

PAST PAPER / EXPLAINED WITH MITO

Understand the answer. Keep the method.

IMAT 2026

60 questions. Every solution explained.

A compact companion to the question paper.



Reason it through / the steps that make the answer work

Avoid the trap / why the alternatives fail

Mito says / one habit to carry into your next question

Independent learning companion by Mito - Learn IMAT.

Use alongside the supplied IMAT2026.pdf. Not an official solution publication.

Try. Explain. Repair.

Start with the paper or the signed-in simulator. Commit to an answer and a reason before opening the explanation. Then use this book to fix the step that went wrong.

01 / FIRST ATTEMPT

The simulator gives you 100 minutes for 60 questions. Both question order and option order change for each new attempt. Reloading resumes the saved order.

02 / REVIEW THE REASON

Each entry below refers to the original paper number, not the shuffled simulator position. The supplied PDF highlights A for all questions. In the simulator, follow the answer text instead of memorising a letter.

03 / RETURN TO THE IDEA

Read the explanation, name the trap, then cover the solution and explain the method aloud. A repeated score on a familiar paper is practice, not an independent prediction of your exam result.

Find your section

Reading Q1-4: pp. 3-4 · Logic Q5-9: pp. 5-7

Biology Q10-32: pp. 7-18 · Chemistry Q33-47: pp. 19-26

Physics Q48-54: pp. 26-29 · Maths Q55-60: pp. 30-32

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Q01 / READING

Fake news has a history

Paper answer A: Has always existed, albeit in different forms

The passage opens by saying deceptive communication has always existed. Its biblical, medieval and revolutionary examples support that broad claim. They are illustrations of continuity, not competing dates for the invention of fake news.

Avoid the trap. B and E mistake examples for starting points. C reverses the passage's concern with deception. D adds a claim about the modern age that the passage does not establish.



Mito says

Find the sentence that covers every example. For reading questions, answer from the passage rather than correcting or expanding its historical claims.

Q02 / READING

A chain passed down

Paper answer A: From one generation to the next, women hand down a condition of servitude associated with motherhood

Aleramo describes a cycle: a daughter recognises her mother's sacrifice, feels guilt, and repeats that sacrifice for her own children. This hands a condition of servitude from one generation to the next. The wish to break the chain describes a proposed alternative, not the existing cause.

Avoid the trap. B confuses denying oneself with denying one's children. C and D describe outcomes the passage does not say currently occur. E refers to responsibility before birth, not the mechanism that perpetuates sacrifice.



Mito says

Separate the author's diagnosis from the author's proposed solution. Can you explain the cycle in three arrows?

Q03 / READING

Cities as meeting places

Paper answer A: The flourishing of cities, where people meet and ideas spread.

The passage identifies cities as the places where people meet and ideas circulate. That interaction explains the many centres of Italian cultural life. The reference to quiet villas contrasts writing a book with exchanging ideas.

Avoid the trap. B treats the contrasting villa example as an equal cause. C adds that books are written in cities. D and E shift attention away from the urban exchange explicitly highlighted.



Mito says

Underline the causal phrase. Do not replace it with a plausible fact that the passage never states.

Q04 / READING

Name the economic system

Paper answer A: The digital economy

The digital economy is economic activity organised around digital technology, networks and information systems. Production, distribution and exchange can all take place through these systems.

Avoid the trap. Global describes geographical reach, not the role of digital technology. Big data and mobile systems are parts of the digital economy. Technological economy is not the standard term sought here.



Mito says

Match the definition to its umbrella term, not to one smaller example.

Q05 / LOGIC

Follow one recurrence

Paper answer A: 12

From the third term onward, each term is twice the previous term plus the term before it: $5 = 2 \times 2 + 1$. Therefore $x = 2 \times 5 + 2 = 12$. Check forward: $29 = 2 \times 12 + 5$, $70 = 2 \times 29 + 12$ and $169 = 2 \times 70 + 29$.

Avoid the trap. A rule that fits only the first three terms is weak evidence. Substituting 8, 11, 16 or 24 fails the same recurrence when you check the next term.



Mito says

Sequences can admit many invented rules; use the simple rule that also explains every supplied later term.

