NUMS MDCAT — 2025 · Solved Past Paper

Body: National University of Medical Sciences (NUMS) · **Post:** MDCAT (Medical & Dental College Admission Test) · **Year:** 2025 · **Exam date:** 14 September 2025 · **Questions:** 150 in the original paper — **145 solved and verified**, 5 excluded as defective (Q46, Q111, Q142, Q143, Q146) · **Price:** Free

> **How to use this paper:** each question shows the stem, the four options, and the correct answer. Click “Why each option?” under a question to see all four options explained — one question teaches four topics. Answers are as of the 2025 sitting.

Source note: Primary source: mdcatpapers.com transcription, "NUMS MDCAT 2025 Past Paper" (accessed 31 Oct 2026), 141 questions with stems, all four options, a marked answer and an explanation each. True total verified 8 Nov 2026 as 150 Paper-I MCQs (official NUMS 2025 pattern: Paper-I 150, Paper-II a separate 50-MCQ psychological test, grand total 200; exam held 14 September 2025; Paper-I 2 hours 45 minutes; no negative marking). The 9 questions the transcription omitted were recovered from the two second reproductions and appended as Q142–Q150 in original-paper order. Every filed answer was cross-checked letter-by-letter against the mdcatguide key (140 of 141 agree; Q126 is a mdcatguide key-letter error contradicted by its own explanation). Q83 filed key D corrected to B; Q46, Q111, Q142, Q143, Q146 excluded as DEFECTIVE (no unique correct answer as printed) by the assistant under the owner's 8 Nov 2026 delegation. See the 37s push note in the reviewed file for every decision with its evidence.

Question 1 Physics

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

- A. Circular ✓ **Correct answer**
- B. Helical
- C. Parabola

A. With velocity perpendicular to a uniform field, the magnetic force q(v × B) is always perpendicular to the velocity and of constant size, so it acts as a centripetal force and the particle moves in a circle at constant speed; correct.

B. A helix needs a velocity component ALONG the field as well; here the motion is in a plane perpendicular to the field, so there is no forward drift along the field.

C. A parabola is the path under a constant force in one direction (like a projectile in gravity); the magnetic force keeps changing direction, so it cannot give a parabola.

D. An ellipse needs a force whose size varies with distance (like gravity around a planet); the magnetic force here is constant in size, giving a circle, not an ellipse.

Question 2 Physics

Magnetic force acting on a charge at rest is:

- A. Zero ✓ **Correct answer**
- B. Positive
- C. Negative
- D. Infinite

A. Magnetic force is F = q(v × B); with v = 0 the force is zero whatever the field; correct.

B. "Positive" is not a size of force at all, and no force acts on a stationary charge.

C. Likewise, no force acts; a sign cannot describe a force that does not exist.

D. Nothing in F = q(v × B) blows up at v = 0; the force is exactly zero, not infinite.

Question 3 Physics

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

- A. Doubled

/ed ✓ **Correct answer**

- C. Quadrupled
- D. One fourth

A. Cyclotron frequency falls as mass rises ($f = qB/2\pi m$), so doubling the mass cannot double the frequency.

B. f is inversely proportional to m, so 2m gives f/2; correct.

C. A squared dependence would be needed for this, but the frequency depends on 1/m, not $1/m^2$ or m^2.

D. That would need the mass to be quadrupled (or an m^2 dependence); doubling the mass only halves the frequency.

Question 4 Physics

Electric field intensity of infinite charge sheet:

- A. $E = 2\sigma/\varepsilon_0$
- B. $E = 1/\varepsilon_0$
- C. $E = \sigma/\varepsilon_0$
- D. $\sigma/(2\varepsilon_0)$ ✓ **Correct answer**

A. Too large by a factor of 4; the correct field is $\sigma/(2\varepsilon_0)$.

B. This leaves out the surface charge density σ entirely, so it cannot be the field of a charged sheet.

C. That is the field just outside a CONDUCTOR's surface (where the field exists on one side only); a free sheet has field on both sides, halving it.

D. Gauss's law with a pillbox through the sheet gives equal flux through both faces, so $E = \sigma/(2\varepsilon_0)$ on each side, independent of distance; correct. (Option D prints the bare formula in the fetched text.)

5 Physics

Stability of radioactivity element is determined by:

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

A. 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.

B. The observed rate (activity = λN) depends on how many nuclei are present as well as on λ, so it is not the property that defines the element's stability.

C. A duration of observation says nothing about the nuclide itself; the same nuclide can be watched for any length of time.

D. The count N fixes how much material there is, not how stable each nucleus is; λ is independent of N.

Question 6 Physics

1 kWh is equal to:

- A. 3.6 MW
- B. 3.6 MJ ✓ **Correct answer**
- C. 3.6 kJ
- D. 3.6 GJ

A. A megawatt is a unit of power, not energy; 1 kWh is an amount of energy.

B. $1 \text{ kW} \times 3600 \text{ s} = 1000 \text{ J/s} \times 3600 \text{ s} = 3.6 \times 10^6 \text{ J} = 3.6 \text{ MJ}$; correct.

C. A thousand times too small: 3.6 kJ is only 3.6 seconds at 1 kW.

D. A thousand times too large: 3.6 GJ would need 1000 hours at 1 kW.

7 Physics

Basic requirement for induced emf is:

- A. Flux linked to coil
- B. No flux linked to coil
- C. Coil should be circular
- D. Change in flux links to the coil ✓ **Correct answer**

A. A steady flux through a coil induces nothing; Faraday's law needs the flux to CHANGE.

B. With no flux at all there is nothing to change, so no emf can be induced.

C. The coil's shape is irrelevant; square and rectangular coils induce emf just as well.

D. Faraday's law: emf = −dΦ/dt, so a changing flux linkage is exactly the requirement; correct.

Question 8 Physics

Product of force and time is equal to:

- A. Change in displacement
- B. Change in momentum ✓ **Correct answer**
- C. Change in velocity
- D. Change in acceleration

A. Force × time has units of momentum (N·s), not of length; displacement change is governed by velocity × time.

B. Impulse J = FΔt equals the change in momentum Δp (impulse–momentum theorem); correct.

C. Force × time gives mass × velocity change; velocity change alone misses the mass.

D. Acceleration change is not what FΔt measures; F itself (not FΔt) is tied to acceleration by F = ma.

9 Physics

Bursting of tire is an example of which process?

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

A. The burst is so fast that there is effectively no time for heat to flow in or out, so the rapid expansion is treated as adiabatic; correct.

B. Isochoric means constant volume, but the gas expands violently out of the tyre, so the volume changes.

C. Isothermal means constant temperature, but the expanding gas cools as it does work; the temperature does not stay constant.

D. Isobaric means constant pressure, but the pressure collapses from tyre pressure to atmospheric pressure during the burst.

Question 10 Physics

Direction of angular velocity can be found by:

- A. Right-hand rule ✓ **Correct answer**
- B. Fleming's left-hand rule
- C. Lenz's law
- D. Faraday's law

A. Curl the fingers in the sense of rotation and the thumb points along the angular-velocity vector; correct.

B. That rule gives the direction of force on a current-carrying conductor in a magnetic field, not the direction of angular velocity.

gives the direction of an INDUCED current (opposing the flux change), not the direction of rotation.

D. Faraday's law gives the SIZE of an induced emf from a changing flux, not the direction of angular velocity.

Question 11 Physics

When star moves towards the earth, the shift is known as:

- A. Blue shift ✓ **Correct answer**
- B. Red shift
- C. Compton shift
- D. None

A. An approaching source compresses the waves, shifting them to shorter wavelength (toward the blue end); correct.

B. A red shift is the stretch to longer wavelengths from a source moving AWAY.

C. The Compton shift is the wavelength change when X-rays scatter off electrons, not the Doppler shift of starlight.

D. The effect has a name: blue shift.

Question 12 Physics

Angle at which maximum range of projectile is achieved?

- A. 0°
- B. 45° ✓ **Correct answer**
- C. 90°
- D. 76°

A. A horizontal launch gives no flight time to speak of on level ground, so the range is minimal, not maximal.

($u^2 \sin 2\theta/g$ is largest when $\sin 2\theta = 1$, i.e. $2\theta = 90°$, $\theta = 45°$ (level ground, no air resistance); correct.

C. A vertical launch goes straight up and lands back at the launch point, so the horizontal range is zero.

D. No feature of the range formula peaks at 76°; the product of horizontal and vertical components is maximised at 45°.

Question 13 Physics

Which of the following spectrum is produced when atoms are in the gaseous state?

- A. Continuous spectrum
- B. Band spectrum
- C. Line spectrum ✓ **Correct answer**
- D. Absorption spectrum

A. A continuous spectrum (all wavelengths) comes from hot dense solids/liquids, not from isolated gaseous atoms.

B. Band spectra come from MOLECULES (closely spaced vibrational/rotational lines), not from single atoms.

C. Isolated gaseous atoms emit only at the discrete energies of their electron transitions, giving sharp lines; correct.

D. Absorption is a way of OBSERVING a spectrum (dark lines against a background), not the kind of spectrum gaseous atoms emit; the emission form is the line spectrum.

Question 14 Physics

Conductance is reciprocal of resistance, its unit is:

- A. Siemen ✓ **Correct answer**
- B. Ohm

- D. Watt

A. Conductance G = 1/R is measured in siemens (S, formerly mho); correct. The option prints "Siemen"; the SI unit name is "siemens".

B. The ohm (Ω) is the unit of RESISTANCE, the reciprocal of conductance.

C. The ampere is the unit of electric current, not conductance.

D. The watt is the unit of power, not conductance.

Question 15 Physics

During rubbing of hands, internal energy:

- A. Increases ✓ **Correct answer**
- B. Decreases
- C. Zero
- D. Remains same

A. Friction does work on the hands and that work becomes thermal energy inside them, raising their temperature and internal energy; correct.

B. Energy is being ADDED by the rubbing, not removed, so the internal energy cannot fall.

C. Internal energy is never zero for hands at ordinary temperatures, and rubbing raises it rather than wiping it out.

D. The hands plainly get warmer, which is the sign that their internal energy has risen.

Question 16 Physics

If velocity is doubled, what happens to kinetic energy:

- A. Remains same
- B. Doubles

- quadruples ✓ **Correct answer**
- D. Halves

A. Kinetic energy depends on speed, so doubling the speed must change it.

B. That would be true if KE were proportional to v, but KE is proportional to v^2.

C. KE = ½mv^2, so 2v gives ½$m(2v)^2$ = 4 × ½mv^2; correct.

D. Doubling the speed increases the energy; it cannot halve it.

Question 17 Physics

On a clear day at noon, intensity of solar energy is:

- A. 1.4 kW/m^2 ✓ **Correct answer**
- B. 1.2 kW/m^2
- C. 1 kW/m^2
- D. 1.3 kW/m^2

A. The solar constant (irradiance just outside the atmosphere) is about 1.36 kW/m^2, conventionally rounded to 1.4 kW/m^2 in textbooks, and this is the marked textbook value; correct on that convention.

B. Below the accepted solar-constant value; no standard rounding gives 1.2.

C. This is roughly the irradiance reaching the ground after atmospheric losses, not the conventional solar-constant figure the question asks for.

D. Close to 1.36, but the textbook rounding used by the paper is 1.4, not 1.3. NOTE: the answer rests on the conventional rounded value (1.36 → 1.4) rather than on a derivation; 1.3 is numerically almost as close.

Question 18 Physics

Work done is positive if angle is:

θ < 90° ✓ Correct answer

- B. 0° < θ < 180°
- C. 90° < θ < 270°
- D. None of these

A. W = Fd cos θ is positive exactly when cos θ > 0, i.e. for an acute angle between force and displacement; correct.

B. This range includes obtuse angles (90°–180°) where cos θ is negative and the work is negative.

C. In this range cos θ is negative (or zero at the ends), so the work is negative, not positive.

D. Option A is correct, so "none of these" is wrong.

Question 19 Physics

The electric potential at a distance r is given by the formula:

- A. V = kq/r ✓ **Correct answer**
- B. $1/4\pi\varepsilon_0 qr$
- C. Ed
- D. Ir

A. The potential of a point charge q at distance r is $V = (1/4\pi\varepsilon_0)(q/r) = kq/r$; correct.

B. As printed this is garbled: it multiplies by q and r instead of dividing by r, and it does not give the potential; the correct form needs q divided by r.

C. Ed is the potential DIFFERENCE across a uniform field over distance d, not the potential of a point charge at distance r.

D. Ir is a voltage drop across a resistance (Ohm's law), not the potential due to a point charge.

20 Physics

Which of the following act as a semiconductor?

- A. Iron
- B. Silicon ✓ **Correct answer**
- C. Zinc
- D. Tungsten

A. Iron is a metal and a good conductor, with a partly filled conduction band, not a semiconductor.

B. Silicon has a band gap (≈ 1.1 eV) that lets its conductivity be controlled, making it the standard semiconductor; correct.

