleming's right-hand rule, the second finger indicates the direction of:

- A. Motion
- B. Magnetic field
- C. Induced current ✓ **Predicted answer**
- D. Force

Why this answer? In Fleming's right-hand (generator) rule, thumb = motion, first finger = field, second finger = induced current.

Why predicted [B] — Verified fact, predicted to recur: 37o Q14 (VERIFIED) — Induced current.

Question 145 Physics

A current generator is a device that converts:

- A. Electrical energy into mechanical energy
- B. Mechanical energy into electrical energy ✓ **Predicted answer**
- C. Heat into light
- D. Chemical energy into heat

swer? A generator converts mechanical work into electrical energy.

Why predicted [B] — Verified fact, predicted to recur: 37o Q15 (VERIFIED) — Mechanical energy into electrical energy.

Question 146 Physics

In full-wave rectification, how many diodes are used?

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

Why this answer? A centre-tapped full-wave rectifier uses two diodes (a bridge uses four).

Why predicted [B] — Verified fact, predicted to recur: 37o Q18 (VERIFIED) — 2.

Question 147 Physics

The time taken for half the number of atoms of a radioactive isotope to disintegrate is called its:

- A. Mean life
- B. Half life ✓ **Predicted answer**
- C. Decay time
- D. Activity

Why this answer? Half-life is the time for half the atoms of a radioactive sample to decay.

Why predicted [B] — Verified fact, predicted to recur: 37o Q19 (VERIFIED) — Half life.

Question 148 Physics

A 32 g radioactive element decays and 2 g remain after 60 days. What is the half-life of this element?

- B. 6 days
- C. 10 days
- D. 15 days ✓ **Predicted answer**

Why this answer? 32 g → 16 g → 8 g → 4 g → 2 g is four half-lives in 60 days, so one half-life is 15 days.

Why predicted [B] — Verified fact, predicted to recur: 37o Q20 (VERIFIED) — 15 days.

Question 149 Physics

If a car is slowing down along the negative x-axis, its acceleration will be along the:

- A. Negative x-axis
- B. Positive x-axis ✓ **Predicted answer**
- C. Positive y-axis
- D. Negative y-axis

Why this answer? Slowing down while moving in the −x direction means acceleration points in the +x direction.

Why predicted [B] — Verified fact, predicted to recur: 37o Q21 (VERIFIED) — Positive x Axis.

Question 150 Physics

The instantaneous velocity along a curved path is:

- A. Along the radius
- B. Along the tangent ✓ **Predicted answer**
- C. Towards the centre
- D. Along the normal

Why this answer? Instantaneous velocity is always tangent to the path.

ted [B] — Verified fact, predicted to recur: 37o Q22 (VERIFIED) — Along the tangent.

Question 151 Physics

In a perfectly elastic collision:

- A. Only momentum is conserved
- B. Only kinetic energy is conserved
- C. Momentum, kinetic energy and total energy, all are conserved ✓ **Predicted answer**
- D. Neither momentum nor energy is conserved

Why this answer? In a perfectly elastic collision, momentum and kinetic energy are both conserved.

Why predicted [B] — Verified fact, predicted to recur: 37o Q23 (VERIFIED) — Momentum, kinetic energy and total energy, all are conserved.

Question 152 Physics

The slope of a displacement–time graph is equal to:

- A. Acceleration
- B. Velocity ✓ **Predicted answer**
- C. Force
- D. Momentum

Why this answer? Slope = displacement/time = velocity.

Why predicted [B] — Verified fact, predicted to recur: 37o Q24 (VERIFIED) — Velocity.

Question 153 Physics

The range of a projectile on a horizontal plane is the same for which pair of angles?

and 60°

- B. 45° and 45°
- C. 75° and 15° ✓ **Predicted answer**
- D. 60° and 30°

Why this answer? Complementary angles (θ and 90° − θ) give the same range; 75° and 15° are complementary.

Why predicted [B] — Verified fact, predicted to recur: 37o Q25 (VERIFIED) — 75 & 15.