Q06 / LOGIC

Count diagonals once

Paper answer A: A hexagon has nine diagonals

An n -sided polygon has $n(n-3)/2$ diagonals. Each vertex joins $n-3$ non-neighbouring vertices; divide by two because each diagonal was counted from both ends. For a hexagon: $6 \times 3 / 2 = 9$.

Avoid the trap. A triangle has 0 diagonals, a square 2, a pentagon 5 and an octagon 20. These eliminate the other four statements.



Mito says

Why subtract three? Exclude the starting vertex and its two adjacent vertices.

Q07 / LOGIC

Substitute before rearranging

Paper answer A: $u = s/27$

Insert $t = 9u$ into $s = 3t$: $s = 3 \times 9u = 27u$. Dividing by 27 gives $u = s/27$. The factors multiply because one relationship is nested inside the other.

Avoid the trap. Adding 3 and 9, multiplying only once, or reversing the ratio changes the relationship. None of the other equations follows from both premises.

**Mito says**

Try $u = 1$. Then $t = 9$ and $s = 27$. Which option still works?

Q08 / LOGIC

A percentage of a percentage

Paper answer A: 300

Let N be the total workforce. Full-time staff number $0.80N$. Bonus recipients number $0.20 \times 0.80N = 0.16N$. Thus $0.16N = 48$, giving $N = 300$.

Avoid the trap. The 20% bonus rate applies to full-time employees, not to all employees. Dividing 48 by 0.20 gives 240 full-time staff, not the total.

**Mito says**

Name the whole before every percentage calculation. Check: $300 \times 80\% = 240$; $240 \times 20\% = 48$.

Q09 / LOGIC

Some is enough

Paper answer A: Some animals are carnivores

The first statement establishes that at least some felines are carnivores. Felines are animals, so at least some animals are carnivores. The second statement tells us those carnivores eat meat.

Avoid the trap. Nothing says all animals eat meat, nor establishes that some do not. Preference and survival requirements are also absent. Do not infer a universal rule from an existential statement.

**Mito says**

Draw one feline inside the carnivore set. What is guaranteed about that one animal?

Q10 / BIOLOGY

Red cells carry oxygen

Paper answer A: To transport oxygen to the tissues

Haemoglobin inside red blood cells binds oxygen in the lungs and delivers it to tissues. That oxygen transport is the main function asked for.

Avoid the trap. White blood cells are central to defence; platelets and clotting factors form clots. Red cells also participate in CO₂ transport, but transport to the liver is not the relevant route or their main role.

**Mito says**

Pair the blood component with its job: red cells, oxygen; white cells, defence; platelets, clot formation.

Q11 / BIOLOGY

A thin exchange surface

Paper answer A: Alveoli

Alveoli provide a large surface area with thin walls closely associated with capillaries. Oxygen and carbon dioxide diffuse across this barrier down their partial-pressure gradients.

Avoid the trap. The trachea conducts air and the diaphragm drives ventilation. The aorta and left atrium move blood; they are not the main lung gas-exchange surface.

**Mito says**

Distinguish ventilation, moving air, from gas exchange, diffusion across the alveolar barrier.

Q12 / BIOLOGY

A bacterial propeller

Paper answer A: To allow the cell to move

Prokaryotic flagella rotate to propel the cell. Their primary role is motility, helping bacteria move through their environment.

Avoid the trap. Attachment is commonly associated with fimbriae or pili. DNA transfer can involve a conjugation pilus. Intracellular transport and cell division are different functions.

**Mito says**

Think movement when you see flagellum. Do not assume bacterial flagella have the same structure as eukaryotic flagella.

Q13 / BIOLOGY

The stomach starts protein digestion

Paper answer A: To break down food using enzymes and acids

The stomach churns food and exposes it to acid and digestive enzymes. Acid denatures proteins and helps activate pepsin, which breaks peptide bonds. This makes acid-and-enzyme breakdown the best answer.

Avoid the trap. Most nutrient absorption occurs in the small intestine. Bile is produced by the liver. Toxin processing and direct delivery to the large intestine do not describe the stomach's primary digestive role.

**Mito says**

Trace the route: stomach, then small intestine. Ask what happens to food, not merely where it travels.