C. Zinc is a metal and a conductor, not a semiconductor.

D. Tungsten is a metal conductor (used in filaments), not a semiconductor.

Question 21 Physics

The fraction change in resistance per kelvin is:

- A. Coefficient of conductivity
- B. Temperature coefficient of resistance ✓ **Correct answer**
- C. Coefficient of conductance
- D. Coefficient of resistivity

A. No such standard name describes the fractional resistance change; conductivity has its own temperature behaviour but is not this definition.

B. Defined as $\alpha = (1/R)(\Delta R/\Delta T)$, exactly the fractional change in resistance per kelvin; correct.

C. Conductance is 1/R, and its fractional change is not given this name.

D. Resistivity's temperature coefficient is a related but different quantity (it describes the

: the resistance of a particular sample).

Question 22 Physics

Quantized momentum was explained by:

- A. Einstein
- B. Bohr ✓ **Correct answer**
- C. de-Broglie
- D. Rutherford

A. Einstein explained the photoelectric effect with light quanta, not the quantisation of an electron's orbital angular momentum.

B. Bohr's 1913 postulate quantised angular momentum ($L = n\hbar$), giving discrete orbits and energy levels; correct.

C. De Broglie later gave a wave reason for Bohr's rule (whole wavelengths fitting the orbit), but the quantisation postulate itself is Bohr's.

D. Rutherford's nuclear atom had electrons orbiting classically with no quantisation, which is why it could not explain stable discrete spectra.

Question 23 Physics

EMF induced is zero when plane of coil is:

- A. Perpendicular to B ✓ **Correct answer**
- B. Parallel to B
- C. Antiparallel
- D. None of these

A. When the coil's plane is perpendicular to B, its normal is along B, the flux is at a maximum, and its rate of change (hence the emf) is momentarily zero; correct.

B. When the plane is parallel to B the flux is changing fastest and the emf is at its

not zero.

C. "Antiparallel" describes a direction opposite to B; the flux is again extremal there in a rotating coil, but the standard textbook answer for the zero-emf position is the perpendicular-plane position, and "antiparallel" does not name the coil-plane position asked for.

D. Option A is correct, so "none of these" is wrong.

Question 24 Physics

The spectra obtained by absorption or emission of radiation by atoms of the gas:

- A. Atomic spectra ✓ **Correct answer**
- B. Molecular spectra
- C. Band spectra
- D. Continuous spectra

A. Discrete lines from electron transitions in isolated atoms, seen in either absorption or emission; correct.

B. Molecules give band structure from combined electronic, vibrational and rotational changes, not the atomic line pattern.

C. Bands are the molecular pattern; atoms give lines, not bands.

D. A continuum comes from hot dense matter, not from gaseous atoms making discrete transitions.

Question 25 Physics

Two waves identical traveling in the same medium are superposed:

- A. Interference ✓ **Correct answer**
- B. Diffraction
- C. Reflection

A. Two identical (same frequency and amplitude) waves superposing add their amplitudes, reinforcing or cancelling each other — that is interference; correct.

B. Diffraction is the spreading of a wave around an obstacle or through a narrow opening, not the superposition of two waves.

C. Reflection is a wave bouncing off a surface; no second superposing wave is involved.

D. Refraction is the bending of a wave as its speed changes entering a new medium, not superposition in the same medium.

Question 26 Physics

The work done by centripetal force is:

- A. Maximum
- B. Minimum
- C. Zero ✓ **Correct answer**
- D. Negative

A. The centripetal force does no work at all, so it cannot be doing maximum work.

B. "Minimum" suggests some small positive amount; the work is exactly zero.

C. The force points radially inward while each small displacement is tangential, so F · ds = 0 at every instant; correct.

D. Negative work needs a force component opposing the motion; the centripetal force is perpendicular to the motion, never opposing it.

Question 27 Physics

Which of the following has highest specific heat capacity?

- A. Copper

- C. Water ✓ **Correct answer**
- D. Glass

A. Copper's specific heat (≈ 385 J/kg·K) is far below water's.

B. Iron's specific heat (≈ 450 J/kg·K) is also far below water's.

C. Water's specific heat (≈ 4200 J/kg·K), raised by hydrogen bonding, is far higher than any of the solids listed; correct.

D. Glass (≈ 840 J/kg·K) is higher than the metals but still about five times lower than water.

Question 28 Physics

In photoelectric effect, stopping potential depends upon:

- A. Intensity of light
- B. Frequency of light ✓ **Correct answer**
- C. Speed of light
- D. Amplitude of light

A. Intensity fixes how MANY electrons are emitted per second (the photocurrent), not their maximum energy or the stopping potential.

B. $K_{max} = h\nu - \varphi$, so the stopping potential $eV_0 = h\nu - \varphi$ depends on the frequency ν; correct.

C. The speed of light in vacuum is a constant; it cannot be the variable the stopping potential depends on.

D. Amplitude is another way of stating intensity; it changes the number of photons, not each photon's energy.

29 Physics

Power of a lens is measured in:

- A. Meter
- B. Dioptre ✓ **Correct answer**
- C. Candela
- D. Watt

A. The metre measures the focal LENGTH; power is its reciprocal.

B. Lens power P = 1/f (f in metres) is measured in dioptres (D = m^{-1}); correct.

C. The candela is the unit of luminous intensity, not lens power.

D. The watt is the unit of power in the energy sense, not of optical (lens) power. (The source page tags this question with a site "outside-current-syllabus" label; that is the site's classification, not a statement about the 2025 paper, and it plays no part in the answer.)

Question 30 Physics

The SI unit of magnetic flux is:

- A. Tesla
- B. Weber ✓ **Correct answer**
- C. Henry
- D. Farad

A. The tesla is the unit of magnetic flux DENSITY (B), i.e. flux per unit area.

B. Magnetic flux Φ = BA is measured in webers (1 Wb = 1 T·m^2); correct.

C. The henry is the unit of inductance, not flux.

D. The farad is the unit of capacitance, not flux.

31 Physics

Half-life of a radioactive element is 10 days. After 30 days, fraction remaining is:

- A. 1/2
- B. 1/4
- C. 1/8 ✓ **Correct answer**
- D. 1/16

A. That is the fraction after ONE half-life (10 days), not three.

B. That is the fraction after TWO half-lives (20 days), not three.

C. 30 days is 3 half-lives, so the remainder is $(1/2)^3 = 1/8$; correct.

D. That would need FOUR half-lives (40 days), not three.

Question 32 Physics

Which type of wave cannot be polarized?

- A. Radio waves
- B. Light waves
- C. Sound waves ✓ **Correct answer**
- D. X-rays

A. Radio waves are transverse electromagnetic waves and can be polarised.

B. Light is transverse and polarisation (e.g. by Polaroid) is a standard demonstration.

C. Sound in air is longitudinal: the oscillation is along the direction of travel, so there is no transverse direction to select, and it cannot be polarised; correct.

D. X-rays are transverse electromagnetic waves and can be polarised.

33 Physics

The energy stored in a capacitor is:

- A. QV
- B. QV/2 ✓ **Correct answer**
- C. Q^2V
- D. 2QV

A. Too large by a factor of 2: the voltage rises from 0 to V as charge is added, so the average voltage during charging is V/2.

B. Energy = $\int V\,dq = \frac{1}{2}QV$ (= $\frac{1}{2}CV^2 = Q^2/2C$); correct.

C. Dimensionally wrong for an energy in these terms and far too large; the correct form is $Q^2/2C$. (The option prints "Q2V"; it is read as Q^2V.)

D. Four times the correct energy; the charging integral gives one half, not twice.

Question 34 Physics

Which phenomenon proves the transverse nature of light?

- A. Interference
- B. Diffraction
- C. Polarization ✓ **Correct answer**
- D. Refraction

A. Interference happens for longitudinal waves too (e.g. sound), so it cannot prove transverseness.

B. Diffraction also happens for longitudinal waves, so it does not prove transverseness either.

C. Only a transverse wave has a direction of oscillation across the travel direction that can be selected; observing polarisation therefore proves light is transverse; correct.

n (bending on entering a new medium) happens for sound as well as light and says nothing about transverseness.

Question 35 Physics

Absolute zero temperature is equal to:

- A. 0°C
- B. −173°C
- C. −273°C ✓ **Correct answer**
- D. −373°C

A. 0°C is the freezing point of water (273 K), far above absolute zero.

B. 100 degrees above absolute zero (100 K); not the zero of the Kelvin scale.

C. Absolute zero is 0 K = −273.15°C, quoted as −273°C; correct.

D. Below absolute zero, which is impossible; no temperature can be colder than 0 K.

Question 36 Physics

The process of converting AC into pulsating DC is called:

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

A. Amplification increases the SIZE of a signal; it does not convert AC into DC.

B. Modulation impresses information onto a carrier wave; it is not AC-to-DC conversion.

C. A rectifier (diode circuit) passes current in one direction only, turning AC into pulsating DC; correct.

D. Filtering (smoothing) removes the ripple from pulsating DC afterwards; it is not the

Question 37 Chemistry

Most molecular crystals melt below:

- A. 200°C ✓ **Correct answer**
- B. 280°C
- C. 330°C
- D. 480°C

A. Molecular crystals are held by weak intermolecular forces, so most melt at relatively low temperatures, conventionally quoted as below about 200°C; correct on that textbook generalisation.

B. Above the conventional "most melt below" threshold; a higher cut-off would wrongly include many ionic and network solids' range.

C. Well above the usual molecular-crystal range; most molecular solids have melted long before this.

D. A temperature typical of ionic or network solids, not of molecular crystals. NOTE: "most ... below 200°C" is a textbook generalisation with an arbitrary threshold, not a derivable law.

Question 38 Chemistry

How much heavier is the H-atom as compared to electron?

- A. 1937
- B. 1737
- C. 1837 ✓ **Correct answer**
- D. 1637

A. 100 too high; the proton/electron mass ratio is about 1836, not 1937.

w, it understates the ratio.

C. The hydrogen atom (essentially one proton plus one electron) is about 1837 times as heavy as the electron (proton alone ≈ 1836.15); correct.

D. 200 too low; it understates the ratio by a wide margin.

Question 39 Chemistry

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

- A. 10^{55} ✓ **Correct answer**
- B. 10^{65}
- C. 10^{25}
- D. 10^{50}

A. The ozone-decomposition equilibrium constant at 25°C is quoted in textbooks as an extremely large number of order 10^{55}, showing the reaction goes essentially to completion; correct on that quoted value.

B. Ten orders of magnitude larger than the quoted value; no standard source gives this.

C. Far too small: it would imply a far less complete decomposition than the quoted constant.

D. Five orders of magnitude below the quoted value. NOTE: the answer rests on a single quoted textbook constant; it cannot be derived from the stem alone. (The options print "1055", "1065", "1025", "1050" with the superscript lost in the fetched text; they are read as powers of ten.)

Question 40 Chemistry

A reaction is first order with respect to A and third order with respect to B, the rate equation is:

- A. Rate = $K[A][B]^2$

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

A. This makes the reaction second order in B, contradicting the stated third order in B.

B. This swaps the orders: second in A, first in B, the reverse of what is stated.

C. Each concentration is raised to its own order (1 for A, 3 for B) and multiplied; correct. (The options print "[B]2"/"[B]3" with superscripts lost; they are read as [B]^2/[B]^3.)

D. This drops B entirely, making the rate independent of B, which contradicts the stated third order in B.

Question 41 Chemistry

For a reaction A → Product, if concentration of A is doubled, product increases 4 times. The order of reaction will be:

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

A. Zero order would give no change at all (factor 1) when the concentration doubles.

B. First order would give a factor of 2 (2^1), not 4.

C. Rate $\propto$ [A]^n with $2^n = 4$ gives n = 2; correct.

D. Third order would give a factor of 8 (2^3), not 4.

Question 42 Chemistry

Select the spontaneous reaction from the following:

- A. Reaction of nitrogen and oxygen

ssion of α-particles from polonium ✓ **Correct answer**

- C. Thermal decomposition of marble
- D. Burning of paper

A. $N_2 + O_2$ needs very high temperatures (e.g. lightning) to react; at ordinary conditions it does not proceed on its own.

B. Radioactive decay happens entirely on its own, with no external trigger, energy input or ignition; correct on the school meaning of "spontaneous".

C. Heating calcium carbonate to decompose it needs a sustained external heat supply; it does not happen spontaneously at ordinary temperatures.

D. Paper needs ignition to start, even though combustion then releases heat; on the school "no external aid" reading it is not counted as spontaneous in the way nuclear decay is. NOTE: the answer rests on the school convention that "spontaneous" means "occurring with no external trigger"; thermodynamically, combustion is also a downhill ($\Delta G < 0$) process once started.

Question 43 Chemistry

Select the exothermic reaction among the following:

- A. Thermal composition of P_2O_5
- B. Formation of atmospheric nitric oxide
- C. Burning of methane ✓ **Correct answer**
- D. Sublimation of dry ice

A. Thermal decomposition (as the stem's "composition" is read) absorbs heat to break bonds; it is endothermic, not exothermic.

B. Forming NO from $N_2 + O_2$ absorbs a large amount of heat (it needs lightning or high temperature); it is endothermic.

C. Combustion of CH_4 forms stronger C=O and O–H bonds and releases heat; correct.

turning directly to gas absorbs heat from the surroundings; it is endothermic.

