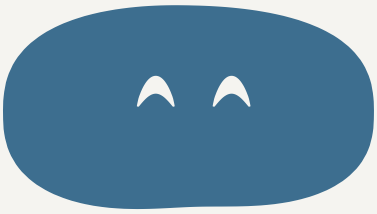
PAST PAPER / EXPLAINED WITH MITO

Understand the answer. Keep the method.

IMAT 2024

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 published IMAT2024.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 published key selects A for all questions. Printing issues are discussed in the relevant entries. 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
Maths Q48-54: pp. 26-29 · Physics Q55-60: pp. 30-32

Source: MUR, IMAT 2024, academic year 2024/2025. Original question paper: accessoprogrammato.mur.gov.it/compiti/CompitoInglese2024.pdf. File checked 4 October 2026. Independent explanations by Mito; not an official solution publication.

Q01 / READING

A modernist author

Published answer A: Virginia Wolf

To the Lighthouse is Virginia Woolf's novel. The published option spells her surname "Wolf"; the intended author is Woolf. Match the title to its author, rather than treating the spelling mistake as another author.

Avoid the trap. Shelley wrote Frankenstein; Austen and Christie belong to different bodies of work. Dickinson is chiefly known for poetry.



Mito says
Keep a short title-author list and practise recalling it both ways.

Q02 / READING

Find the claim the passage rejects

Published answer A: Since antiquity, mathematics has been characterized by abstractness and generality.

The passage distinguishes practical pre-Greek mathematics from the abstract, general science developed by the Greeks. Saying mathematics had always possessed those qualities contradicts that distinction.

Avoid the trap. The other statements paraphrase details about symbols, practical uses, unsystematic communication and slow development.



Mito says
For CANNOT be inferred, look for a contradiction, not merely an unfamiliar sentence.

Q03 / READING

The Hundred Years' War

Published answer A: The Kingdom of France and the Kingdom of England

The main opposing kingdoms were England and France. The conflict concerned claims to the French crown and control of territory in France.

Avoid the trap. Do not confuse this Anglo-French conflict with wars among the Iberian kingdoms.



Mito says
Attach a historical event to its participants before memorising dates.

Q04 / READING

Who receives the action?

Published answer A: The deeds of Aeneas were sung by Virgil.

In "were sung by Virgil", the deeds receive the action. "Were" plus the past participle "sung" forms the passive; Virgil is the agent.

Avoid the trap. An active sentence can mention a historical event without being grammatically passive.



Mito says
Ask: does the subject perform the action, or receive it?

Q05 / LOGIC

Count candidates, not marks

Published answer A: 25%

The frequencies total 24 candidates. Marks strictly above 5 have frequencies 1 + 2 + 2 + 1 + 0 = 6. Therefore 6/24 = 1/4 = 25% passed.

Avoid the trap. The mark 5 does not pass. Adding the mark values instead of their frequencies counts the wrong thing.



Mito says
Underline the threshold, then total the frequencies on the passing side.

Q06 / LOGIC

One prize group out of three

Published answer A: 4 %

Silver : gold = 2 : 1, so gold pens are one third of all prizes. A third of 12% is 4%. Equivalently, 180 prizes include 60 gold pens, and 60/1500 = 0.04.

Avoid the trap. One third is the probability among prize winners, not among all contestants.



Mito says
Separate "of the winners" from "of all participants".

Q07 / LOGIC

Successive discounts multiply

Published answer A: 28%

Start with 100. After 10% off, 90 remains. Taking 20% off 90 leaves 72. The total reduction is 28, or 28%.

Avoid the trap. Adding 10% and 20% ignores that the second discount uses the reduced price.



Mito says
Multiply the remaining fractions: 0.90 × 0.80 = 0.72.

Q08 / LOGIC

Painted shell, unpainted centre

Published answer A: 218

Since 343 = 7^3, there are seven blocks per edge. The unpainted interior has five per edge: 5^3 = 125. The painted shell contains 343 - 125 = 218 blocks.

Avoid the trap. Counting six faces separately double-counts edges and corners.



Mito says
For a solid n-by-n-by-n cube, subtract $(n - 2)^3$ from n^3.

Q09 / LOGIC

Reverse and negate

Published answer A: Marco arrived late; therefore he did not take the train.

The statement is train → on time. Its contrapositive is not on time → not train. Arriving late therefore rules out having taken the train.

Avoid the trap. Not taking the train does not force lateness; another form of transport may also arrive on time.