Q14 / BIOLOGY

Ribosomes build proteins

Paper answer A: On ribosomes in the cytoplasm

Translation reads an mRNA sequence to assemble amino acids into a polypeptide. In prokaryotes this takes place on ribosomes in the cytoplasm, including ribosomes that may associate with the membrane.

Avoid the trap. Prokaryotes lack a membrane-bound nucleus. A membrane alone, a flagellum or the space outside the plasma membrane is not the translation machinery.

**Mito says**

Transcription makes RNA; translation makes protein. Name the machine for translation: the ribosome.

Q15 / BIOLOGY

A bilayer with proteins

Paper answer A: Phospholipids and proteins

The plasma membrane consists primarily of a phospholipid bilayer containing proteins. Hydrophilic heads face aqueous surroundings; hydrophobic tails face inward. Proteins supply transport, signalling and other functions.

Avoid the trap. Carbohydrates may decorate the membrane, but DNA, RNA and glycogen are not its main structural pair. Free fatty acids and sugars do not describe the bilayer architecture.

**Mito says**

Sketch heads outside and tails inside. Then add a protein crossing the bilayer.

Q16 / BIOLOGY

A selective passage

Paper answer A: To permit specific substances to pass through the membrane

Channel proteins provide selective routes through the membrane. Open channels typically allow ions or water to move down their electrochemical or concentration gradients; selectivity depends on channel structure.

Avoid the trap. Channels do not store the energy used for active transport, synthesise proteins or export DNA. Membrane fluidity is governed mainly by lipid composition and temperature, not this primary channel function.

**Mito says**

A channel is a passage, not a pump. Ask both what passes and which gradient drives movement.

Q17 / BIOLOGY

Muscle to bone

Paper answer A: To connect muscles to bones

A tendon transmits the force generated by a muscle to a bone, allowing movement across a joint. Its strong collagen-rich tissue withstands tension.

Avoid the trap. A ligament generally connects bone to bone. Tendons do not conduct motor nerve impulses or control actin production. Although tendons can store elastic energy, their primary anatomical role here is attachment.

**Mito says**

Use the pair: tendon, muscle to bone; ligament, bone to bone.

Q18 / BIOLOGY

Cut within DNA

Paper answer A: Endonucleases

Restriction enzymes cleave DNA at or near particular recognition sequences. They are endonucleases because they cut phosphodiester bonds within a nucleic-acid strand.

Avoid the trap. Ligases join nucleic-acid fragments. Isomerases rearrange molecules, oxidoreductases catalyse redox reactions and transferases move functional groups. None names this DNA-cutting role.

**Mito says**

Endo means inside. Contrast an endonuclease with an exonuclease, which removes nucleotides from an end.

Q19 / BIOLOGY

Taking up environmental DNA

Paper answer A: It has taken up foreign DNA directly from the environment

Bacterial transformation is the uptake of extracellular DNA. If retained or incorporated, that DNA can change the recipient's genetic properties.

Avoid the trap. Mutation caused by a mutagen is not transformation. Phagocytosis is engulfment by another cell. Anaerobic growth and a particular wall structure do not define this genetic process.

**Mito says**

Distinguish transformation, free DNA; transduction, a virus; conjugation, cell-to-cell transfer.

Q20 / BIOLOGY

A flexible cartilage flap

Paper answer A: Cartilage

The epiglottis has a core of elastic cartilage. During swallowing it helps protect the airway by covering the laryngeal inlet.

Avoid the trap. It is not primarily a gland, nerve, vertebra or muscle. Its movement does not mean the structure itself is composed mainly of muscle.

**Mito says**

Separate what a structure does from what it is made of. Flexible support points toward cartilage.

Q21 / BIOLOGY

Oxytocin and labour

Paper answer A: Oxytocin

Oxytocin stimulates contraction of uterine smooth muscle during labour. Cervical stretch can promote further oxytocin release, forming a positive-feedback loop.

Avoid the trap. Thyrotropin acts on the thyroid. LH and FSH regulate reproductive processes such as ovulation and follicle development. Insulin regulates fuel metabolism rather than primarily driving labour contractions.

**Mito says**

Follow the loop: stretch, oxytocin, stronger contractions, more stretch.