Question 154 Physics

A body of mass m is moving with velocity v. After a short interval of time its velocity becomes double. How many times will its kinetic energy increase?

- A. 2 times
- B. 3 times
- C. 4 times ✓ **Predicted answer**
- D. 8 times

Why this answer? Kinetic energy is proportional to v^2, so doubling the velocity quadruples the kinetic energy.

Why predicted [A] — Repeated question: repeated — 37o Q31 and 37s Q16 and 37adb Q101 all key four times. Also asked as: 37o Q31: “A body of mass 'm' is moving with velocity 'v'. After a short interval of time its velocity becomes double. How many times its K.E will increase or decrease?”; 37s Q16: “If velocity is doubled, what happens to kinetic energy:”; 37adb Q101: “When the speed of a car is doubled, what will happen to its kinetic energy?”

Question 155 Physics

The product of force and time is equal to the:

- A. Change in displacement

nge in momentum ✓ **Predicted answer**

- C. Change in velocity
- D. Change in acceleration

Why this answer? Impulse (F × t) equals the change in momentum.

Why predicted [A] — Repeated question: repeated — 37o Q26 and 37s Q8 all key change in momentum. Also asked as: 37o Q26: “The product of force and time is equal to:”; 37s Q8: “Product of force and time is equal to:”

Question 156 Physics

A device that converts alternating current (AC) into direct current (DC) is called a:

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

Why this answer? A diode allows current in one direction only, so it converts AC into DC.

Why predicted [A] — Repeated question: repeated — 37o Q16 and 37adb Q131 all key diode. Also asked as: 37o Q16: “A device that converts AC into DC is called:”; 37adb Q131: “An electrical component used to convert AC into DC is:”

Question 157 Physics

The conversion of alternating current into direct current is called:

- A. Amplification
- B. Modulation
- C. Rectification ✓ **Predicted answer**
- D. Filtration

Why this answer? Rectification is the process of converting AC into (pulsating) DC.

ed [A] — Repeated question: repeated — 37o Q17 and 37s Q36 all key rectification. Also asked as: 37o Q17: “The conversion of alternating current into direct current is called:”; 37s Q36: “The process of converting AC into pulsating DC is called:”

Question 158 Physics

What is the SI unit of force?

- A. Joule
- B. Watt
- C. Newton ✓ **Predicted answer**
- D. Pascal

Why this answer? The SI unit of force is the newton ($kg \cdot m/s^2$).

Why predicted [C] — Syllabus anchor: syllabus anchor — SI units recur (37o Q6: the SI unit of capacitance is the farad; 37o Q12: the weber is the unit of magnetic flux; 37s Q14: the unit of conductance is the siemen). Standard textbook fact.

Question 159 Physics

At what point during the motion of a projectile is its vertical component of velocity zero?

- A. At launch
- B. At the highest point ✓ **Predicted answer**
- C. At landing
- D. Halfway up

Why this answer? At the peak of the trajectory, the vertical velocity is momentarily zero.

Why predicted [B] — Verified fact, predicted to recur: 37o Q27 (VERIFIED) — Highest point.

160 Physics

An object has 1 J of potential energy. What is the work done in terms of height?

- A. 0 J
- B. 1 J ✓ **Predicted answer**
- C. 2 J
- D. 10 J

Why this answer? The work done against gravity equals the gain in potential energy, 1 J.

Why predicted [B] — Verified fact, predicted to recur: 37o Q28 (VERIFIED) — 1 J.

Question 161 Physics

Power is the dot product of:

- A. Force and displacement
- B. Force and velocity ✓ **Predicted answer**
- C. Mass and velocity
- D. Force and time

Why this answer? Power P = F · v.

Why predicted [B] — Verified fact, predicted to recur: 37o Q29 (VERIFIED) — Force and velocity.

Question 162 Physics

The area under a force–displacement graph gives:

- A. Power
- B. Work ✓ **Predicted answer**
- C. Momentum
- D. Energy density

swer? Work is the area under the force-displacement curve.