Mito says
An implication allows its contrapositive, not its converse.

Q10 / BIOLOGY

Where respiration happens

Published answer A: Cellular respiration

Mitochondria host major stages of aerobic cellular respiration: pyruvate oxidation, the Krebs cycle and oxidative phosphorylation. They convert energy from nutrients into usable ATP.

Avoid the trap. Glycolysis, although part of respiration overall, takes place in the cytosol rather than inside mitochondria.



Mito says
Place each stage of respiration on a cell map.

Q11 / BIOLOGY

A hydrogen-bond attraction

Published answer A: It is a bond between a hydrogen atom and another strongly electronegative atom (such as oxygen or nitrogen) which is present in another molecule.

A hydrogen covalently bonded to an electronegative atom can be attracted to a nearby electronegative atom. The published answer describes an intermolecular hydrogen bond. Such bonds can also form within a large molecule.

Avoid the trap. The O-H bonds inside one water molecule are covalent; the attractions between water molecules are hydrogen bonds.



Mito says
Distinguish the covalent bond holding H in a molecule from its attraction to a neighbour.

Q12 / BIOLOGY

The Krebs cycle's compartment

Published answer A: In the mitochondrial matrix

In eukaryotes, the Krebs cycle is conventionally located in the mitochondrial matrix. Its enzymes process acetyl-CoA and generate reduced electron carriers.

Avoid the trap. The inner membrane houses the respiratory chain; succinate dehydrogenase is also membrane-associated, but that does not relocate the whole cycle.



Mito says
Matrix for the cycle, inner membrane for the respiratory chain.

Q13 / BIOLOGY

Count glucose's carbons

Published answer A: hexose

Glucose contains six carbon atoms, so it is a hexose. Its molecular formula is C6H12O6.

Avoid the trap. A sugar's ring size is not necessarily the same as the total number of carbon atoms.

Mito says
Hex means six; pent means five.

Q14 / BIOLOGY

The sugar in RNA

Published answer A: Ribose

RNA nucleotides contain ribose, a five-carbon sugar. DNA contains deoxyribose, which lacks the oxygen of the 2'-hydroxyl group.

Avoid the trap. Glucose is a six-carbon sugar; lactose is a disaccharide, not a nucleotide sugar.

Mito says
Use the R in RNA to recall ribose.

Q15 / BIOLOGY

Membrane carriers

Published answer A: They are the proteins that transfer molecules and ions across the plasma membrane

Carrier proteins bind particular solutes and change shape to move them across a membrane. They can support facilitated diffusion or coupled/active transport.

Avoid the trap. A carrier is not defined by phosphorylating enzymes or degrading membrane lipids.



Mito says
Picture binding, a shape change, then release on the other side.

Q16 / BIOLOGY

The cell's spendable energy

Published answer A: ATP

ATP couples energy-releasing processes to energy-requiring work. Its hydrolysis can help drive transport, biosynthesis and movement.

Avoid the trap. NADH and FADH2 mainly transfer electrons; they are not the usual direct energy currency of cellular work.



Mito says
Carriers deliver energy; ATP is the commonly spent currency.

Q17 / BIOLOGY

ATP hydrolysis releases free energy

Published answer A: exergonic

ATP hydrolysis to ADP and phosphate is exergonic under typical cellular conditions: the products have lower Gibbs free energy. Coupling it to another process can make the combined process favourable.

Avoid the trap. Breaking a bond alone requires energy. The net release comes from the complete reaction and stabilisation of its products.

Mito says
Judge the free-energy change of the whole reaction, not one broken bond.

Q18 / BIOLOGY

Compartmentalised cells

Published answer A: Of eukaryotes

The question intends intracellular compartmentalisation: eukaryotic cells contain membrane-bound organelles that separate different processes.

Avoid the trap. The printed "intercellular" wording is imprecise. Viruses are not cells, and prokaryotes do not have the standard eukaryotic organelle system.

Mito says
Internal rooms are a useful picture for eukaryotic organelles.

Q19 / BIOLOGY

A microtubule structure

Published answer A: The centriole

Centrioles are typically built from nine sets of microtubule triplets arranged in a cylinder. They are associated with centrosomes and the organisation of microtubules.

Avoid the trap. The nucleus, Golgi apparatus and endoplasmic reticulum are not cylinders made of microtubule triplets.



Mito says
Connect centrioles to microtubules, not to membrane stacks.