Q22 / BIOLOGY

Break down fuel

Paper answer A: They are broken down to produce energy for cellular activities

In catabolism, carbohydrates are broken down and their chemical energy is captured, including in ATP. Glucose oxidation is a familiar example of this energy-yielding role.

Avoid the trap. Carbohydrates also have storage and structural roles, but the question asks about catabolism. Storage as fat and exclusive use for protein synthesis do not describe the main catabolic function.

**Mito says**

Catabolism breaks down; anabolism builds up. Identify which direction the question asks about.

Q23 / BIOLOGY

Both halves of metabolism

Paper answer A: It includes both catabolism and anabolism

Metabolism is the total network of chemical reactions in cells. It includes catabolism, breakdown, and anabolism, synthesis. These processes operate in many kinds of organisms.

Avoid the trap. It is not restricted to animals, sunlight or synthesis alone. Claiming metabolism excludes chemical reactions removes its defining feature.

**Mito says**

If a cell builds a protein and breaks down glucose, both activities belong to metabolism.

Q24 / BIOLOGY

Lower the activation barrier

Paper answer A: To speed up reactions without being consumed

Enzymes accelerate reactions by providing a pathway with a lower activation energy. They participate in the mechanism but are regenerated rather than consumed overall.

Avoid the trap. They do not supply the net chemical energy of a reaction, require an increase in temperature, or turn permanently into substrates. They do not change the equilibrium position.

**Mito says**

An enzyme changes how fast equilibrium is reached, not where that equilibrium lies.

Q25 / BIOLOGY

Photosynthesis in chloroplasts

Paper answer A: Chloroplast

In plant and algal cells, chloroplasts contain the machinery for photosynthesis. Light reactions occur on thylakoid membranes; carbon fixation takes place in the stroma.

Avoid the trap. Mitochondria mainly support respiration, ribosomes translation, and the nucleus genetic organisation. The ER is not the photosynthetic organelle. Photosynthetic bacteria lack chloroplasts, but this question asks for an organelle.

**Mito says**

Keep the scope clear: chloroplast is the organelle answer, not a claim that every photosynthetic organism has one.

Q26 / BIOLOGY

Respiration and mitochondria

Paper answer A: Mitochondria

Mitochondria house the citric-acid cycle and oxidative phosphorylation in eukaryotic cells. They are the main organelles associated with aerobic cellular respiration.

Avoid the trap. Glycolysis occurs in the cytosol, so not every respiratory step is mitochondrial. Ribosomes, lysosomes and ER have other primary roles; chloroplasts are associated with photosynthesis.

**Mito says**

Locate glycolysis in cytosol, the citric-acid cycle in matrix, and the respiratory chain in the inner membrane.

Q27 / BIOLOGY

Reduction and variation

Paper answer A: The production of genetically diverse haploid cells

Meiosis reduces chromosome number and usually produces genetically varied haploid cells. Homologous chromosomes separate in meiosis I; crossing over and independent assortment contribute variation.

Avoid the trap. Both meiosis and mitosis use microtubules. Identical daughter cells are the usual mitotic comparison, not the distinctive meiotic result. Meiosis is not confined to unicellular organisms or ordinary somatic division.

**Mito says**

Track homologous pairs first, sister chromatids second. What happens to chromosome number after meiosis I?

Q28 / BIOLOGY

Genes ride on chromosomes

Paper answer A: Genes are located on chromosomes

The chromosomal theory of inheritance links genes to chromosomes. Chromosome behaviour during meiosis helps explain segregation and inheritance patterns.

Avoid the trap. Genes are not independent of chromosomes, and chromosomes do segregate during meiosis. The existence of RNA genomes in some viruses does not support the claim that genes are found only in RNA.

**Mito says**

Connect a gene's transmission to the chromosome carrying it, rather than treating the two as unrelated.

Q29 / BIOLOGY

Diffraction reveals structure

Paper answer A: X-ray crystallography

Franklin used X-ray diffraction to study DNA fibres, a technique commonly grouped under X-ray crystallography. The diffraction pattern provided evidence about DNA's helical structure.

Avoid the trap. MRI, electron microscopy, chromatography and electrophoresis are different methods. A diffraction pattern is not an ordinary magnified photograph of the double helix.

**Mito says**

Remember what is measured: the scattering of X-rays by an ordered sample.