Question 44 Chemistry

The oxidation number of Cl in $HClO_2$ is:

- A. +1
- B. +3 ✓ **Correct answer**
- C. +5
- D. +7

A. +1 is chlorine's oxidation number in HClO (hypochlorous acid), with only one oxygen, not $HClO_2$.

B. H is +1 and each O is −2, so +1 + Cl + 2(−2) = 0 gives Cl = +3; correct.

C. +5 is chlorine's number in $HClO_3$ (three oxygens), not $HClO_2$.

D. +7 is chlorine's number in $HClO_4$ (four oxygens), the highest oxoacid, not $HClO_2$.

Question 45 Chemistry

Bond order is equal to:

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

A. Missing the factor of one half: this would count electrons, not electron PAIRS.

B. Adding antibonding electrons would reward the very electrons that weaken the bond; the definition subtracts them.

er = (N_bonding − N_antibonding)/2, i.e. the number of net bonding pairs; correct.

D. No factor of one quarter appears in the definition; the divisor is 2.

Question 46 — Excluded (defective)

Which of the following molecule has non-polar covalent bond?

- A. Methyl chloride
- B. Methanol
- C. Carbon dioxide
- D. Tetrachloromethane

No answer is given for this question, and none is taught. excluded by assistant under owner's 8 Nov delegation (see push note). No answer is taught: neither CO_2 nor CCl_4 has non-polar bonds, and both molecules are non-polar, so the question as worded has no unique answer; the mdcatguide key says C and the Tabeer key says D.

A. CH_3Cl is a polar molecule (the C–Cl bond dipole does not cancel); it is not a non-polar molecule.

B. CH_3OH is polar (O–H and C–O dipoles, plus hydrogen bonding); it is not a non-polar molecule.

C. CO_2 is linear, so its two polar C=O bond dipoles cancel and the MOLECULE is non-polar; the marked key.

D. CCl_4 is tetrahedral and symmetric, so its four polar C–Cl bond dipoles cancel and the MOLECULE is also non-polar. DEFECTIVE: candidates C and D are both non-polar molecules, and NEITHER has non-polar bonds (C=O and C–Cl bonds are both polar; only the molecular dipoles cancel). The question as worded ("non-polar covalent bond") is satisfied by neither, and as a molecular-polarity question it is satisfied by both C and D. The two second reproductions split on the key (mdcatguide C, Tabeer D). No letter is asserted; the question is excluded and must never be taught as having an answer.

47 Chemistry

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

- A. 3-Methyl-2-butanol
- B. 2-Methyl-2-butanol ✓ **Correct answer**
- C. 2-Butanol
- D. Ethyl alcohol

A. A secondary alcohol; it dehydrates much less readily than a tertiary alcohol and does not give the ready oily alkene layer under the test conditions.

B. A tertiary alcohol; it dehydrates readily on heating (with acid) to an alkene, which separates as an oily layer; correct on the textbook dehydration-test convention.

C. A secondary alcohol; slower to dehydrate and not the ready oily-layer case.

D. A primary alcohol; it resists dehydration to an oily layer under these conditions (it tends instead toward other products). NOTE: the stem states no reagent or temperature, so the answer rests on the textbook convention that "oily layer upon heating" means acid-catalysed dehydration of a tertiary alcohol.

Question 48 Chemistry

Formalin is a mixture of:

- A. 40% HCHO, 8% CH_3OH, 52% H_2O ✓ **Correct answer**
- B. 40% CH_3CHO, 8% CH_3OH, 50% H_2O
- C. 40% CH_3CHO, 8% C_2H_5OH, 50% H_2O
- D. 45% HCHO, 8% C_2H_5OH, 50% H_2O

A. Formalin is the commercial aqueous solution of formaldehyde (HCHO, about 37–40%) with methanol (CH_3OH, about 8%) added as a stabiliser and the rest water; correct.

B. CH_3CHO is acetaldehyde, not formaldehyde; formalin contains no acetaldehyde.

lehyde (acetaldehyde) and wrong stabiliser (ethanol instead of methanol).

D. Right aldehyde but the wrong percentage and the wrong stabiliser (ethanol, not methanol); the standard stabiliser is methanol.

Question 49 Chemistry

Polymerization of HCHO and CH_3CHO occurs in the presence of:

- A. Conc. H_2SO_4 ✓ **Correct answer**
- B. Dil. H_2SO_4
- C. Conc. H_2CO_3
- D. Dil. H_2CO_3

A. Concentrated sulfuric acid is the strong acid catalyst/dehydrating agent of the textbook polymerisation of these aldehydes (formaldehyde to paraformaldehyde/trioxane; acetaldehyde to paraldehyde/metaldehyde); correct on that convention.

B. Dilute acid is too weak a catalyst/dehydrating agent for the textbook polymerisation as stated.

C. Carbonic acid is a weak acid and is not used as the polymerisation catalyst here.

D. Dilute carbonic acid is weaker still and plays no such role. NOTE: the answer rests on the textbook catalyst convention for aldehyde polymerisation; the stem names no temperature or product.

Question 50 Chemistry

The boiling point of carboxylic acids are relatively high due to:

- A. Increased molecular mass
- B. Intermolecular carbon bonding
- C. Intermolecular oxygen bonding
- D. Intermolecular hydrogen bonding ✓ **Correct answer**

e does not explain it. carboxylic acids boil far higher than alkanes or esters of similar mass.

B. There is no such bonding mode between carbon atoms of neighbouring acid molecules.

C. Oxygen atoms do not bond directly to each other between molecules; the attraction runs through hydrogen.

D. Carboxylic acids pair into hydrogen-bonded dimers (O–H···O), greatly increasing the energy needed to separate the molecules, hence the high boiling points; correct.

Question 51 Chemistry

Carboxylic acid reacts with metal carbonate. The colorless gas evolved is:

- A. H_2
- B. O_2
- C. CO_2 ✓ **Correct answer**
- D. CO

A. Hydrogen gas is given off by acids reacting with METALS, not with carbonates.

B. Oxygen is not a product of an acid–carbonate reaction.

C. Acid + carbonate → salt + water + carbon dioxide, the colourless gas that turns limewater milky; correct.

D. Carbon monoxide is not formed in this reaction; the carbonate carbon leaves as CO_2.

Question 52 Chemistry

Which of the following compound will react with 2,2-dimethyl propanoic acid to produce ester?

- A. Ethanoic acid
- B. Propane

anol ✓ **Correct answer**

- D. Propanone

A. Another carboxylic acid; two acids do not esterify each other (esterification needs an alcohol).

B. An alkane with no functional group that can esterify a carboxylic acid.

C. An alcohol; acid + alcohol (with acid catalyst) gives the ethyl ester and water (Fischer esterification); correct.

D. A ketone; ketones do not react with carboxylic acids to give esters.

Question 53 Chemistry

The most abundant protein in animal kingdom forming 25–35% of body proteins is/are:

- A. Derived proteins
- B. Simple proteins ✓ **Correct answer**
- C. Compound proteins
- D. Conjugated proteins

A. Derived proteins are breakdown products of other proteins (e.g. proteoses, peptones), not the abundant structural protein class.

B. Collagen, the most abundant animal protein (25–35% of body protein), is a simple protein: it is made only of amino acids, with no prosthetic group; correct.

C. Compound proteins contain a non-protein part in addition to amino acids, which collagen does not.

D. Conjugated proteins are the same class as compound proteins (protein + prosthetic group); collagen carries no prosthetic group, so this class is wrong.

54 Chemistry

Protein present in connective tissues of human body is:

- A. Phosphoprotein
- B. Collagen ✓ **Correct answer**
- C. Lecithin
- D. Cholesterol

A. A class of proteins carrying phosphate groups (e.g. casein); not the structural protein of connective tissue.

B. The fibrous structural protein of tendons, ligaments, skin and bone matrix — the connective tissues; correct.

C. A phospholipid (a fat-like substance), not a protein at all.

D. A sterol lipid found in membranes, not a protein and not the connective-tissue structural material.

Question 55 Chemistry

In human body Ferritin is used to store:

- A. P
- B. Ca
- C. Fe ✓ **Correct answer**
- D. Zn

A. Phosphorus is not stored by ferritin; phosphate is handled by bone and other systems.

B. Calcium is stored in bone, not in ferritin.

C. Ferritin is the iron-storage protein, holding iron in a soluble, non-toxic form inside cells; correct.

D. Zinc is carried and stored by other proteins (e.g. metallothionein), not by ferritin.

56 Chemistry

In human body Ceruloplasmin acts as a carrier of:

- A. O_2
- B. Zn
- C. Cu ✓ **Correct answer**
- D. Fe

A. Oxygen is carried by haemoglobin (in red cells) and myoglobin, not by ceruloplasmin.

B. Zinc is carried mainly by albumin and α_2-macroglobulin, not by ceruloplasmin.

C. Ceruloplasmin is the copper-containing plasma protein that carries most plasma copper and oxidises Fe^{2+} for transport; correct.

D. Iron is carried by transferrin in plasma; ceruloplasmin helps mobilise iron but its carried metal is copper.

Question 57 Chemistry

Predict the element with lowest ionization energy:

- A. Mg ✓ **Correct answer**
- B. Ar
- C. Si
- D. P

A. Magnesium is furthest left in period 3, so its outer electron is least tightly held; its first ionisation energy (738 kJ/mol) is the lowest of the four; correct.

B. Argon is a noble gas with a full shell; its ionisation energy (1521 kJ/mol) is the highest of the four.

C. Silicon (787 kJ/mol) is higher than magnesium, as ionisation energy rises across the period.

us (1012 kJ/mol) is higher still, with a half-filled 3p subshell adding stability.

Question 58 Chemistry

Select the group II element which has the highest atomic radius?

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

A. Beryllium is at the top of group II with only two shells; it has the smallest radius of the four.

B. Calcium is larger than beryllium but smaller than strontium and barium below it.

C. Barium is lowest in the group (six shells), so its radius is the largest; atomic radius increases down a group as shells are added; correct.

D. Strontium is larger than calcium but smaller than barium, which sits below it.

Question 59 Chemistry

Which of the following element has least boiling point?

- A. Li
- B. Na
- C. K
- D. Cs ✓ **Correct answer**

A. Lithium has the strongest metallic bonding of the four and the highest boiling point (≈ 1342°C).

B. Sodium (≈ 883°C) is lower than lithium but higher than potassium and caesium.

C. Potassium (≈ 759°C) is lower than sodium but higher than caesium.

…has the largest atoms and weakest metallic bonding down the group, giving the lowest boiling point (≈ 671°C); correct.

Question 60 Chemistry

2-pentanone and 3-pentanone are examples of:

- A. Metamers
- B. Functional group isomers
- C. Tautomerism
- D. Position isomers ✓ **Correct answer**

A. Metamerism is isomerism from different alkyl groups on either side of a polyvalent atom (e.g. ethers); here the alkyl groups differ only because the carbonyl has moved, and the standard classification is position isomerism.

B. Both compounds have the same functional group (a ketone C=O); functional-group isomers would need different groups (e.g. an aldehyde vs a ketone).

C. Tautomers interconvert by moving a hydrogen (keto–enol); these two ketones do not interconvert into each other in that way.

D. Same formula ($C_5H_{10}O$) and same functional group, differing only in the position of the carbonyl carbon (C-2 vs C-3); correct.

Question 61 Chemistry

Which of the following is an electrophile in sulphonation?

- A. SO_3H
- B. SO_3 ✓ **Correct answer**
- C. SO_2
- D. SO_3^+

A. SO_3H is not the attacking species; the sulfonic-acid product carries an $–SO_3H$ group, but

hile that attacks the ring is SO_3.

B. Sulfur trioxide is the electron-deficient electrophile that attacks the benzene ring in sulfonation; correct (in concentrated acid the active form is often written as HSO_3^+, but among these options SO_3 is the textbook electrophile).

C. Sulfur dioxide is the lower oxide and is not the sulfonating electrophile.

D. No such standard electrophile is written this way; the positive charge is not carried on SO_3 in the mechanism.

Question 62 Chemistry

Acetylene reacts with hydrogen bromide to form:

- A. 2,2-Dibromoethane
- B. 1,1-Dibromoethane ✓ **Correct answer**
- C. 1,2-Dibromoethane
- D. 1,1,2,2-Tetrabromoethane

A. Numbering a two-carbon chain from the substituted end gives 1,1-, not 2,2-; this name describes the same connectivity numbered the wrong way.

B. Two HBr additions by Markovnikov's rule put the second bromine on the same carbon as the first (via bromoethene), giving $CH_3–CHBr_2$; correct, on the reading that HBr is present in excess (the stem does not state the amount — see defect note).

C. This is the anti-Markovnikov / double-addition-across-both-carbons product ($BrCH_2–CH_2Br$), which is not what Markovnikov addition to acetylene gives.

D. That would need four bromine atoms (e.g. from Br_2 addition twice); HBr addition cannot supply four bromines in this way. Defect: the stem does not state that two equivalents of HBr are used; with one equivalent the product would be bromoethene, which is not among the options.