Q20 / BIOLOGY

Two mitochondrial membranes

Published answer A: An outer membrane and a very selective inner membrane

A mitochondrion has an outer membrane and a highly selective inner membrane. The inner membrane contains the machinery for oxidative phosphorylation and helps maintain the proton gradient.

Avoid the trap. Membranes are lipid bilayers with proteins. A single lipid layer or a protein-free membrane does not describe mitochondria.



Mito says
The inner membrane is the controlled boundary that makes the gradient useful.

Q21 / BIOLOGY

The adaptor's anticodon

Published answer A: The sequence of three nucleotides found on the tRNA corresponding to a codon on the mRNA.

A tRNA carries an anticodon, a three-base sequence that pairs antiparallel with a complementary mRNA codon. The tRNA thereby connects the codon to an amino acid.

Avoid the trap. The codon is on mRNA; the anticodon is on tRNA. DNA is not directly read by a ribosome.



Mito says
Codon: message. Anticodon: adaptor.

Q22 / BIOLOGY

Ribosomes are ribonucleoproteins

Published answer A: RNA and proteins

Ribosomes contain ribosomal RNA and proteins. rRNA contributes both structure and the catalytic centre responsible for peptide-bond formation.

Avoid the trap. They do not contain DNA as a structural ingredient and are not lipid-bound organelles.



Mito says
The name ribosome is a reminder to include RNA.

Q23 / BIOLOGY

The membrane's bilayer

Published answer A: a double phospholipid layer with hydrophobic tails facing inward and the presence of integral and peripheral proteins

Phospholipids form a bilayer with hydrophobic tails sheltered inside and hydrophilic heads facing water. Integral and peripheral proteins provide transport, signalling and other functions.

Avoid the trap. Triglycerides store energy; they do not form the basic plasma-membrane bilayer.



Mito says
Heads to water, tails together, proteins embedded or attached.

Q24 / BIOLOGY

Translating a message

Published answer A: It is the process by which mRNA is read and converted into a specific sequence of amino acids.

During translation, a ribosome reads mRNA codons and builds a polypeptide with the corresponding amino-acid sequence. tRNAs deliver the amino acids.

Avoid the trap. DNA → RNA is transcription. RNA → polypeptide is translation.



Mito says
Keep the two arrows distinct: DNA to RNA to protein.

Q25 / BIOLOGY

Three cytoskeletal systems

Published answer A: Microtubules, microfilaments, and intermediate filaments

The principal systems are actin microfilaments, intermediate filaments and microtubules. They support cell shape, mechanical strength, transport and movement.

Avoid the trap. Myosin and dynein are motor proteins, not additional filament classes. Collagen is mainly extracellular.



Mito says
Learn the three filament families before their associated motors.

Q26 / BIOLOGY

An alternative gene version

Published answer A: one of several alternative forms of a gene

An allele is one of the alternative forms of a gene at a particular locus. Different alleles can contribute to variation in a trait.

Avoid the trap. An allele is not a phenotype, a single amino acid or necessarily one DNA base.



Mito says
A gene is the location/function; an allele is a version.

Q27 / BIOLOGY

Dominance in a heterozygote

Published answer A: dominant

Under the simple Mendelian model used here, a dominant allele determines the phenotype in a heterozygote. One copy is sufficient for that dominant phenotype to appear.

Avoid the trap. Recessive does not mean absent or never transcribed. The question concerns phenotypic expression in the simple dominance model.



Mito says
State the model before applying a genetics shortcut.

Q28 / BIOLOGY

A change in genetic information

Published answer A: Alterations in the genetic information of a cell

A mutation changes genetic material, for example a DNA base sequence or chromosome structure. Its effects may be neutral, harmful or beneficial.

Avoid the trap. A change in metabolism or enzyme activity is not by itself evidence that the DNA has changed.



Mito says
Distinguish a genetic change from its possible downstream effects.

Q29 / BIOLOGY

From mRNA to a polypeptide

Published answer A: leads to the synthesis of polypeptide chains from mRNA

Translation assembles amino acids into a polypeptide according to the mRNA sequence. It takes place on ribosomes in both prokaryotic and eukaryotic cells.

Avoid the trap. RNA synthesis from DNA is transcription; translation is not exclusively eukaryotic or normally located in the nucleus.



Mito says
Identify the template and the product in the question.