Why predicted [B] — Verified fact, predicted to recur: 37o Q30 (VERIFIED) — Work.

Question 163 Physics

The relation between radian and degree is:

- A. 1 rad = 57.3° ✓ **Predicted answer**
- B. 1 rad = 180°
- C. 1 rad = 90°
- D. 1 rad = 360°

Why this answer? One radian is about 57.3 degrees (180/π).

Why predicted [B] — Verified fact, predicted to recur: 37o Q32 (VERIFIED) — 1 rad = 57.3°.

Question 164 Physics

In the case of centripetal force, the value of instantaneous acceleration is given by:

- A. ac = v/r
- B. ac = v^2/r ✓ **Predicted answer**
- C. ac = r/v^2
- D. ac = v^2r

Why this answer? Centripetal acceleration equals the square of the speed divided by the radius.

Why predicted [B] — Verified fact, predicted to recur: 37o Q33 (VERIFIED) — ac = v2/r.

Question 165 Physics

A disc, a hoop and a sphere are rolling down an inclined plane simultaneously. Which object will reach the bottom first?

- B. Hoop
- C. Sphere ✓ **Predicted answer**
- D. All together

Why this answer? The sphere has the smallest moment of inertia for its mass, so it accelerates fastest down the plane.

Why predicted [B] — Verified fact, predicted to recur: 37o Q35 (VERIFIED) — Sphere.

Question 166 Physics

The centripetal force formula is:

- A. $Fc = mv^2$
- B. $Fc = mr\omega^2$ ✓ **Predicted answer**
- C. $Fc = m\omega/r$
- D. $Fc = mr^2\omega$

Why this answer? Centripetal force $F = m\ r\ \omega^2$ (equivalently $m\ v^2/r$).

Why predicted [B] — Verified fact, predicted to recur: 37o Q36 (VERIFIED) — Fc = mrω2.

Question 167 Physics

With an increase in pressure, the speed of sound will:

- A. Increase
- B. Decrease
- C. Remain the same ✓ **Predicted answer**
- D. Become zero

Why this answer? At constant temperature, the speed of sound in a gas does not change with pressure.

Why predicted [B] — Verified fact, predicted to recur: 37o Q37 (VERIFIED) — Remain

Question 168 Physics

In transverse waves, the portion above the mean level is called the:

- A. Trough
- B. Wave crest ✓ **Predicted answer**
- C. Amplitude
- D. Node

Why this answer? The crest is the highest point of a transverse wave above the mean level.

Why predicted [B] — Verified fact, predicted to recur: 37o Q38 (VERIFIED) — Wave crest.

Question 169 Physics

The maximum displacement of particles of a medium, on either side of the mean position of a wave, is called its:

- A. Wavelength
- B. Frequency
- C. Amplitude ✓ **Predicted answer**
- D. Period

Why this answer? Amplitude is the maximum displacement from the mean position.

Why predicted [B] — Verified fact, predicted to recur: 37o Q39 (VERIFIED) — Amplitude.

Question 170 Physics

The path of a charged particle in a plane perpendicular to a uniform magnetic field is:

- A. Straight

ular ✓ **Predicted answer**

- C. Parabolic
- D. Helical

Why this answer? A charge moving perpendicular to a uniform magnetic field experiences a centripetal force and moves in a circle.

Why predicted [B] — Verified fact, predicted to recur: 37s Q1 (VERIFIED) — Circular.

Question 171 Physics

The magnetic force acting on a charge at rest is:

- A. Maximum
- B. Zero ✓ **Predicted answer**
- C. Equal to qvB
- D. Equal to qE

Why this answer? Magnetic force F = qvB sin θ; with v = 0 the force is zero.

Why predicted [B] — Verified fact, predicted to recur: 37s Q2 (VERIFIED) — Zero.