63 Chemistry

Generally the decreasing order of reactivity is:

- A. Alkane > Alkynes > Alkene
- B. Alkene < Alkynes < Alkanes
- C. Alkene > Alkynes > Alkanes ✓ **Correct answer**
- D. Alkynes < Alkanes < Alkene

A. Backwards: alkanes, with only single bonds, are the least reactive of the three toward addition.

B. Also backwards: it makes alkanes the most reactive, which they are not.

C. Alkenes undergo electrophilic addition most readily (the vinyl cation from an alkyne is less stable and the triple bond is held more tightly), and alkanes are least reactive; correct.

D. Wrongly places alkanes above alkynes; alkynes, with π bonds, are more reactive than alkanes.

Question 64 Chemistry

Racemic mixture formed in SN1 reaction is due to presence of empty:

- A. s-orbital
- B. p-orbital ✓ **Correct answer**
- C. sp^3-orbital
- D. sp^2-orbital

A. The carbocation's empty orbital is not an s-orbital; s-orbitals are filled in the σ framework.

B. The SN1 carbocation is planar and sp^2-hybridised with an empty p-orbital above and below the plane, so the nucleophile can attack from either face, giving both enantiomers (a racemic mixture); correct.

bon is tetrahedral with all four orbitals used in bonds; the carbocation has lost that geometry.

D. The carbon IS sp^2-hybridised, but the empty orbital itself is the unhybridised p-orbital, not an sp^2 orbital (the three sp^2 orbitals hold the σ bonds).

Question 65 Chemistry

The order of reactivity of alcohol with respect to cleavage of C–O bond:

- A. Tertiary > Secondary > Primary ✓ **Correct answer**
- B. Primary > Tertiary > Secondary
- C. Secondary > Tertiary > Primary
- D. Tertiary < Secondary < Primary

A. C–O cleavage goes through a carbocation, and tertiary carbocations are the most stable, so tertiary alcohols cleave fastest; correct.

B. Reverses the stability order; primary carbocations are the least stable, so primary alcohols are slowest.

C. Puts secondary above tertiary, contradicting carbocation stability.

D. The exact reverse of the correct order.

Question 66 Chemistry

$NaOH + H_2SO_4 \rightarrow Na_2SO_4 + H_2O$. When 40g of NaOH reacts with 49g of H_2SO_4, the number of water molecules produced are:

- A. 6.02×10^{23} ✓ **Correct answer**
- B. 6.02×10^{24}
- C. 1.2044×10^{23}
- D. 1.204×10^{24}

A. 40 g NaOH = 1.00 mol and 49 g H_2SO_4 = 0.50 mol, exactly the 2:1 ratio of the balanced

ving 1.00 mol of water = Avogadro's number of molecules; correct.

B. Ten moles of water; ten times too many.

C. 0.2 mol of water; five times too few.

D. Two moles of water; twice too many. Defect: the stem prints the equation without the coefficient 2 before NaOH; the balanced equation is $2NaOH + H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O$.

Question 67 Chemistry

The number of electrons in a subshell can be calculated by the formula:

- A. 2l + 1
- B. 2l + 2
- C. 2(2 + l)
- D. 2(2l + 1) ✓ **Correct answer**

A. That counts the number of ORBITALS in the subshell, not the number of electrons.

B. No such formula: it neither counts orbitals nor electrons correctly.

C. This expands to 4 + 2l, which gives the wrong capacity for every subshell except by accident.

D. A subshell has (2l + 1) orbitals and each holds 2 electrons, so the capacity is 2(2l + 1) (2, 6, 10, 14 for s, p, d, f); correct.

Question 68 Chemistry

When 5d orbital is complete, the entering electron goes into:

- A. 6s
- B. 6p ✓ **Correct answer**
- C. 6d
- D. 6f

-ORE 5d (and 4f) in the Aufbau order, not after a completed 5d.

B. In period 6 the filling order runs ...6s, 4f, 5d, 6p: once 5d is full (mercury), the next electron (thallium) enters 6p; correct.

C. The 6d subshell does not fill at this point in the periodic table; it belongs to a later, higher-energy sequence.

D. There is no occupied 6f subshell in the ground-state filling order at this point.

Question 69 Chemistry

Which of the following relationship is correct for kinetic energy of gases?

- A. K.E = 2RT/3N_A
- B. K.E = 3RT/2N_A ✓ **Correct answer**
- C. K.E = 2mNT/2R
- D. K.E = 2N_A/3RT

A. The fraction is inverted (2/3 instead of 3/2); the average energy per molecule is (3/2)kT, not (2/3)kT.

B. Average translational kinetic energy per molecule is (3/2)kT, and k = R/N_A, giving 3RT/(2N_A); correct.

C. A meaningless jumble of symbols (mass, number, temperature over R) that does not reduce to an energy per molecule.

D. Inverted and dimensionally wrong: it puts temperature in the denominator, so hotter gas would have LESS energy.

Question 70 Chemistry

The fourth state of matter is:

- A. Solid

- C. Gaseous liquid
- D. Plasma ✓ **Correct answer**

A. Solid is the first (lowest-energy) state, not the fourth.

B. Liquid is the second state.

C. Not a state of matter at all; it is a self-contradictory phrase.

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

Question 71 Chemistry

Which factor does not affect the rate of evaporation?

- A. Amount of liquid ✓ **Correct answer**
- B. Surface area
- C. Temperature
- D. Inter-molecular forces

A. The rate of escape per unit surface area does not depend on how much liquid sits below the surface (until the liquid runs out); correct on the textbook "rate" reading.

B. A larger surface exposes more molecules, so the evaporation rate rises with surface area.

C. Higher temperature gives more molecules enough energy to escape, so the rate rises with temperature.

D. Stronger attractions hold molecules back, so the rate falls as intermolecular forces strengthen. NOTE: "rate" here means rate per unit area; the TOTAL time to evaporate a sample does depend on how much liquid there is.

72 Chemistry

Which of the following is responsible for the low boiling point of diethyl ether as compared to water?

- A. Weak intermolecular forces ✓ **Correct answer**
- B. High surface tension
- C. Low vapour pressure
- D. High vapour pressure

A. Ether molecules cannot hydrogen-bond to each other as water does, so their attractions are weak and little energy is needed to boil the liquid; correct.

B. Ether has a LOW surface tension, and surface tension is a consequence of intermolecular forces, not the cause of the low boiling point.

C. Ether has a HIGH vapour pressure (it evaporates readily); low vapour pressure would go with a HIGH boiling point.

D. True of ether, but it is the RESULT of weak intermolecular forces, not the reason for the low boiling point; the question asks what is responsible.

Question 73 Chemistry

Hydrogen bonding does not exist in:

- A. Proteins
- B. Alcohols
- C. Liq HF
- D. SiH_4 ✓ **Correct answer**

A. Hydrogen bonds between N–H and C=O groups hold protein secondary structures together; they exist here.

B. O–H···O hydrogen bonds between alcohol molecules exist and raise their boiling points.

lrogen fluoride is famous for strong F–H···F hydrogen bonding.

D. In silane the hydrogen is bonded to silicon, which is not electronegative enough (and carries no lone pairs in the required way) to support hydrogen bonding; correct.

Question 74 Chemistry

The factor that affects the lattice energy is:

- A. Charge to size ratio ✓ **Correct answer**
- B. Shielding effect
- C. Crystal structure
- D. Atomic radius

A. Lattice energy rises with ionic charge and falls as ions get larger; the charge-to-size ratio summarises both in one textbook factor; correct on that convention.

B. Shielding affects ionisation energy and atomic size trends, not lattice energy directly.

C. The Madelung constant does depend on structure, but among these options the charge/size factor is the one the textbook names as the controlling factor.

D. Radius alone is only half the story: charge matters just as much, and option A combines both. NOTE: the answer rests on the textbook shorthand; strictly, lattice energy depends on the product of the ion charges divided by the interionic distance (Born–Landé), of which "charge to size ratio" is a loose summary.

Question 75 Chemistry

The shape of the crystal lattice depends upon:

- A. Size of particles
- B. Nature of particles
- C. Arrangement of particles ✓ **Correct answer**
- D. Size of unit cell

ze sets the scale of the lattice, not its geometric shape.

B. The nature of the particles (ions, atoms, molecules) decides the TYPE of bonding, but the lattice shape itself is fixed by how they are arranged.

C. The repeating three-dimensional arrangement (the unit-cell geometry and packing) is what defines the lattice shape; correct on the textbook reading.

D. The unit-cell size sets dimensions, not the shape (two lattices can share a shape at different sizes). NOTE: the answer rests on the textbook distinction between arrangement (shape) and size (scale); in practice, particle nature also constrains which arrangements occur.

Question 76 English

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

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

A. "A female lion is called the lioness" wrongly makes "lioness" definite, as if there were one particular lioness; the sentence defines the general name.

B. "The female lion" picks out the kind (the female of the species) and "a lioness" gives its general name; correct on the article convention the paper uses.

C. The second "the" would mean a specific lioness already known, which the defining sentence does not intend.

D. "A female lion" is possible in isolation, but the paper's expected generic pattern is "the" for the kind; option B is the marked convention. NOTE: the answer rests on the exam's article-use convention; in ordinary English "A female lion is called a lioness" is also acceptable.

77 English

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

- A. Noun clause ✓ **Correct answer**
- B. Adjective clause
- C. Adverb clause
- D. Independent clause

A. "Whatever you order for dinner" acts as a single noun-like unit (the subject of "is fine"); it names a thing/choice; correct.

B. An adjective clause modifies a noun, but this clause does not describe any noun; it stands in the subject's place.

C. An adverb clause modifies a verb, adjective or adverb (time, reason, condition); this clause does none of those jobs.

D. It cannot stand alone as a sentence ("Whatever you order for dinner." is a fragment); it depends on the main clause.

Question 78 English

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

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

A. One independent clause (subject "the ghost", predicate "will come out…") with only a prepositional phrase and an infinitive phrase added; correct.

B. Compound needs two independent clauses joined together; there is only one here.

needs a subordinate clause; "after midnight" and "to scare the people" are phrases, not clauses (they have no subject + finite verb of their own).

D. That needs at least two independent clauses plus a subordinate clause; this sentence has neither extra clause.

Question 79 English

I suggest that you _____ visit a doctor.

- A. Must
- B. Should ✓ **Correct answer**
- C. Ought to
- D. Have to

A. "Must" states a strong obligation or necessity, far stronger than a suggestion.

B. After "suggest that", "should" is the expected modal for advice in the exam's convention (the bare subjunctive "you visit" would also work, but it is not offered); correct on that convention.

C. "Ought to" expresses advice and is grammatical here, but it is not the collocation the paper expects after "suggest that".

D. "Have to" states an external obligation, not a suggestion. NOTE: the answer rests on the expected collocation after "suggest"; "ought to" is not ungrammatical, only less idiomatic in this frame.

Question 80 English

Choose the correctly structured sentence.

- A. Had he been there, he would see us.
- B. Had he been there, he would had seen us.
- C. Had he been there, he would have seen us. ✓ **Correct answer**

If he had been there, he would have seen us.

A. Mixes a past-perfect (third-conditional) opening with a present-tense result ("would see"); the result must be "would have seen".

B. "Would had" is ungrammatical; the auxiliary must be "would have".

C. Correct inverted third conditional: "Had he been there" (= "If he had been there") with "would have + past participle" in the result; correct.

D. Doubles the auxiliary ("had had been"); the inversion needs only one "had".

Question 81 English

Identify the sentence with correct structure.

- A. We noticed the boy, walking down the street.
- B. We noticed, the boy walk down the, street.
- C. We noticed, that the boy was walking down the street.
- D. We noticed the boy, who was walking down the street. ✓ **Correct answer**

A. The comma plus participle leaves it unclear who is walking and breaks the object phrase awkwardly; the paper counts it as incorrect punctuation/structure.

B. Ungrammatical throughout: a comma after the verb, the bare verb "walk" for a past observation, and a comma inside "the, street".

C. A comma must not separate the verb "noticed" from its "that"-clause object.

D. A correct non-defining relative clause ("who was walking...") giving extra information about "the boy"; correct. NOTE: the answer rests on the paper's punctuation convention for the participial phrase in A; in loose usage A can be read as grammatical.

Question 82 English

He circled _____ whole world on his ship and on _____ island he encountered _____ fierce

- A. the, an, the
- B. the, a, a
- C. the, an, a ✓ **Correct answer**
- D. the, an, an

A. The last gap must be indefinite (a giant encountered for the first time), not "the fierce giant" as if already known.

B. "A island" is wrong: "island" begins with a vowel sound, so it needs "an".

C. "The whole world" (a unique whole, definite), "an island" (vowel sound), "a fierce giant" (consonant sound, first mention); correct.

D. "An fierce giant" is wrong: "fierce" begins with a consonant sound, so it needs "a".

Question 83 English

Choose the sentence with correct order of adjectives.

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

A. Wrong on every count: a comma after the verb, "young two" reverses number and age, and commas are scattered wrongly.

B. 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.

C. A comma after the number, and origin ("British") placed before age and opinion, reversing the conventional sequence.

tuation is neat (one comma in the coordinate pair, none before "British"), but the ORDER is wrong: "young" (age) comes before "beautiful" (opinion), reversing the standard opinion-before-age sequence; the filed key. NOTE: the mdcatguide key says D and the Tabeer key says B; the decision-sheet recommendation (5B-44) and the batch research addendum are for B on the adjective-order rule, and the mdcatguide key's own explanation states the opinion-before-age rule, which B follows and D reverses. Decided by assistant under owner's 8 Nov delegation — see push note.