Q30 / BIOLOGY

Pair each DNA base

Published answer A: GGCAATAACT

Apply C-G and A-T pairing to CCGTTATTGA. The corresponding bases are GGCAATAACT. The two strands run antiparallel; this option is aligned beneath the given strand.

Avoid the trap. Simply reversing the original string does not complement its bases. A requested 5'-to-3' reverse complement would need an additional reversal.



Mito says
First complement; then check whether strand directions require reversing.

Q31 / BIOLOGY

Copying DNA

Published answer A: DNA is used as a template to synthesise new DNA molecules

Replication uses DNA as a template to make new DNA. Each daughter double helix normally contains one parental strand and one newly synthesised strand.

Avoid the trap. Cell division distributes DNA; it is not the molecular copying process. DNA → RNA is transcription.



Mito says
Replication preserves the molecule type: DNA to DNA.

Q32 / BIOLOGY

An operon is coordinated control

Published answer A: A functional unit composed of a group of adjacent genes, co-ordinately controlled, and of DNA sequences with regulatory functions.

A prokaryotic operon groups adjacent genes under shared regulatory control, often producing one polycistronic RNA. Regulatory DNA helps coordinate their expression.

Avoid the trap. Adjacent genes alone are not enough: the coordinated control is central to the definition.



Mito says
Imagine several related genes sharing a control switch.

Q33 / CHEMISTRY

Partial pressure follows mole fraction

Published answer A: 0.6 atm

Total gas amount is 0.3 + 0.5 + 0.4 = 1.2 mol. Nitrogen's mole fraction is 0.3/1.2 = 1/4. Dalton's law gives 2.4 × 1/4 = 0.6 atm.

Avoid the trap. Use the total number of gas moles, not the number of gas species or their masses.

Mito says
Partial pressure = mole fraction × total pressure.

Q34 / CHEMISTRY

Gas temperatures must be absolute

Published answer A: 10 atm

At fixed amount and volume, P/T is constant. Convert roughly to 270 K and 300 K: P2 = 9 × 300/270 = 10 atm. Using 273.15 gives approximately the same answer.

Avoid the trap. Ratios of Celsius temperatures are invalid because zero Celsius is not absolute zero.

Mito says
Convert to kelvin before using a gas-law ratio.

Q35 / CHEMISTRY

A basic metal oxide

Published answer A: BaO

Barium oxide reacts with water to form barium hydroxide: BaO + H2O → Ba(OH)2. It is a basic oxide.

Avoid the trap. The listed non-metal oxides generally form acids or do not react readily with water in this way.

Mito says
Metal oxide plus water can give a hydroxide; check the element first.

Q36 / CHEMISTRY

Find the limiting reagent

Published answer A: From 2 mol of FeS2 and 11 mol of O2, 1 mol of Fe2O3 can be obtained.

The balanced equation converts 4 mol FeS2 into 2 mol Fe2O3. Thus 2 mol FeS2 can produce 1 mol Fe2O3 and needs 5.5 mol O2. With 11 mol O2 available, oxygen is in excess.

Avoid the trap. The coefficient ratio matters. Producing 1 mol Fe2O3 requires 5.5 mol O2, not 5.

Mito says
Convert each reactant into possible product, then choose the smaller amount.

Q37 / CHEMISTRY

Final volume versus water added

Published answer A: 60 mL

Conservation of solute gives 0.25 × 15 = 0.05 × V2, so the final volume is 75 mL. The water added is 75 - 15 = 60 mL, assuming additive volumes.

Avoid the trap. 75 mL is the final solution volume, not the amount of extra water.



Mito says
Finish a dilution calculation by rereading what volume was requested.

Q38 / CHEMISTRY

Count ions per formula unit

Published answer A: 0.6

The solution contains 1.2 mol/L × 0.250 L = 0.300 mol Na2SO4. Each formula unit supplies two sodium ions, so there are 0.600 mol Na+.

Avoid the trap. Moles of compound and moles of a particular ion are not always equal.



Mito says
Molarity times litres, then multiply by the ion's subscript.

Q39 / CHEMISTRY

An electron-pair donor

Published answer A: Lewis base

NH3 donates its nitrogen lone pair to electron-deficient BF3. A Lewis base donates an electron pair; a Lewis acid accepts it.

Avoid the trap. This reaction does not transfer a proton, so a Brønsted acid-base description is not the defining one here.

Mito says
Ask what is transferred: a proton or an electron pair?