Q30 / BIOLOGY

Two complementary strands

Paper answer A: It has a double-stranded helical structure.

The standard cellular DNA molecule is a double helix composed of two antiparallel polynucleotide strands. Complementary bases pair through hydrogen bonds: A with T, and G with C.

Avoid the trap. The other options remove a strand, remove hydrogen bonds, reduce the four base types to two or add a third strand. None describes the usual DNA structure requested.

**Mito says**

Two strands does not mean two base types. Count A, T, G and C separately.

Q31 / BIOLOGY

A changed haemoglobin

Paper answer A: Their haemoglobin has a different structure from normal haemoglobin

Sickle-cell haemoglobin has an amino-acid substitution in its beta chain. The structural change promotes polymerisation under low-oxygen conditions and can distort red cells.

Avoid the trap. It is too strong to say this haemoglobin cannot transport oxygen at all. It is not identical to normal haemoglobin. The underlying mutation is in the gene; proteins themselves are not said to undergo genetic mutations.

**Mito says**

Distinguish altered protein function from complete loss of function. Avoid absolute wording when the mechanism is conditional.

Q32 / BIOLOGY

One RNA strand

Paper answer A: mRNA consists of a single polynucleotide strand

An mRNA molecule is a single polynucleotide strand that carries coding information for translation. Its sequence contains uracil rather than thymine.

Avoid the trap. Local folding does not make mRNA a two-strand molecule. Its length is not generally greater than DNA, and carrying information for protein synthesis is precisely its role.

**Mito says**

Single-stranded RNA can still fold and form local base-paired regions.

Q33 / CHEMISTRY

Magnesium loses its outer shell

Paper answer A: The ion has 8 electrons in its outermost electron shell

Neutral magnesium has 12 electrons, arranged 2,8,2. Losing two gives Mg^{2+} with 10 electrons, arranged 2,8. The outermost occupied shell therefore contains eight electrons.

Avoid the trap. The ion has fewer electrons and is smaller than the neutral atom. Proton number stays fixed, but electron number changes, so the two species cannot have identical counts of all three particles.

**Mito says**

Write the neutral electron arrangement first. Remove electrons before counting the ion's outer shell.

Q34 / CHEMISTRY

Balance atoms and electrons

Paper answer A: 3, 8, 3, 2, 4

Copper goes from oxidation state 0 to +2, losing two electrons per atom. Nitrogen in nitrate goes from +5 to +2 in NO, gaining three. Three Cu and two NO balance six electrons. Completing nitrate, hydrogen and oxygen gives coefficients 3,8,3,2,4.

Avoid the trap. Check both sides: Cu 3, H 8, N 8 and O 24. The alternatives fail at least one atom count. Do not change chemical subscripts when balancing.

**Mito says**

Use electron balance to find the Cu:NO ratio, then finish by counting atoms.

Q35 / CHEMISTRY

A rate law needs evidence

Paper answer A: To be determined experimentally

An overall reaction equation records stoichiometry, not necessarily the reaction mechanism. Its experimental rate law may have orders that differ from the coefficients.

Avoid the trap. $v = k[A][B]$ would require additional evidence, such as an established elementary bimolecular step. Expressions containing product concentration or equilibrium-style ratios cannot be inferred from this equation alone.

**Mito says**

Ask whether the reaction is explicitly elementary. If not, do not read rate exponents from coefficients.

Q36 / CHEMISTRY

Chloride completes an octet

Paper answer A: 8

Neutral chlorine has seven valence electrons. The chloride anion gains one electron, giving eight in its outer shell and 18 electrons in total.

Avoid the trap. Seven describes the neutral atom's valence count. Seventeen is chlorine's proton number; 35 is not its valence-electron count. Keep total electrons, outer electrons and mass number separate.

**Mito says**

A negative charge means an electron was gained. Does your electron count increase accordingly?

Q37 / CHEMISTRY

A salt with negligible hydrolysis

Paper answer A: A neutral aqueous solution

NaBr dissociates into Na^+ and Br^- . These correspond to a strong base and a strong acid and undergo negligible acid-base hydrolysis in the usual dilute aqueous model, giving an approximately neutral solution.

Avoid the trap. Neither ion generates substantial H^+O or OH^- by reaction with water. Simply seeing a metal cation or a halide does not make the solution strongly basic or acidic.