Note: FILE CORRECTION: the filed key was D ("I met two young, beautiful British girls at the airport"); corrected to B on the standard adjective-order rule (opinion before age before origin), per the decision sheet 5B-44 and the batch research addendum. The mdcatguide key says D and the Tabeer key says B; see the 37s push note in the reviewed file.

Question 84 English

Identify the underlined part of the sentence: I know you have already read this book.

- A. Independent clause
- B. Adjective clause
- C. Adverb clause
- D. Noun clause ✓ **Correct answer**

A. "You have already read this book" could stand alone, but here it is the OBJECT of "know", functioning as a noun clause (object clause); as used, it is subordinate.

B. It does not modify any noun; it completes the verb "know".

C. It does not modify a verb, adjective or adverb for time, reason or condition; it states the fact that is known.

D. The clause acts as the object of "know" (I know WHAT? — that you have read the book); correct.

85 English

Which of the following verbs takes the preposition 'from' with it?

- A. Abstain ✓ **Correct answer**
- B. Accused
- C. Desirous
- D. Ignorant

A. The fixed collocation is "abstain from" (to abstain from something); correct.

B. "Accused" takes "of" (accused of a crime), not "from".

C. "Desirous" takes "of" (desirous of success), not "from".

D. "Ignorant" takes "of" (ignorant of the facts), not "from".

Question 86 English

Choose the correct preposition. One hour _____ glorious life is worth an age without a name.

- A. In
- B. Of ✓ **Correct answer**
- C. To
- D. With

A. "One hour in glorious life" does not form the idiom; the measure of time is not located "in" the life.

B. The idiom is "one hour OF glorious life" (an hour consisting of glorious life, set against an age without a name); correct.

C. "One hour to glorious life" would mean time remaining before it, which is not the sense.

D. "One hour with glorious life" would mean companionship, not the measure-of-life sense of the quotation.

87 English

Clive had been only a few months in the army when announced that peace had been concluded between great britain and france. The sentence contains errors of:

- A. Comma
- B. Comma and full stop
- C. Comma and capitalization
- D. Capitalization ✓ **Correct answer**

A. No comma error is present: the sentence contains no comma at all, and none is required at the point named.

B. Neither a comma error nor a full-stop error is present; the sentence ends correctly.

C. The capitalisation errors are real, but there is no comma error to pair with them.

D. "great britain" and "france" are proper names of countries and must be capitalised ("Great Britain", "France"); correct as the error the options name. NOTE: the sentence also omits "it was" before "announced" ("when [it was] announced"), a further defect the options do not offer; the answer names only the error the options cover. Defect: the stem as printed is missing "it was".

Question 88 Biology

Induced fit model of enzyme activity suggests that an enzyme:

- A. Cannot modify its active sites
- B. Can bind to a single substrate
- C. Can catalyze related specific reaction ✓ **Correct answer**
- D. Usually belongs to non-regulatory enzyme

A. The opposite of the induced-fit model: the active site DOES change shape to fit the substrate.

B. Absolute single-substrate rigidity is the lock-and-key picture; induced fit allows

this does not capture the model.

C. Because the active site moulds itself around the substrate, the enzyme can accept closely related substrates and catalyse their related reactions; correct on the textbook phrasing of the model.

D. Induced fit says nothing about whether an enzyme is regulatory or not; allosteric regulation is a separate concept. NOTE: the answer rests on the textbook's phrasing of the model; the model's core claim (flexible active site) is not itself offered as an option.

Question 89 Biology

Select the one which is used by hexokinase as an activator:

- A. Cu^{2+}
- B. Zn^{2+}
- C. Mg^{2+} ✓ **Correct answer**
- D. Fe^{2+}

A. Copper is a cofactor for some enzymes (e.g. cytochrome oxidase), but it is not the activator of hexokinase.

B. Zinc activates enzymes such as carbonic anhydrase, not hexokinase.

C. Kinases use the Mg–ATP complex as their true substrate: Mg^{2+} shields ATP's negative charges and is essential for hexokinase activity; correct.

D. Iron is a cofactor for haem proteins and some oxidases, not the activator of hexokinase.

Question 90 Biology

The linkage between substrate molecule and active site is:

- A. Ionic bonding
- B. Disulfide bonding
- C. Hydrogen bonding ✓ **Correct answer**

A. Ionic (salt-bridge) interactions do occur between substrate and active site, so this is a real part of binding, but the paper's expected single answer is hydrogen bonding.

B. Disulfide bonds stabilise the enzyme's own structure; they do not link the substrate to the active site.

C. Hydrogen bonds are the characteristic weak, specific, reversible links that hold a substrate in the active site; correct on the textbook's single-answer reading.

D. Ordinary substrate binding is non-covalent and reversible; a covalent link would be the exception (e.g. covalent catalysis intermediates), not the general linkage. NOTE: substrate binding in fact uses several non-covalent interactions together (hydrogen bonds, ionic interactions, van der Waals forces); the stem's singular "the linkage" forces the textbook's one-word answer.

Question 91 Biology

Activated pepsin in which polypeptide fragment is removed is an example of:

- A. Apo-enzyme
- B. Holoenzyme
- C. Regulatory enzyme
- D. Non-regulatory enzyme ✓ **Correct answer**

A. An apo-enzyme is an enzyme WITHOUT its cofactor; pepsinogen activation is about removing a peptide fragment, not about a missing cofactor.

B. A holoenzyme is an apo-enzyme PLUS its cofactor; again, this is not the pepsinogen story.

C. Regulatory (allosteric) enzymes are controlled reversibly by effector molecules; pepsinogen activation is irreversible and is not allosteric regulation.

c (zymogen) activation is an irreversible covalent modification, classified in the textbook against reversible allosteric regulation, so pepsin falls on the non-regulatory side of that classification; correct on that convention. NOTE: AskFilo keys this item C (activation as a regulatory mechanism in the broader sense); the paper's classification (regulatory = reversible allosteric control) and the mdcatguide key both give D — see push note. NOTE: the answer rests on the textbook's regulatory/non-regulatory classification; "non-regulatory" is a category label, not a property derived from the activation chemistry alone.

Question 92 Biology

Reversible inhibitors affect the enzyme catalyzed reaction by:

- A. Forming covalent bonds with active site
- B. Destroying the globular structure
- C. Forming weak linkages with enzymes ✓ **Correct answer**
- D. Activating the catalytic sites

A. Covalent attachment is typically IRREVERSIBLE inhibition; a reversible inhibitor does not lock on covalently.

B. Destroying the protein structure (denaturation) is irreversible damage, not reversible inhibition.

C. Reversible inhibitors bind by weak, non-covalent forces (hydrogen bonds, ionic and van der Waals interactions) and can dissociate, so the inhibition can be undone; correct.

D. Inhibitors reduce activity; they do not activate catalytic sites.

Question 93 Biology

What is the required medium for the maximum activity of the given enzymes? (Lipase / Pepsin)

- A. Acidic / Basic
- B. Acidic / Acidic

ic / Acidic ✓ **Correct answer**

- D. Basic / Basic

A. Reversed: lipase is not at its best in acid, and pepsin is not at its best in base.

B. Pepsin is indeed acid-loving, but lipase (pancreatic/intestinal) is not.

C. Pancreatic lipase works best in the neutral-to-alkaline intestine (around pH 8), while pepsin works best in the strongly acidic stomach (around pH 2); correct.

D. Pepsin is denatured and inactive in basic conditions; it needs acid.

Question 94 Biology

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

- A. Life is not the product of sudden creative act
- B. Unicellular prokaryotes might be the life ancestors
- C. Rely on inspiration and meditation for life origin ✓ **Correct answer**
- D. Life results from innumerable changes

A. Denying a sudden creative act is the EVOLUTIONARY position, not what distinguishes special creation.

B. A common ancestry from early prokaryotes is an evolutionary claim, not a creationist one.

C. Special creation rests on supernatural/revealed explanation rather than on natural mechanisms; the textbook contrasts this reliance on inspiration with evolution's naturalistic account; correct on that framing.

D. Gradual change over vast time is the evolutionary account, not the creationist one.
NOTE: the answer rests on the textbook's philosophical framing of the two concepts; it is a distinction of explanatory approach, not a checkable biological fact.

95 Biology

Which of the following idea is a part of Lamarckism?

- A. Use and disuse of organs ✓ **Correct answer**
- B. Survival of the fittest
- C. Origin of species
- D. Variation

A. Lamarck held that organs strengthened by use and weakened by disuse, and that the changes were inherited; correct.

B. A Darwinian (Spencer/Darwin) phrase for natural selection, not Lamarck's mechanism.

C. The title of Darwin's book and the Darwinian programme, not a Lamarckian idea.

D. Variation as the raw material of selection is central to Darwinism; Lamarck's mechanism did not rest on random variation and selection.

Question 96 Biology

Choose the correct pair for homology?

- A. Wings of birds and wings of butterfly
- B. Forelimbs of birds and fins of whales ✓ **Correct answer**
- C. Leaves of pines and cactus
- D. Gills of fish and lungs of humans

A. Similar function (flight) but different origin (vertebrate limb vs insect outgrowth): analogous, not homologous.

B. Both are the same ancestral tetrapod forelimb (same bones: humerus, radius, ulna, digits), modified for different functions: homologous; correct.

C. Pine needles and cactus spines are both modified leaves, but the pairing as stated does not show the shared-ancestry limb pattern the question tests; it is not the textbook

D. Both are respiratory organs, but they are not the same ancestral structure modified; they are analogous in function, not homologous in the sense asked.

Question 97 Biology

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

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

A. Starts with the latest group (birds) and scrambles the rest; the fossil order is the reverse in effect.

B. Puts reptiles first and fish near the end, contradicting the fossil record.

C. The fossil sequence: jawed fishes first, then amphibians (land invasion), then reptiles, then birds (from reptilian ancestors); correct.

D. Puts fish last, although fishes are the earliest vertebrates in the record.

Question 98 Biology

The reduction of population carrying a specific allele and genotype due to natural disaster is called:

- A. Mutation
- B. Bottle neck effect ✓ **Correct answer**
- C. Founder effect
- D. Speciation

A. Mutation creates new alleles; it does not describe a disaster shrinking a population.

chance reduction of a population by a disaster, which randomly cuts allele diversity; correct. (The option prints "Bottle neck"; the standard term is "bottleneck".)

C. The founder effect is the loss of diversity when a SMALL group leaves to found a NEW population, not when a disaster shrinks an existing one.

D. Speciation is the formation of a new species, a long-term outcome, not the disaster-driven reduction itself.

Question 99 Biology

Which of the following increases variation within a gene pool?

- A. Adaptation
- B. Genetic drift
- C. Gene mutation ✓ **Correct answer**
- D. Neutral selection

A. Adaptation is the RESULT of selection acting on variation that already exists; it does not itself create new variation.

B. Drift randomly REMOVES alleles and reduces variation, especially in small populations.

C. Mutation creates new alleles, the ultimate source of new genetic variation in a gene pool; correct.

D. Neutral changes neither create variation nor drive adaptation; selection (neutral or otherwise) acts on variation rather than generating it.

Question 100 Biology

Identify the location of mitral valve in human heart:

- A. Between right ventricle and pulmonary trunk
- B. Between left ventricle and aorta
- C. Between right atrium and right ventricle

ween left atrium and left ventricle ✓ **Correct answer**

A. That is the pulmonary (semilunar) valve, not the mitral valve.

B. That is the aortic (semilunar) valve, not the mitral valve.

C. That is the tricuspid valve, the right-side atrioventricular valve.

D. The mitral (bicuspid) valve guards the left atrioventricular opening and stops backflow into the atrium; correct.

Question 101 Biology

Which of the following components are present both in blood and lymph?

- A. O_2, water, large proteins
- B. RBCs, electrolytes, amino acids
- C. CO_2, RBCs and water
- D. CO_2, glucose and water ✓ **Correct answer**

A. Oxygen and water are in both, but LARGE proteins (albumin, globulins, fibrinogen) are abundant in blood plasma and only present in small amounts in lymph; the combination fails on the proteins.

B. Lymph normally contains no red blood cells; that alone disqualifies the option.

C. Again, red blood cells are a blood component, not a lymph component.

D. Dissolved carbon dioxide, glucose and water are all present in both blood plasma and lymph (lymph is essentially filtered tissue fluid); correct.

Question 102 Biology

Blood flow in vessels least depends on:

- A. Total cross sectional area of vessels
- B. Blood pressure

etal muscle contraction ✓ **Correct answer**

- D. Heart beat

A. Total cross-sectional area strongly sets flow velocity (velocity falls as total area rises, e.g. in capillaries), so flow depends on it.

B. The pressure gradient is the main driving force for flow through vessels.

C. The skeletal-muscle pump helps venous RETURN in the limbs, but it is not a general determinant of flow through all vessels in the way pressure, area and cardiac output are; correct as the "least depends" answer on the textbook's ranking.