Q40 / CHEMISTRY

The reducing agent is oxidised

Published answer A: Zn(s)

Metallic zinc loses electrons to become Zn2+. Because it donates electrons and is oxidised, Zn(s) is the reducing agent.

Avoid the trap. The reducing agent is not the species being reduced, nor necessarily the product containing the same element.

Mito says
Reducing agent: gives electrons, oxidation number increases.

Q41 / CHEMISTRY

Count the hydrogen atoms

Published answer A: 2,3-Dimethylpentane

2,3-Dimethylpentane is an acyclic saturated seven-carbon hydrocarbon: C7H16. The other listed six-carbon rings, alkene and alcohol have fewer than 16 hydrogens.

Avoid the trap. A ring or double bond reduces the hydrogen count relative to an acyclic alkane.



Mito says
For an acyclic alkane, start with CnH(2n+2).

Q42 / CHEMISTRY

An ether has no carbonyl

Published answer A: Dimethyl ether

Dimethyl ether is CH3-O-CH3. Its oxygen has two single bonds, so there is no carbon-oxygen double bond. Aldehydes, ketones, carboxylic acids and esters contain a carbonyl.

Avoid the trap. Having oxygen in a molecule does not automatically mean it has C=O.



Mito says
Sketch the functional group, not the entire molecule.

Q43 / CHEMISTRY

Check the prefix

Published answer A: 1013.25 kPa

One atmosphere equals 101325 Pa = 101.325 kPa. Therefore 1013.25 kPa is ten atmospheres, not one. The millibar value in the options is a rounded equivalent.

Avoid the trap. Changing Pa to kPa requires division by 1000. Do not preserve the same numerical value.



Mito says
Write the prefix factor beside each conversion.

Q44 / CHEMISTRY

Atoms versus molecules

Published answer A: 3.01×10^{22}

Gaseous nitrogen is N2, with molar mass 28 g/mol. In 0.7 g there are 0.025 mol molecules, hence 0.050 mol nitrogen atoms. Multiplying by Avogadro's constant gives about 3.01×10^{22} atoms.

Avoid the trap. Using 0.025 mol without doubling counts N2 molecules, not nitrogen atoms.



Mito says
Label the particle being counted at every step.

Q45 / CHEMISTRY

Carbon limits the carbon dioxide

Published answer A: 33 g of CO_2 are produced.

For $C + O_2 \rightarrow CO_2$, 9/12 = 0.75 mol carbon reacts with 0.75 mol oxygen. There are 36/32 = 1.125 mol oxygen available. Product mass is 0.75 × 44 = 33 g CO_2.

Avoid the trap. Not all 45 g of initial material becomes CO_2; 12 g of oxygen remains.



Mito says
Use moles to decide what reacts, then convert the product back to grams.

Q46 / CHEMISTRY

Two pH units mean a hundredfold dilution

Published answer A: 99 mL

For this dilute strong acid, pH 2 means $[H^+] \approx 0.01$ M and pH 4 means about 0.0001 M. A hundredfold dilution takes 1 mL to 100 mL, requiring 99 mL water.

Avoid the trap. A pH change of two is not a twofold concentration change.



Mito says
Each pH unit represents a factor of ten.

Q47 / CHEMISTRY

Strong acid, weak conjugate base

Published answer A: a strong acid forms a conjugate with a weak base

An acid loses H+ to form its conjugate base. A strong acid readily donates that proton, so its conjugate base has little tendency to take it back in water.

Avoid the trap. Brønsted theory concerns H+ transfer, not hydroxide donation or electron-pair donation.



Mito says
A conjugate pair differs by exactly one proton.

Q48 / MATHS

Multiply the exponents

Published answer A: 2√2

Taking a cube root and then a square root gives 512^(1/6). Since 512 = 2^9, this is 2^(9/6) = 2^(3/2) = 2√2.

Avoid the trap. Do not add the exponents of a power raised to another power; multiply them.



Mito says
Rewrite a large number as a power of a small base.

Q49 / MATHS

Evaluate, then take the reciprocal

Published answer A: 1/4

At x = 2, $x^2 + 12 = 16$, and $\log_2(16) = 4$. The requested reciprocal is therefore 1/4.

Avoid the trap. The function value is 4; the question asks for its reciprocal, not its inverse function.



Mito says
Perform the requested operations in order and name the final one.

Q50 / MATHS

Replacement keeps the probability fixed

Published answer A: 49/100

The first green draw has probability 7/10. Replacing the ball restores the same composition, so the second green probability is also 7/10. Their product is 49/100.