**Mito says**

Identify the parent acid and base before predicting salt-solution pH.

Q38 / CHEMISTRY

Acetate accepts a proton

Paper answer A: A basic aqueous solution

Acetate is the conjugate base of weak acetic acid. It reacts with water: $\text{CH}_3\text{COO}^- + \text{H}_2\text{O} \rightleftharpoons \text{CH}_3\text{COOH} + \text{OH}^-$. The generated hydroxide makes the solution basic.

Avoid the trap. Na^+ does not supply the basicity. The salt does dissolve; its name does not mean the solution becomes an alcohol. Compare this with a salt of a strong acid.

**Mito says**

Weak acid gives a conjugate base capable of hydrolysis. Which side of the equation contains OH^- ?

Q39 / CHEMISTRY

Match the electron transfer

Paper answer A: $\text{PbBr}_2 + 2 \text{FeBr}_3 \rightarrow \text{PbBr}_4 + 2 \text{FeBr}_2$

Lead changes from +2 in PbBr_2 to +4 in PbBr_4 , losing two electrons. Each iron changes from +3 to +2, gaining one. Two Fe atoms are required per Pb atom: $\text{PbBr}_2 + 2\text{FeBr}_3 \rightarrow \text{PbBr}_4 + 2\text{FeBr}_2$.

Avoid the trap. This also balances eight bromine atoms on each side. The other coefficient sets fail electron balance, atom balance, or both.



Mito says

A two-electron oxidation needs two one-electron reductions.

Q40 / CHEMISTRY

One iodine species, two directions

Paper answer A: $3 \text{KIO}_2 \rightarrow \text{KI} + 2 \text{KIO}_3$

Iodine is +3 in IO_2^- , -1 in I^- and +5 in IO_3^- . One iodine gains four electrons; two iodines each lose two. Therefore $3\text{KIO}_2 \rightarrow \text{KI} + 2\text{KIO}_3$.

Avoid the trap. The correct coefficients also balance K 3, I 3 and O 6. Disproportionation means the same initial element is both oxidised and reduced.



Mito says

Compare oxidation-state changes before guessing coefficients.

Q41 / CHEMISTRY

Oxygen distinguishes the acid

Paper answer A: An oxyacid

HClO contains hydrogen, chlorine and oxygen and is hypochlorous acid, an oxyacid. Its acidic hydrogen can be released as a proton in water.

Avoid the trap. HCl, without oxygen, is a binary hydrohalic acid. An oxide or acid anhydride is not the same formula class. The presence of an O–H unit does not make this a metal hydroxide.

**Mito says**

Use composition first: an acid containing oxygen is an oxyacid.

Q42 / CHEMISTRY

Separate molecules, not their bonds

Paper answer A: The intermolecular forces in A are stronger than those in B

Boiling separates molecules from one another. Stronger intermolecular attractions generally require more energy to overcome, raising the boiling point in the comparison intended here.

Avoid the trap. Intramolecular bonds hold atoms together within a molecule and are not normally broken by boiling. The full boiling-point comparison also depends on pressure and molecular properties; the test focuses on attractions between molecules.

**Mito says**

Inter means between; intra means within. Which interactions are overcome during a phase change?

Q43 / CHEMISTRY

Read the functional-group ending

Paper answer A: Ketones

Pentanones are five-carbon ketones. The ending -one identifies a carbonyl group whose carbon is bonded to two carbon groups, as in pentan-2-one.

Avoid the trap. Alcohols use -ol. Carboxylic acids contain a carboxyl group; lactones are cyclic esters. A hydroxyketone would additionally need a hydroxyl group, not implied by pentanone.

**Mito says**

Find the suffix before counting the carbon chain.

Q44 / CHEMISTRY

Ethene contains a double bond

Paper answer A: An alkene

Ethene, $\text{CH}_2=\text{CH}_2$, has one carbon-carbon double bond and belongs to the alkenes. The prefix eth- signals two carbons, while -ene signals the double bond.

Avoid the trap. An alkyne contains a triple bond. A diene has two double bonds; an alkenyne has both double and triple bonds. Ethene is a real, familiar molecule.