D. Cardiac output (heart rate × stroke volume) is the primary determinant of total blood flow. NOTE: the answer is a relative ranking, not a derivation; the muscle pump is genuinely important for venous return, so "least" is a textbook judgment, not an absolute fact.

Question 103 Biology

Which T-lymphocytes do not directly attack invading microbes?

- A. Natural killer cell
- B. Macrophages
- C. B-lymphocytes ✓ **Correct answer**
- D. Neutrophils

A. Natural killer cells DO directly kill infected or abnormal cells; they are cytotoxic attackers, not the answer.

B. Macrophages directly engulf and destroy microbes by phagocytosis; they are direct attackers.

C. B cells fight by humoral immunity: they make antibodies that tag microbes for others to destroy, rather than attacking microbes directly themselves; correct on the function the question tests.

ils directly engulf and kill microbes by phagocytosis; they are direct attackers.

NOTE: the answer rests on the humoral-vs-direct function distinction. Defect: the stem says "T-lymphocytes", but B-lymphocytes are NOT T-lymphocytes (they are a separate lymphocyte class), and neither are any of the other options; the stem should read "which cells/lymphocytes".

Question 104 Biology

A woman cuts her finger while working in kitchen. Which chemical substance will cause inflammation around wound?

- A. Interleukin – I
- B. Histamine ✓ **Correct answer**
- C. Interleukin – II
- D. Heparin

A. Interleukin-1 is a signalling molecule in inflammation, but the immediate vasodilation and swelling at a fresh wound is driven by histamine release, which is the textbook answer here.

B. Released from mast cells and basophils at the injury, histamine dilates vessels and increases their permeability, producing redness, heat and swelling; correct.

C. Interleukin-2 drives T-cell growth in adaptive immunity, not the immediate inflammatory response at a cut.

D. Heparin is an anticoagulant that prevents clotting; it does not cause inflammation.

Question 105 Biology

Choose the mismatched:

- A. Acetylcholine – gastrin
- B. Enterokinase – lipase
- C. Emulsification – fat droplets

lomicrons – cholesterol + carbohydrates ✓ **Correct answer**

A. Loosely matched: vagal acetylcholine stimulates G cells to release gastrin, so the pair is physiologically related.

B. Loosely matched as digestive enzymes of the small intestine/pancreatic system, though enterokinase's actual job is activating trypsinogen, not working with lipase.

C. Matched: emulsification is the breaking of fat into small droplets (by bile salts) for lipase action.

D. Mismatched: chylomicrons are lipoproteins carrying triglycerides and cholesterol esters (with apolipoproteins) from the intestine; they carry NO carbohydrates; correct as the mismatched pair. NOTE: the stem states no matching criterion, so the answer rests on the exam's intended pairing reading; D is the only pair that is factually false as a composition statement.

Question 106 Biology

Which protein is present in the walls of alveoli?

- A. Collagen ✓ **Correct answer**
- B. Hemoglobin
- C. Myoglobin
- D. Myosin

A. Collagen (with elastin) is the structural protein of the alveolar walls' connective tissue, giving them strength and recoil; correct.

B. Haemoglobin is the oxygen carrier INSIDE red blood cells, not a structural protein of alveolar walls.

C. Myoglobin stores oxygen inside muscle cells; it is not an alveolar-wall protein.

D. Myosin is the contractile protein of muscle; it is not a structural component of alveolar

Question 107 Biology

Which of the following acts as an enzyme activator in human digestive system?

- A. Erepsin
- B. Enterokinase ✓ **Correct answer**
- C. Pepsinogen
- D. Trypsinogen

A. Erepsin is itself an active mixture of peptidases; it is not the activator of other enzymes.

B. Enterokinase (enteropeptidase) converts trypsinogen to trypsin, which then activates the other pancreatic zymogens; it is the activator; correct.

C. Pepsinogen is the INACTIVE precursor of pepsin; it is what gets activated, not the activator.

D. Trypsinogen is the inactive precursor of trypsin; it is what enterokinase activates.

Question 108 Biology

How would you classify a bacterium having a group of 2 or more flagella at one pole?

- A. Lophotrichous ✓ **Correct answer**
- B. Amphitrichous
- C. Monotrichous
- D. Peritrichous

A. "Lopho-" means a tuft: a group (tuft) of flagella at one pole; correct.

B. Flagella at BOTH poles (one or more at each end), not a tuft at one pole.

C. A SINGLE flagellum at one pole, not a group.

D. Flagella spread all over the cell surface, not clustered at one pole.

109 Biology

Which of the following bacteria is used for developing vaccine against tuberculosis?

- A. Mycobacterium tuberculosis
- B. E. coli
- C. Salmonella typhi
- D. Mycobacterium bovis ✓ **Correct answer**

A. The bacterium that CAUSES tuberculosis; the vaccine is not made from the virulent disease organism itself.

B. A gut bacterium unrelated to tuberculosis vaccination.

C. Causes typhoid; it is used for typhoid vaccines, not for tuberculosis.

D. The BCG vaccine is made from an attenuated strain of M. bovis (the cattle tuberculosis bacterium), weakened by long culture; correct.

Question 110 Biology

If a bacteria can grow in the presence or absence of oxygen it would be a(n):

- A. Aerobic
- B. Anaerobic
- C. Facultative anaerobe ✓ **Correct answer**
- D. Microaerophilic

A. An obligate aerobe REQUIRES oxygen and cannot grow without it.

B. An obligate anaerobe is harmed or killed by oxygen and cannot grow in its presence.

C. Grows with oxygen (aerobic respiration) and without it (fermentation/anaerobic respiration); correct.

D. Needs oxygen, but only at LOW concentrations; it does not grow in the absence of oxygen.

111 — Excluded (defective)

Which testicular cells in a human male with high testosterone level will start the endocrine activity?

- A. Interstitial cell
- B. Sertoli cells
- C. Spermatogonial cells
- D. Leydig cells

No answer is given for this question, and none is taught. excluded by assistant under owner's 8 Nov delegation (see push note). No answer is taught: options A and D name the same cells, so there is no unique answer.

A. The interstitial cells of the testes ARE the Leydig cells: the same testosterone-secreting endocrine cells, under their other name.

B. Sertoli (nurse) cells support developing sperm inside the tubules; they are not the testosterone-secreting endocrine cells.

C. Spermatogonia are the germ-line stem cells that give rise to sperm; they have no endocrine (testosterone) role.

D. Leydig cells in the interstitial tissue secrete testosterone under LH stimulation; the marked key. DEFECTIVE: candidates A and D name the SAME cells — Leydig cells are the interstitial cells of the testis (the mdcatguide key's own explanation says "Leydig cells (interstitial cells of Leydig)") — so both options describe the testosterone-secreting cells. No letter is asserted; the question is excluded and must never be taught as having an answer.

Question 112 Biology

Which layer of uterus is composed of contractile muscles?

- A. Endometrium

metrium

- C. Myometrium ✓ **Correct answer**
- D. Both endo and myometrium

A. The inner lining (epithelium + glands) that is shed in menstruation; it is not a muscle layer.

B. The outer serosal covering of the uterus; it is not contractile muscle.

C. The thick middle layer of smooth muscle whose contractions expel the baby in labour and drive menstrual flow; correct.

D. Wrong because the endometrium is not muscular; only the myometrium is.

Question 113 Biology

One of the endocrine glands responsible for failure in ovulation is:

- A. Pituitary ✓ **Correct answer**
- B. Placenta
- C. Thyroid
- D. Adrenal

A. The pituitary secretes FSH and LH, which grow the follicle and trigger ovulation; pituitary failure directly stops ovulation; correct as the direct regulator.

B. The placenta is an endocrine organ of pregnancy, after ovulation and conception have already happened; it does not control ovulation.

C. Thyroid disorders CAN disturb ovulation indirectly, but the thyroid does not directly command ovulation.

D. Adrenal disorders CAN disturb fertility indirectly, but the adrenal does not directly command ovulation. NOTE: the answer rests on the direct-vs-indirect distinction; thyroid and adrenal disease are real indirect causes of anovulation, so "one of the glands

is a best-fit reading, not an exclusive fact.

Question 114 Biology

The reason behind the slow healing of cartilage is:

- A. Absence of minerals in matrix
- B. Absence of nervous supply
- C. Absence of blood supply ✓ **Correct answer**
- D. Loose arrangement of cells

A. Cartilage matrix lacks the mineral of bone, but that is about stiffness, not about why repair is slow.

B. Cartilage is also without nerves, but nerves do not deliver the nutrients and repair cells that healing needs.

C. Cartilage is avascular: nutrients must diffuse slowly through the matrix and repair cells cannot arrive quickly by blood, so healing is slow; correct.

D. Cartilage cells (chondrocytes) sit in separate lacunae, but it is the lack of vessels, not the spacing, that limits repair.

Question 115 Biology

H zone of sarcomere consists of:

- A. Proteins supporting myosin filaments
- B. Myosin overlapped by actin
- C. Only actin filament
- D. Only myosin filament ✓ **Correct answer**

A. The M-line and associated proteins sit in the middle of the H zone, but the zone itself is defined by its FILAMENT content, not by its support proteins.

B. That describes the zone of overlap on either side of the H zone (parts of the A band).

ne itself.

C. The I band contains only actin; the H zone contains no actin at all.

D. The H zone is the central part of the A band where only thick (myosin) filaments are present, with no actin overlap; it narrows as actin slides in during contraction; correct.

Question 116 Biology

Which cell is most important to cause bone resorption?

- A. Osteoblast
- B. Osteoclast ✓ **Correct answer**
- C. Osteocyte
- D. Fibroblast

A. Osteoblasts BUILD bone by laying down matrix; they do the opposite of resorption.

B. Large multinucleated cells that dissolve bone mineral with acid and digest its matrix with enzymes; correct.

C. Osteocytes are mature bone cells embedded in the matrix that sense strain and signal; they do not resorb bone.

D. Fibroblasts make connective-tissue fibres (e.g. collagen in skin); they do not resorb bone.

Question 117 Biology

Activity of which organ would be compromised with impaired function of smooth muscles?

- A. Heart
- B. Lungs
- C. Stomach ✓ **Correct answer**
- D. Tongue

is made of CARDIAC muscle, a distinct muscle type, so impaired smooth muscle does not directly compromise it.

B. The lungs do contain smooth muscle in the bronchi and bronchioles (airway tone), so lung function would be affected to a degree — but breathing itself is driven by skeletal muscles (diaphragm, intercostals), not by smooth muscle.

C. The stomach's churning and peristalsis are entirely smooth-muscle work, so impaired smooth muscle compromises gastric activity most directly; correct as the best fit.

D. The tongue is skeletal (voluntary) muscle, not smooth muscle. NOTE: the answer is a best-fit judgment; the lungs' bronchial smooth muscle means B is not wholly unaffected.

Question 118 Biology

The phenomena of gene linkage rejects the concept of:

- A. Law of segregation
- B. Polygenic traits
- C. Epistasis
- D. Law of independent assortment ✓ **Correct answer**

A. Segregation (the two alleles of one gene separating into gametes) still happens for linked genes; linkage does not reject it.

B. Polygenic inheritance (many genes shaping one trait) is unaffected by linkage; linked genes can still be polygenic.

C. Epistasis (one gene masking another) is an interaction between genes and is not rejected by linkage.

D. Linked genes sit on the same chromosome and are inherited together, so they do NOT assort independently; linkage is the exception that limits this law; correct.

119 Biology

Which of the following is used to determine linkage between two gene pairs?

- A. Test cross ✓ **Correct answer**
- B. Back cross
- C. Monohybrid cross
- D. Dihybrid cross

A. Crossing the heterozygote with a homozygous recessive exposes the gametes it made, so parental vs recombinant offspring can be counted and the recombination frequency (hence linkage) calculated; correct.

B. A backcross is any cross back to a parent; a test cross is the specific backcross to the recessive parent, and the general term is not the tool named for linkage measurement.

C. A monohybrid cross follows ONE gene pair, so it cannot reveal linkage BETWEEN two pairs.

D. A dihybrid (heterozygote × heterozygote) cross can hint at linkage through a distorted ratio, but the test cross is the standard method for measuring it; the paper's expected answer is the test cross.

Question 120 Biology

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

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

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

s the self-digestion of a whole cell by its own lysosomal enzymes (e.g. after death), not the routine engulfing of unwanted structures.

C. Endocytosis brings material in from OUTSIDE the cell, not the cell's own unwanted structures.

D. Exocytosis sends material OUT of the cell (secretion); it is the opposite direction.

Question 121 Biology

Fluidity of biological membranes is maintained by:

- A. Glycoprotein
- B. Saturated fatty acid
- C. Fatty acids
- D. Phospholipids ✓ **Correct answer**

A. Glycoproteins are cell-surface markers and receptors; they do not maintain bilayer fluidity.

B. Saturated fatty-acid tails pack tightly and DECREASE fluidity; they work against it.

C. Fatty acids are the tails of the phospholipids, but the membrane's fluid bilayer itself is made of phospholipids; "fatty acids" alone is the part, not the structure that maintains fluidity.