Question 172 Physics

If the mass of a charged particle is doubled, its cyclotron frequency becomes:

- A. Doubled
- B. Halved ✓ **Predicted answer**
- C. Four times
- D. Unchanged

Why this answer? Cyclotron frequency f = qB/2πm, so doubling the mass halves the frequency.

Why predicted [B] — Verified fact, predicted to recur: 37s Q3 (VERIFIED) — Halved.

173 Physics

The electric field intensity of an infinite charge sheet is:

- A. σ/ε_0
- B. $\sigma/(2\varepsilon_0)$ ✓ **Predicted answer**
- C. $2\sigma/\varepsilon_0$
- D. σ^2/ε_0

Why this answer? The field of an infinite sheet of charge is $\sigma/2\varepsilon_0$ on each side.

Why predicted [B] — Verified fact, predicted to recur: 37s Q4 (VERIFIED) — $\sigma/(2\varepsilon_0)$.

Question 174 Physics

The basic requirement for an induced emf is:

- A. A constant magnetic field
- B. Change in flux linked to the coil ✓ **Predicted answer**
- C. A large resistance
- D. A steady current

Why this answer? Faraday's law: emf is induced only when the magnetic flux through the coil changes.

Why predicted [B] — Verified fact, predicted to recur: 37s Q7 (VERIFIED) — Change in flux links to the coil.

Question 175 Physics

The bursting of a tyre is an example of which process?

- A. Isothermal
- B. Adiabatic ✓ **Predicted answer**
- C. Isobaric
- D. Isochoric

Why this answer? The sudden expansion is so fast that no heat is exchanged — an adiabatic process.

Why predicted [B] — Verified fact, predicted to recur: 37s Q9 (VERIFIED) — Adiabatic.

Question 176 Physics

The direction of angular velocity can be found by:

- A. Left-hand rule
- B. Right-hand rule ✓ **Predicted answer**
- C. Fleming's rule
- D. Lenz's law

Why this answer? Curling the fingers in the direction of rotation, the thumb gives the direction of angular velocity.

Why predicted [B] — Verified fact, predicted to recur: 37s Q10 (VERIFIED) — Right-hand rule.

Question 177 Physics

When a star moves towards the Earth, the shift in its light is known as:

- A. Red shift
- B. Blue shift ✓ **Predicted answer**
- C. Compton shift
- D. Doppler shift

Why this answer? Light from an approaching star is shifted towards the blue end of the spectrum.

Why predicted [A] — Repeated question: repeated — 37s Q11 and 37adb Q112 all key blue shift. Also asked as: 37s Q11: “When star moves towards the earth, the shift is known as:”; 37adb Q112: “The star moving closer to earth will experience:”

178 Physics

The angle at which the maximum range of a projectile is achieved is:

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

Why this answer? For a projectile on level ground, the range is maximum at 45°.

Why predicted [A] — Repeated question: repeated — 37s Q12 and 37adb Q97 all key 45°. Also asked as: 37s Q12: “Angle at which maximum range of projectile is achieved?”; 37adb Q97: “Range of projectile is maximum at:”

Question 179 Physics

1 kWh is equal to:

- A. 3.6×10^4 J
- B. 3.6×10^5 J
- C. 3.6×10^6 J ✓ **Predicted answer**
- D. 3.6×10^7 J

Why this answer? 1 kWh = 1000 W × 3600 s = 3.6×10^6 J (3.6 MJ).

Why predicted [A] — Repeated question: repeated — 37o Q7 and 37s Q6 all key 3.6 MJ. Also asked as: 37o Q7: “1 kWh =”; 37s Q6: “1 kWh is equal to:”

Question 180 Physics

The SI unit of magnetic flux is the:

- A. Tesla
- B. Henry
- C. Weber ✓ **Predicted answer**

Why this answer? The SI unit of magnetic flux is the weber (Wb).

Why predicted [A] — Repeated question: repeated — 37o Q12 and 37s Q30 all key weber. Also asked as: 37o Q12: “The weber is unit of measure of:”; 37s Q30: “The SI unit of magnetic flux is:”

Question 181 English

Choose the sentence with correct order of adjectives.