**Mito says**

Compare ethane, ethene and ethyne: single, double and triple carbon-carbon bond.

Q45 / CHEMISTRY

A formula can hide different groups

Paper answer A: An alcohol, an aldehyde, or a ketone

C_3H_6O can describe propanal, an aldehyde; propanone, a ketone; or an unsaturated alcohol such as $CH_2=CH-CH_2OH$. The formula has one degree of unsaturation, which can sit in a $C=C$ bond instead of a carbonyl.

Avoid the trap. Assuming an alcohol must be saturated would wrongly rule it out. A molecular formula alone does not specify connectivity or the functional group.

**Mito says**

Construct one valid structure for every proposed class. One counterexample defeats a claim that a class is impossible.

Q46 / CHEMISTRY

Hold temperature and amount fixed

Paper answer A: The pressure decreases in inverse proportion

For a fixed amount of ideal gas, $pV = nRT$. During an isothermal process T is constant, so pV stays constant: increasing volume decreases pressure in inverse proportion.

Avoid the trap. Doubling V halves p . Direct proportionality would make pressure rise with volume, and isothermal explicitly rules out a temperature increase.

**Mito says**

State the fixed quantities before applying a gas law.

Q47 / CHEMISTRY

Heat leaves the reacting system

Paper answer A: The products have lower chemical potential energy than the reactants

An exothermic reaction transfers energy to the surroundings. In the simplified chemical-energy picture used here, the products lie below the reactants; at constant pressure the reaction enthalpy change is negative.

Avoid the trap. Exothermic does not mean fast. A large activation barrier can make an energy-releasing reaction slow. Absorbing heat instead describes an endothermic process.

**Mito says**

Draw products lower than reactants, then add an activation hump. Height difference and barrier height answer different questions.

Q48 / PHYSICS

Rate of change of position

Paper answer A: Velocity

Velocity measures change of position per unit time: average velocity is displacement divided by elapsed time, and instantaneous velocity is its time derivative.

Avoid the trap. Acceleration measures change of velocity. Frequency counts cycles per time, while angular frequency describes angular oscillation rate. None is the direct rate of change of position.

**Mito says**

Position → velocity → acceleration. Each arrow means one time derivative.

Q49 / PHYSICS

Two inertial frames

Paper answer A: Uniform rectilinear motion of one observer relative to the other

Galilean transformations relate inertial frames moving at constant relative velocity along a straight line. For motion along x , $x' = x - vt$ and $t' = t$ in the classical approximation.

Avoid the trap. Accelerating or rotating observers are non-inertial, so the simple Galilean frame transformation is not the appropriate answer. At relativistic speeds Lorentz transformations are needed instead.



Mito says

Uniform rectilinear means constant speed and fixed direction, so no relative acceleration.

Q50 / PHYSICS

Convert speed before squaring

Paper answer A: 1000 J

First convert 36 km/h to 10 m/s by dividing by 3.6. Then $E_k = \frac{1}{2}mv^2 = \frac{1}{2} \times 20 \times 10^2 = 1000 \text{ J}$.

Avoid the trap. Using 36 directly mixes units; forgetting the half or forgetting to square the speed gives another wrong value. The unit joule is $\text{kg} \cdot \text{m}^2/\text{s}^2$.



Mito says

Square the converted speed, not the original number in kilometres per hour.

Q51 / PHYSICS

Mechanical energy becomes thermal

Paper answer A: decreases

Sliding friction does negative work on the moving object. Some gravitational potential energy becomes thermal energy rather than kinetic energy, so the object's mechanical energy decreases.

Avoid the trap. Total energy is conserved when the thermal energy of the object and surroundings is included. Decreasing mechanical energy does not mean it becomes zero immediately.



Mito says

Choose the system and the kind of energy before invoking conservation.

Q52 / PHYSICS

Absolute pressure doubles

Paper answer A: Approximately 10m

At depth h , absolute pressure is $p = p_0 + \rho gh$. Doubling surface pressure requires $\rho gh = p_0$. Using $p_0 \approx 1.0 \times 10^5 \text{ Pa}$, $\rho \approx 1.0 \times 10^3 \text{ kg/m}^3$ and $g \approx 10 \text{ m/s}^2$ gives $h \approx 10 \text{ m}$.