D. The phospholipid bilayer, and the kinks in its unsaturated fatty-acid tails, set how freely molecules move sideways in the membrane; correct on the textbook's answer. NOTE: the answer rests on the textbook's one-word summary; strictly, fluidity is maintained by the phospholipid composition INCLUDING the proportion of unsaturated fatty acids (and cholesterol), so option C names a real contributor rather than a wholly wrong idea.

Question 122 Biology

Which of the following independently reproduces in the cell?

gi complex

- B. Nucleus
- C. Chloroplast ✓ **Correct answer**
- D. Endoplasmic reticulum

A. The Golgi is built from vesicles from the endoplasmic reticulum; it does not reproduce itself.

B. The nucleus divides with the cell, but it does not reproduce independently inside the cell.

C. Chloroplasts carry their own circular DNA and divide by binary fission inside the cell, independently of the nucleus; correct.

D. The ER grows by membrane addition and divides with the cell; it has no independent reproduction.

Question 123 Biology

Which statement best describes difference of prokaryotic cell from eukaryotic cell?

- A. Prokaryote: Membrane bound organelle is present / Eukaryote: Membrane bound organelle is absent
- B. Prokaryote: Ribosomal subunits are 50S & 30S / Eukaryote: Ribosomal subunits are 60S & 40S ✓ **Correct answer**
- C. Prokaryote: DNA is double stranded / Eukaryote: DNA is circular
- D. Prokaryote: Multicellular / Eukaryote: Multicellular and unicellular

A. Backwards: prokaryotes LACK membrane-bound organelles and eukaryotes HAVE them.

B. Prokaryotic ribosomes are 70S (50S + 30S) and eukaryotic ribosomes are 80S (60S + 40S); correct.

C. Both have double-stranded DNA, and it is the PROKARYOTE whose chromosome is

statement swaps the circular DNA half.

D. Prokaryotes are unicellular; it is the eukaryotes that include both unicellular and multicellular forms, so the first half is wrong.

Question 124 Biology

Skeletal muscle cells are having:

- A. Less SER & more RER
- B. More SER & less RER ✓ **Correct answer**
- C. Equal amount of SER & RER
- D. No SER & RER

A. Backwards: skeletal muscle is not a major secretory cell, so it does not carry abundant rough ER.

B. Skeletal muscle is packed with smooth ER in the form of the sarcoplasmic reticulum, which stores and releases Ca^{2+} for contraction, while rough ER is relatively sparse; correct.

C. The two are far from equal in a muscle fibre; the sarcoplasmic reticulum dominates.

D. Muscle cells plainly have both; the sarcoplasmic reticulum is one of their defining features.

Question 125 Biology

Which one is the correct direction of action potential along the neuron?

- A. Axon → post synaptic terminal ✓ **Correct answer**
- B. Schwann cells → pre synaptic terminal
- C. Cell body → pre synaptic terminal
- D. Dendrite → post synaptic terminal

A. The impulse travels along the axon toward the terminal; the marked key. The terminal named, however, is wrong: the axon's end is the PRESYNAPTIC terminal ("postsynaptic"

ne next cell).

B. Schwann cells wrap the axon (myelin); the impulse does not travel FROM Schwann cells TO the terminal.

C. The impulse is generated at the axon hillock (cell-body/axon junction) and travels to the presynaptic terminal, so this traces the correct overall direction with the correct terminal name.

D. Dendrites RECEIVE signals and carry graded potentials toward the cell body; the action potential does not travel from dendrite to terminal in this direction. NOTE (defect recorded openly): option A misnames the terminal — the axon's end is the PRESYNAPTIC terminal ("postsynaptic" belongs to the next cell); C traces the same direction with the correct terminal name. The exam key is A in all three sources (filed marked key, mdcatguide key, Tabeer key — and the Tabeer reproduction prints option A correctly as "Axon → Pre synaptic Terminal"), so A is taught as the exam's answer with this defect disclosed. Decided by assistant under owner's 8 Nov delegation — see push note.

Question 126 Biology

Concentration of Na^+ and K^+ ions during resting membrane potential is: (Inside Neuron / Outside Neuron)

- A. K^+ 30 times / Na^+ 10 times ✓ **Correct answer**
- B. K^+ 10 times / Na^+ 30 times
- C. Na^+ 10 times / K^+ 30 times
- D. Na^+ 30 times / K^+ 10 times

A. On the standard reading (first figure = how much more K^+ is inside than outside; second = how much more Na^+ is outside than inside), this matches the textbook concentrations: K^+ ≈ 140 mM inside vs ≈ 4 mM outside (≈ 30×), Na^+ ≈ 145 mM outside vs ≈ 12 mM inside (≈ 10–12×); correct.

B. The printed key, but WRONG: it swaps the two ratios against the standard

ns above.

C. The same 10/30 numbers as A but with the ions in the opposite order, so on the parenthetical "(Inside / Outside)" reading it misplaces which ion is concentrated where.

D. The same swapped numbers as B with the ions reversed; it does not match the standard concentrations on either reading. VERIFIED: Knowt + Wikibooks + Tabeer key — K^+ ≈ 30× higher inside, Na^+ ≈ 10× higher outside; option A matches the textbook concentrations. NOTE (8 Nov 2026): the mdcatguide key prints the letter B for this item, but its own explanation states K^+ is ~30× more concentrated INSIDE and Na^+ ~10× more concentrated OUTSIDE — which is option A, not B. The printed B is a key-letter error in that reproduction; filed A stands.

Note: FILE CORRECTION: the printed key was B (K+ 10 times / Na+ 30 times); corrected to A (K+ 30 times / Na+ 10 times) on the standard resting concentrations (Knowt + Wikibooks + Tabeer key). The mdcatguide key prints B but its own explanation states the A concentrations.

Question 127 Biology

A brief phase in which neuron regains its original ionic distribution and polarity is called:

- A. Repolarization
- B. Synaptic delay
- C. Saltatory period
- D. Refractory period ✓ **Correct answer**

A. Repolarisation is only the return of the membrane potential toward negative values (K^+ leaving); it does not by itself describe the full restoration of ionic distribution and excitability.

B. The synaptic delay is the brief pause at a synapse while transmitter is released and acts; it has nothing to do with restoring the neuron's own ionic distribution.

C. No such standard term exists; saltatory CONDUCTION is the jumping of impulses

des of Ranvier, not a recovery phase.

D. The interval after an action potential during which the neuron restores its ionic gradients and polarity (via pumps and channels) and cannot fire again (absolute) or fires only with difficulty (relative); correct.

Question 128 Biology

Parts of brain that comprise the limbic system:

- A. Thalamus, amygdala, hippocampus
- B. Hypothalamus, amygdala, hippocampus ✓ **Correct answer**
- C. Hypothalamus, corpus callosum, hippocampus
- D. Thalamus, hypothalamus, pons

A. The thalamus is primarily a sensory relay nucleus, not one of the core limbic trio named in textbooks.

B. The standard core trio: hippocampus (memory), amygdala (emotion) and hypothalamus (homeostasis and emotional expression); correct.

C. The corpus callosum is the white-matter bridge between the cerebral hemispheres, not a limbic structure.

D. The pons is a brainstem relay for sleep and motor signals, not a limbic structure, and the amygdala/hippocampus are missing.

Question 129 Biology

Ions involved in synaptic transmission of nerve impulse:

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

ons do take part in the overall process: Na^+ carries the arriving action potential, Ca^{2+} triggers transmitter release, and K^+ carries repolarisation afterwards.

B. Omits Ca^{2+}, without which no transmitter is released at all; this cannot be the complete answer on any reading.

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

D. Omits Na^+, without which the presynaptic action potential does not arrive. NOTE: on the stem's literal wording ("ions involved in synaptic transmission"), A lists every ion that takes part (Na^+ arrival, Ca^{2+} release, K^+ repolarisation); the Tabeer key says A. On the textbook's phase-split reading (transmission = arrival + release, repolarisation counted separately), C is the expected pair — and C is the key in the filed transcription and the mdcatguide key. C is taught, with the A reading recorded. Decided by assistant under owner's 8 Nov delegation — see push note.

Question 130 Biology

Correct sequence of the four elements of a neural pathway in simple-reflex circuit:

- A. Sensory neuron → associative neuron → motor neuron → muscles ✓ **Correct answer**
- B. Muscles → sensory neuron → associative neuron → motor neuron
- C. Motor neurons → associate neuron → sensory neuron → muscles
- D. Associate neuron → sensory neuron → motor neuron → muscles

A. The afferent (sensory) neuron carries the signal in, the interneuron ("associative neuron") relays it in the centre, the motor neuron carries the order out, and the muscle is the effector; correct.

B. Starts at the effector and ends at the motor neuron, running the arc backwards.

C. Puts the motor neuron first and the sensory neuron in the middle, reversing the input/output order.

central relay before the sensory input, which cannot happen: the relay only acts after the sensory signal arrives.

Question 131 Biology

In humans memory storage for behavior and coordination is well developed in the:

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

A. The amygdala stores EMOTIONAL memory (fear, emotional associations), not motor coordination.

B. The cerebrum handles declarative and higher cognitive memory, not the procedural/motor memory for coordinated behaviour.

C. The medulla controls vital reflexes (breathing, heartbeat); it is not a memory store for behaviour and coordination.

D. The cerebellum stores procedural/motor memory and coordinates learned movements and behaviour; correct on the textbook association. NOTE: the answer rests on the textbook's association of "memory for behaviour and coordination" with the cerebellum; memory as a whole is distributed, and the cerebrum also stores behaviour-related memory in other forms.

Question 132 Biology

Choose the correct pairing: (Chemical Nature / Hormones / Glands)

- A. Proteins / Insulin / Pancreas ✓ **Correct answer**
- B. Steroid / Cortisone / Thymus
- C. Catecholamine / Estrogen / Adrenal medulla
- D. Amino acid derivative / Thyroxine / Parathyroid

a peptide/protein hormone made by the pancreatic beta cells; all three parts match; correct.

B. Cortisone IS a steroid, but it comes from the adrenal CORTEX, not the thymus (the thymus makes thymosins).

C. Estrogen is a STEROID (from ovaries/adrenal cortex), not a catecholamine; the adrenal medulla makes adrenaline/noradrenaline, which ARE catecholamines.

D. Thyroxine IS an amino-acid derivative, but it comes from the THYROID gland, not the parathyroid (which makes parathormone).

Question 133 Biology

Which phyla exhibit first true coelom?

- A. Cnidaria
- B. Annelida ✓ **Correct answer**
- C. Mollusca
- D. Platyhelminthes

A. Cnidarians are diploblastic with no coelom at all (only a gut cavity).

B. Annelids are the textbook first group with a true coelom: a body cavity fully lined with mesoderm, formed by schizocoely; correct.

C. Molluscs are coelomates, but their coelom is reduced (mainly around the heart and gonads) and they are not the group cited as FIRST exhibiting the true coelom.

D. Flatworms are acoelomate: solid-bodied with no body cavity.

Question 134 Biology

Which invertebrate has exceptionally large and complex brain with highly developed capabilities to learn and remember?

- B. Cattle fish
- C. Octopus ✓ **Correct answer**
- D. Giant squid

A. Snails have a simple nervous system with limited learning; they are not noted for a large, complex brain.

B. The cuttlefish ("cattle fish" as printed) is also an intelligent cephalopod, but the textbook superlative for brain size, complexity and learning among invertebrates is the octopus.

C. Octopuses have the largest and most complex invertebrate brains, with demonstrated learning, problem-solving and memory; correct.

D. Giant squid are large cephalopods, but their cognitive abilities are far less studied and the textbook answer for the exceptionally developed brain is the octopus, not the squid.

Question 135 Biology

Arthropods constitute 54% of kingdom Animalia. What is the reason for their success?

- A. Diversity and articulation of exoskeleton ✓ **Correct answer**
- B. Existence of haemocoel
- C. Well-developed reproductive system
- D. Bilateral symmetry

A. The jointed, diverse exoskeleton gives protection, muscle attachment and appendages that can specialise for walking, feeding, sensing and flight; the textbook names it as the primary reason for arthropod success; correct on that account.

B. A haemocoel (open blood cavity) is a real arthropod feature, but it is a shared trait, not the feature the textbook credits with their dominance.

C. Arthropod reproduction is varied and effective, but it is a contributing factor, not the

primary reason.

D. Bilateral symmetry is shared by almost all animal phyla, so it cannot explain why arthropods in particular dominate. NOTE: "the reason" for an evolutionary success is a textbook causal claim; several factors contribute, and the answer rests on the textbook's ranking of them.

Question 136 Biology

Which of the following virus is having double stranded RNA in its core?

- A. Small pox
- B. Mild rash virus
- C. Diarrhea virus ✓ **Correct answer**
- D. Rubella virus

A. Smallpox (variola) is a double-stranded DNA virus, not a dsRNA virus.

B. The mild-rash viruses named in textbooks here (e.g. measles/rubella-type) are single-stranded RNA viruses, not dsRNA.

C. The diarrhoea virus meant is rotavirus, the common cause of severe diarrhoea, whose genome is segmented double-stranded RNA; correct. Defect: the option does not name rotavirus; it must be identified from "diarrhea virus".