- A. I met two beautiful, young, British girls at the airport. ✓ **Predicted answer**
- B. I met two, British, young, beautiful girls at the airport.
- C. I met two young, beautiful British girls at the airport.
- D. I met, young two, beautiful, British girls at the airport.

Why this answer? The adjective ORDER is correct: opinion (beautiful) before age (young) before origin (British) is the standard sequence; correct. The comma before "British" is a minor punctuation flaw (origin adjectives are cumulative and usually take no comma), recorded openly — it does not overturn the order, which is what the question tests.

Why predicted [B] — Verified fact, predicted to recur: 37s Q83 (VERIFIED) — I met two beautiful, young, British girls at the airport.

Question 182 English

Choose the synonym of "Benevolent".

- A. Kind ✓ **Predicted answer**
- B. Selfish
- C. Harsh
- D. Cruel

Why this answer? "Benevolent" means kind and generous, wishing others well.

ed [C] — Syllabus anchor: syllabus anchor — vocabulary/synonym items recur (37adb Q136: antonym of clarity). Standard fact.

Question 183 English

Choose the antonym of "Transparent".

- A. Thin
- B. Opaque ✓ **Predicted answer**
- C. Clear
- D. Obvious

Why this answer? "Transparent" means letting light through so objects can be seen clearly; its opposite is opaque.

Why predicted [C] — Syllabus anchor: syllabus anchor — vocabulary/antonym items recur (37adb Q136: antonym of clarity). Standard fact.

Question 184 English

The soup _____ good.

- A. Taste
- B. Tastes ✓ **Predicted answer**
- C. Tasting
- D. Have tasted

Why this answer? "Soup" is singular, so the verb takes the third-person singular form "tastes".

Why predicted [B] — Verified fact, predicted to recur: 37o Q96 (VERIFIED) — Tastes.

Question 185 English

Unless we _____ now, we cannot be on time.

- B. Start ✓ **Predicted answer**
- C. Will start
- D. Starting

Why this answer? After "unless" the present simple is used for a present condition: "Unless we start now, we cannot be on time."

Why predicted [B] — Verified fact, predicted to recur: 37o Q97 (VERIFIED) — Start.

Question 186 English

Daud is better than _____ of the college.

- A. All teachers
- B. All other teachers ✓ **Predicted answer**
- C. Any teacher
- D. Every teachers

Why this answer? When comparing one person with the rest of the group, "other" is needed: "better than all other teachers".

Why predicted [B] — Verified fact, predicted to recur: 37o Q98 (VERIFIED) — All other teachers.

Question 187 English

Abide _____ the traffic laws for smooth and safe flow of traffic.

- A. With
- B. By ✓ **Predicted answer**
- C. On
- D. In

Why this answer? The correct preposition with "abide" is "by": "abide by the rules".

ed [B] — Verified fact, predicted to recur: 37o Q99 (VERIFIED) — By.

Question 188 English

He prefers death _____ dishonour.

- A. Than
- B. To ✓ **Predicted answer**
- C. Over
- D. From

Why this answer? "Prefer" takes "to" (not "than"): "He prefers death to dishonour."

Why predicted [B] — Verified fact, predicted to recur: 37o Q100 (VERIFIED) — To.

Question 189 English

What does the word 'SURPLUS' mean?

- A. Shortage
- B. In excess ✓ **Predicted answer**
- C. Deficit
- D. Equal

Why this answer? "Surplus" means an amount left over, in excess of what is needed.

Why predicted [B] — Verified fact, predicted to recur: 37o Q101 (VERIFIED) — In excess.

Question 190 English

What does the word 'SPILL' mean?

- A. Spread ✓ **Predicted answer**
- B. Collect
- C. Hide
- D. Pour back

swer? To spill is to let a liquid spread over a surface by accident.

Why predicted [B] — Verified fact, predicted to recur: 37o Q102 (VERIFIED) — Spread.