Avoid the trap. The added water pressure is one atmosphere, not two. Confusing gauge pressure with absolute pressure would give about 20 m. Seawater density changes the estimate slightly.



Mito says

Write surface pressure plus water pressure before substituting numbers.

Q53 / PHYSICS

A neutral atom balances charge

Paper answer A: 0 C

A hydrogen atom contains one proton and one electron. Their charges have equal magnitude and opposite signs, so the net electric charge is zero.

Avoid the trap. A hydrogen ion can be charged, but the question says atom. The nonzero nC, mC and pC choices do not represent the net charge of neutral hydrogen.

**Mito says**

Count positive and negative elementary charges; do not confuse atom with ion.

Q54 / PHYSICS

Keep a stable phase relationship

Paper answer A: their phase difference remains constant over time

Coherent waves maintain a constant phase difference over time. For simple monochromatic waves, this requires the same frequency and produces a stable interference relationship.

Avoid the trap. Equal amplitude or intensity does not guarantee coherence. Neither does being visible. A randomly changing phase difference is the opposite of the required stability.

**Mito says**

Same frequency is not the complete definition: ask whether the relative phase remains stable.

Q55 / MATHS

Factor and test the intervals

Paper answer A: $1 \leq x \leq 5$

$x^2 - 6x + 5 = (x-1)(x-5)$. The roots are 1 and 5. An upward-opening quadratic is non-positive between its roots, so the solution is $1 \leq x \leq 5$.

Avoid the trap. Include the endpoints because the sign is $\leq$. Outside the roots both factors have the same sign, so their product is positive. Negative roots would come from a different polynomial.



Mito says

Check $x = 3$ inside and $x = 0$ outside. Do the signs match your interval?

Q56 / MATHS

An exponential stays positive

Paper answer A: All real numbers

For every real x , e^x is strictly positive. Negative x gives a reciprocal, $e^{-a} = 1/e^a$, which is still positive. Therefore every real number satisfies $e^x > 0$.

Avoid the trap. Do not confuse the sign of the exponent with the sign of the function. As x tends to negative infinity, e^x approaches zero but never reaches it for a finite real x .



Mito says

Compare $e^0 = 1$ and $e^{-1} = 1/e$. Both are positive.

Q57 / MATHS

Test the origin directly

Paper answer A: It passes through the origin

Substitute $x = 0$ and $y = 0$ into $x^2 + y^2 + 5x + 4y = 0$. Both sides become zero, so the circle passes through the origin. Completing squares gives $(x+2.5)^2 + (y+2)^2 = 10.25$.

Avoid the trap. The centre is $(-2.5, -2)$, on neither coordinate axis, and the radius is nonzero. Passing through the origin does not mean being centred there.



Mito says

For a point-on-curve question, substitution is often faster than deriving every geometric property.

Q58 / MATHS

Without replacement changes the second draw

Paper answer A: $7/22$

There are 7 non-red balls out of 12. After a non-red first draw, 6 non-red balls remain out of 11. Thus $P(\text{no red}) = (7/12) \times (6/11) = 42/132 = 7/22$.

Avoid the trap. Squaring $7/12$ assumes replacement. Multiplying $7/12$ by $7/11$ fails to remove the first non-red ball. The red-ball counts answer a different event.



Mito says

Update both numerator and denominator after the first draw.

Q59 / MATHS

A point fixes the parameter

Paper answer A: -1

The point $(5,0)$ lies on the curve, so substitute $x = 5$ and $y = 0$: $0 = 25k - 5 + 30 = 25k + 25$. Hence $k = -1$.

Avoid the trap. Substitute into every term, including the linear term $-x$. Moving $+25$ across the equality changes its sign.

**Mito says**

Check by substitution: $-25 - 5 + 30 = 0$.

Q60 / MATHS

Undo a base-ten logarithm

Paper answer A: 1000000

$\log_{10} x = 6$ means $x = 10^6 = 1,000,000$. This satisfies the logarithm's domain $x > 0$.

Avoid the trap. A logarithm asks for an exponent. Multiplying 10 by 6 gives 60, which is not equivalent. Powers 10^4 and 10^5 have exponents 4 and 5, not 6.

**Mito says**

Read it aloud: ten raised to which power equals x ?