Avoid the trap. 42/90 describes two green draws without replacement, which is a different experiment.



Mito says
Ask whether the second draw sees a changed bag.

Q51 / MATHS

A strictly positive numerator

Published answer A: Each real x with x < 4/3

The numerator is x^2 + the absolute value of 4x + 3. Both terms are nonnegative and cannot be zero together, so the numerator is always positive. The fraction is nonnegative exactly when 4 - 3x > 0: x < 4/3.

Avoid the trap. The original contains absolute-value bars. Losing them changes the problem. The denominator cannot be zero, even though the inequality includes equality.



Mito says
Check whether the numerator can ever vanish before making a sign table.

Q52 / MATHS

The tangent-chord theorem

Published answer A: They are equal.

The angle between a tangent and chord AB equals the angle subtended by that chord at a point on the opposite arc. Thus the acute angle θ equals angle ADB = ϕ.

Avoid the trap. Complementary means summing to 90 degrees; supplementary means summing to 180. Neither is the relation here.



Mito says
Draw the tangent, chord and point on the major arc before naming the theorem.

Q53 / MATHS

Base area times height

Published answer A: 175π cm³

A cylinder has volume πr²h. Substituting r = 5 cm and h = 7 cm gives π × 25 × 7 = 175π cm³.

Avoid the trap. The radius must be squared. Using the diameter as the radius would multiply the volume by four.



Mito says
Area uses square units; multiplying by height produces cubic units.

Q54 / MATHS

Sine selects the opposite side

Published answer A: a = c sin(α)

Relative to α, side a is opposite and c is the hypotenuse. Therefore sin(α) = a/c, giving a = c sin(α).

Avoid the trap. Cosine uses the adjacent leg; reversing the ratio changes the equation.



Mito says
Mark opposite, adjacent and hypotenuse before choosing sine or cosine.

Q55 / PHYSICS

A printing issue: work is not power

Published answer A: 210 W

The published key selects 210 W, but the printed question gives no numerical speed or time. Force times distance gives braking work of -1050 J. Instantaneous power is -210v W when v is in m/s, so a unique numerical power cannot be deduced.

Avoid the trap. Do not turn 1050 joules into 1050 watts. The keyed 210 W magnitude would require an unstated speed of 1 m/s.



Mito says
Keep the published key separate from what the supplied data can actually establish.

Q56 / PHYSICS

Boyle's law

Published answer A: becomes P/3

For a fixed amount of ideal gas at constant temperature, PV is constant. Tripling V therefore divides P by three.

Avoid the trap. Pressure is inversely, not directly, proportional to volume under these conditions.



Mito says
Write P1V1 = P2V2 before substituting.

Q57 / PHYSICS

Electrical heating

Published answer A: 29.22 Ω

For a resistor, $P = I^2R$. Hence $R = 2922/(10^2) = 29.22$ Ω.

Avoid the trap. Dividing by 10 rather than 100 forgets to square the current.

Mito says
Choose the power formula whose variables are already given.

Q58 / PHYSICS

Speed can stay constant while velocity changes

Published answer A: The electron continues to move with a constant velocity velocity vector v

A magnetic force perpendicular to motion changes the electron's direction without doing work. The speed stays constant, but the velocity vector continuously changes around the circle. Thus constant velocity is the false statement.

Avoid the trap. Uniform circular motion means constant speed, not an unchanging velocity vector.

Mito says
A vector includes direction. Always check which meaning of "constant" is intended.

Q59 / PHYSICS

Velocity at a turning point

Published answer A: 0 m/s

Differentiate $x(t) = 4\cos(\omega t)$: $v(t) = -4\omega \sin(\omega t)$. At $t = 1/2$ s and $\omega = 2\pi$ rad/s, the sine argument is π, so velocity is zero.

Avoid the trap. Position and velocity are different functions. At the extreme displacement, speed is momentarily zero.



Mito says
Differentiate first, substitute second.

Q60 / PHYSICS

No damping without energy loss

Published answer A: In the absence of friction, the pendulum tends to come to a stop after a certain time

With no friction or other dissipation, the pendulum does not gradually come to rest; mechanical energy keeps exchanging between kinetic and potential forms. That makes the stopping claim false.

Avoid the trap. A pendulum is only approximately simple harmonic at small angles. Briefly stopping at a turning point is different from permanently stopping.



Mito says
Distinguish zero instantaneous velocity from loss of the oscillation's energy.