Question 191 English

What does the word 'CURIOUS' mean?

- A. Bored
- B. Keen ✓ **Predicted answer**
- C. Angry
- D. Tired

Why this answer? "Curious" means eager or keen to know or learn something.

Why predicted [B] — Verified fact, predicted to recur: 37o Q103 (VERIFIED) — Keen.

Question 192 English

Pick the sentence with correct punctuation:

- A. He had one motto, serving humanity.
- B. He had one motto: serving humanity. ✓ **Predicted answer**
- C. He had one motto; serving humanity.
- D. He had one motto serving humanity.

Why this answer? A colon correctly introduces the explanation of the motto.

Why predicted [B] — Verified fact, predicted to recur: 37o Q104 (VERIFIED) — He had one motto: serving humanity.

Question 193 English

Pick the word with correct spelling:

- A. Coleague

eague ✓ **Predicted answer**

- C. Colleage
- D. Collegue

Why this answer? The correct spelling is "colleague".

Why predicted [B] — Verified fact, predicted to recur: 37o Q105 (VERIFIED) — Colleague.

Question 194 English

Pick the word with correct spelling:

- A. Aquaintance
- B. Acquantance
- C. Acquaintance ✓ **Predicted answer**
- D. Aqquaintance

Why this answer? The correct spelling is "acquaintance".

Why predicted [B] — Verified fact, predicted to recur: 37o Q106 (VERIFIED) — Acquaintance.

Question 195 English

Pick the word with correct spelling:

- A. Priorty
- B. Priorety
- C. Priotity
- D. Priority ✓ **Predicted answer**

Why this answer? The correct spelling is "priority".

Why predicted [B] — Verified fact, predicted to recur: 37o Q107 (VERIFIED) — Priority.

196 English

Fill in the correct articles: _____ female lion is called _____ lioness. She has no mane.

- A. A, the
- B. The, a ✓ **Predicted answer**
- C. An, a
- D. The, the

Why this answer? "The female lion is called a lioness" — "the" for the specific subject, "a" for the general name.

Why predicted [B] — Verified fact, predicted to recur: 37s Q76 (VERIFIED) — The, a.

Question 197 English

'Whatever you order for dinner' is fine with me. The underlined part is a:

- A. Noun clause ✓ **Predicted answer**
- B. Adjective clause
- C. Adverb clause
- D. Main clause

Why this answer? "Whatever you order for dinner" acts as the subject of the sentence, so it is a noun clause.

Why predicted [B] — Verified fact, predicted to recur: 37s Q77 (VERIFIED) — Noun clause.

Question 198 English

After midnight, the ghost will come out of the haunted attic to scare the people. The sentence is:

- A. Complex
- B. Compound

ple ✓ **Predicted answer**

- D. Compound-complex

Why this answer? The sentence has one subject and one predicate, so it is a simple sentence.

Why predicted [B] — Verified fact, predicted to recur: 37s Q78 (VERIFIED) — Simple.

Question 199 English

She _____ in this hospital since 2020.

- A. Has been working ✓ **Predicted answer**
- B. Is working
- C. Worked
- D. Works

Why this answer? An action that began in the past and continues to the present takes the present perfect continuous: "has been working since 2020".

Why predicted [A] — Repeated question: repeated — the present perfect continuous recurs across NUMS papers (37o Q95: “I have been studying English for five years”; 37adb Q138: “The baby has been crying all morning”). Also asked as: 37o Q95: “I _____ English for five years.”; 37adb Q138: “Fill in the blank with the correct verb. The baby _____ all morning.”

Question 200 English

Choose the antonym of "Ancient".

- A. Old
- B. Modern ✓ **Predicted answer**
- C. Antique
- D. Aged

swer? "Modern" is the opposite of "ancient".

Why predicted [C] — Syllabus anchor: syllabus anchor — antonyms recur (reuse [C]: the antonym of "Transparent"; 37adb Q136: the antonym of "clarity" is "vagueness"). Standard textbook fact.

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