D. Rubella is a single-stranded RNA virus, not dsRNA.

Question 137 Biology

Pore size of porcelain filter ranges between:

- A. 10 – 100 nm
- B. 100 – 1000 nm ✓ **Correct answer**
- C. 10 – 10 µm
- D. 100 – 1000 µm

or a porcelain (Berkefeld) filter. pores this small belong to ultrafilters/virus filters, not to the bacterial porcelain filter.

B. Porcelain filters retain bacteria (cells several hundred nanometres to micrometres across) with pores in the hundreds-of-nanometres range; correct on the standard quoted range.

C. As printed this range is garbled (both ends read "10"), and a micrometre-scale pore would let bacteria straight through.

D. A thousand times too coarse: pores of 100+ micrometres would pass bacteria, cells and much else. NOTE: the answer rests on the standard quoted pore-size range for porcelain filters; different filter grades vary, and the range is a reference value, not a derivation.

Question 138 Biology

Reverse transcriptase converts:

- A. ds RNA to ss RNA
- B. ss RNA to ds RNA
- C. ss RNA to ds DNA ✓ **Correct answer**
- D. ss DNA to ds DNA

A. No reverse-transcription step converts double-stranded RNA to single-stranded RNA; that is not the enzyme's reaction.

B. RNA-dependent RNA synthesis (replication) makes RNA from RNA; reverse transcriptase makes DNA.

C. Reverse transcriptase copies a single-stranded RNA template into DNA, first as a single strand and then as double-stranded DNA — the hallmark of retroviral replication; correct.

D. Making double-stranded DNA from single-stranded DNA is ordinary DNA polymerase work, not reverse transcription.

139 Biology

Which symptoms disappear after few months in an asymptomatic carrier of HIV?

- A. Loss of memory
- B. Swollen lymph gland ✓ **Correct answer**
- C. Weight loss
- D. Night sweats

A. Memory loss is a late, AIDS-stage neurological feature, not an early symptom that appears and then disappears in an asymptomatic carrier.

B. Generalised lymphadenopathy (swollen lymph glands) is a common early feature of HIV infection that commonly subsides after a few months even though the infection persists into the asymptomatic phase; correct on the textbook clinical picture.

C. Significant weight loss belongs to later, symptomatic disease, not to the early phase that resolves into asymptomatic carriage.

D. Night sweats are a later systemic symptom, not the early feature that disappears as the carrier becomes asymptomatic. NOTE: the answer rests on the textbook's clinical staging of HIV; individual courses vary, and lymphadenopathy can also persist (persistent generalised lymphadenopathy) in some people.

Question 140 Biology

The primary purpose of photosystem-II in thylakoid membrane is:

- A. Synthesis of ATP
- B. Oxidation of water ✓ **Correct answer**
- C. Reduction of $NADP^+$ to NADPH
- D. Oxidation of cytochrome

A. ATP is made by ATP synthase using the proton gradient; photosystem II builds that gradient but its own primary job is not ATP synthesis.

em II uses light energy to split water ($2H_2O \rightarrow O_2 + 4H^+ + 4e^-$), supplying the electrons for the whole chain; this water oxidation is its unique, primary role; correct.

C. $NADP^+$ is reduced at the END of the chain, by photosystem I (via ferredoxin–$NADP^+$ reductase), not by photosystem II.

D. The cytochrome b_6f complex is oxidised/reduced as part of the chain between the photosystems; oxidising it is not photosystem II's primary purpose.

Question 141 Biology

In glycolysis glucose is:

- A. Oxidized into pyruvic acid ✓ **Correct answer**
- B. Reduced into pyruvate
- C. Broken down to G3P
- D. Reduced to NADPH

A. Glycolysis oxidises glucose (losing hydrogen/electrons to NAD^+) to two molecules of pyruvate (pyruvic acid); correct.

B. The direction is wrong: glucose is OXIDISED, while NAD^+ is reduced to NADH; pyruvate is the oxidised product.

C. Glyceraldehyde-3-phosphate (G3P) is an INTERMEDIATE halfway through glycolysis, not its end product.

D. Glycolysis produces NADH, not NADPH (NADPH comes mainly from the pentose-phosphate pathway), and glucose is not "reduced to" a coenzyme.

Question 142 — Excluded (defective)

In uniform circular motion, average velocity is equal to same as:

- A. Linear velocity
- B. Average velocity

- D. Instantaneous velocity

No answer is given for this question, and none is taught. excluded by assistant under owner's 8 Nov delegation (see push note). No answer is taught: the two second reproductions key different letters and neither is correct; the average velocity over a full revolution (zero) is not among the options.

A. Linear velocity is the velocity along a straight line; in circular motion the velocity is tangential and keeps changing direction, so "linear velocity" does not name the average velocity.

B. This only restates the word in the stem; it names no quantity the average velocity is equal to.

C. The mdcatguide key, but WRONG as physics: velocity in uniform circular motion is NOT uniform — its direction changes at every instant, which is why there is a centripetal acceleration; only the speed is uniform.

D. The Tabeer key, but also wrong: the average velocity over any finite interval is not the instantaneous velocity (over one full revolution the average velocity is zero, since the displacement is zero — and zero is not among the options). DEFECTIVE: the two second reproductions key different letters (mdcatguide C, Tabeer B), neither of which is correct, and the average velocity over a full revolution (zero) is not offered. No letter is asserted; the question is excluded and must never be taught as having an answer.

Question 143 — Excluded (defective)

Rectifier converts:

- A. Alternating voltage into Direct voltage
- B. Direct voltage into Alternating voltage
- C. Alternating current into Direct current
- D. Direct current into Alternating current

s given for this question, and none is taught. excluded by assistant under owner's 8 Nov delegation (see push note). No answer is taught: options A and C both correctly describe what a rectifier does, so there is no unique answer.

A. A rectifier does convert alternating voltage into direct voltage; the mdcatguide key.

B. That is the job of an inverter, the reverse of a rectifier.

C. A rectifier ALSO does this: alternating current in, direct current out — the same conversion described in current terms rather than voltage terms, so this is equally correct.

D. Again the inverter's job, not the rectifier's. DEFECTIVE: options A and C both correctly describe what a rectifier does (voltage and current are two ways of stating the same AC-to-DC conversion), so there is no unique answer; the two second reproductions split on the key (mdcatguide A, Tabeer B). No letter is asserted; the question is excluded and must never be taught as having an answer.

Question 144 Physics

Resistivity of copper is:

- A. 1.54×10^{-8} Ω·m ✓ **Correct answer**
- B. 1.34×10^{-8} Ω·m
- C. 1.45×10^{-8} Ω·m
- D. 1.64×10^{-8} Ω·m

A. The resistivity of copper as given in the FSc Physics textbook (Punjab Textbook Board) is 1.54×10^{-8} Ω·m; correct.

B. Below the textbook value; no standard table gives this for copper.

C. Between the textbook value and the next option, but not the value the textbook quotes.

D. Above the textbook value; closer to the resistivity of some copper alloys, not pure copper. NOTE: recovered 8 Nov 2026 from the mdcatguide complete paper (Q11) and the

oduction (Q129); both keys say A. Absent from the mdcatpapers.com transcription — see push note.

Question 145 Physics

Angle between a and r is:

- A. 90° ✓ **Correct answer**
- B. 80°
- C. 45°
- D. 60°

A. With a = r × α (tangential acceleration), a is perpendicular to the radius vector r, so the angle between them is 90°; correct on the intended reading.

B. No feature of circular motion gives an 80° angle between acceleration and radius.

C. The angle for maximum projectile range, not the angle between a and r here.

D. No feature of circular motion gives a 60° angle here. NOTE: recovered 8 Nov 2026 from the mdcatguide complete paper (Q26) and the Tabeer reproduction (Q130); both keys say A. The mdcatguide key's explanation calls a the centripetal acceleration, which would point inward (180° from r) — that wording is sloppy; the letter A is right on the a = r × α (tangential acceleration) reading, which is what the Tabeer stem states. Absent from the mdcatpapers.com transcription — see push note.

Question 146 — Excluded (defective)

Which of the following will show optical isomerism?

- A. 2,2-Dihydroxy propanoic acid
- B. 2-Hydroxy butanedioic acid
- C. Butanoic acid
- D. 2-Hydroxy propanoic acid

s given for this question, and none is taught. excluded by assistant under owner's 8 Nov delegation (see push note). No answer is taught: options B and D are BOTH optically active (both have a chiral centre), so there is no unique answer; both second reproductions key D.

A. Its central carbon carries two identical –OH groups, so it is not a chiral centre; no optical isomerism.

B. Malic acid: its C-2 carries H, OH, COOH and CH_2COOH — four different groups — so it IS a chiral centre and the acid shows optical isomerism (L- and D-malic acid); correct, and therefore a second correct option.

C. No chiral centre ($CH_3CH_2CH_2COOH$); no optical isomerism.

D. Lactic acid: its C-2 carries H, OH, CH_3 and COOH — four different groups — so it shows optical isomerism; the key in both second reproductions. DEFECTIVE: options B and D are both correct (malic acid and lactic acid are both chiral), so the question has no unique answer. No letter is asserted; the question is excluded and must never be taught as having an answer.

Question 147 English

Identify the sentence with correct punctuations:

- A. Ali received a Parker pen, Hamza: a watch.
- B. Ali received a Parker pen; Hamza a watch.
- C. Ali received a Parker pen; Hamza: a watch.
- D. Ali received a Parker pen; Hamza, a watch. ✓ **Correct answer**

A. A comma splice (two clauses joined by a comma) plus a colon that introduces nothing; wrong on both counts.

B. The semicolon is right, but the second clause "Hamza a watch" has no verb and no comma marking the omitted verb ("received"); as printed it is incomplete.

colon is right, but a colon after "Hamza" does not mark an omitted verb; a colon introduces a list or explanation, not an elliptical clause.

D. The semicolon separates the two clauses, and the comma marks the omitted verb ("received") in the second, elliptical clause; correct. NOTE: recovered 8 Nov 2026 from the mdcatguide complete paper (Q81) and the Tabeer reproduction (Q15). The mdcatguide key says C and the Tabeer key says D; the standard punctuation rule (comma marks the ellipsis after a semicolon) favours D. Absent from the mdcatpapers.com transcription — see push note.

Question 148 English

Choose the sentence with correct punctuations.

- A. "go then," Said the ant, "And dance winter away."
- B. "Go then" Said the Ant, and "dance winter away."
- C. "Go then," said the ant, "and dance winter away." ✓ **Correct answer**
- D. "go then". Said the Ant, "and dance Winter away."

A. Wrong twice: the sentence must open with a capital G, and "And" must not be capitalised in the middle of the quoted sentence.

B. Wrong: the comma after "then" is missing, "Said" must not be capitalised mid-sentence, and "and" must stay inside the quotation.

C. Correct dialogue punctuation: comma before the closing quote, lowercase "said" as the reporting verb, lowercase continuation inside the quotes.

D. Wrong: lowercase opening, a full stop breaking the sentence, and "Winter" capitalised for no reason. NOTE: recovered 8 Nov 2026 from the mdcatguide complete paper (Q91) and the Tabeer reproduction (same item, unnumbered in the extraction); mdcatguide key C. Absent from the mdcatpapers.com transcription — see push note.

149 English

According to scientists, the sun is _____ and we can find the early discoveries made by scientists in black and white on _____. Choose correctly spelt homophones:

- A. Stationery, Stationary
- B. Stationary, Stationery ✓ **Correct answer**
- C. Stationary, Stationory
- D. Stationory, Stationary

A. Backwards: the sun is not "stationery" (writing materials), and discoveries are not recorded on "stationary" (not moving).

B. Correct: the sun is stationary (appears not to move), and early discoveries are found in black and white on stationery (printed paper / writing materials).

C. "Stationory" is not a word at all.

D. "Stationory" is not a word, and the order is backwards in any case. NOTE: recovered 8 Nov 2026 from the mdcatguide complete paper (Q93) and the Tabeer reproduction (Q2); mdcatguide key B. The Tabeer key prints A, which is wrong ("the sun is stationery" is false). Absent from the mdcatpapers.com transcription — see push note.

Question 150 Biology

Identify the exact function of ATP hydrolysis during muscle contraction:

- A. Formation of cross bridges
- B. Breaking of cross bridges ✓ **Correct answer**
- C. Displacement of tropomyosin
- D. Release of Ca^{2+} ions from sarcoplasmic reticulum

A. Cross bridges FORM when the myosin head binds actin (after the power stroke cycle resets); ATP hydrolysis does not form them.

B. ATP hydrolysis by myosin-ATPase detaches (breaks) the cross bridge between myosin

:ting the cycle continue, correct.

C. Tropomyosin is displaced when Ca^{2+} binds troponin, exposing the actin binding sites; that is calcium's job, not ATP hydrolysis.

D. Ca^{2+} release is triggered by the action potential arriving at the muscle fibre, not by ATP hydrolysis. NOTE: recovered 8 Nov 2026 from the mdcatguide complete paper (Q122) and the Tabeer reproduction (Q63); both keys give the same answer (breaking of cross bridges) under different option orders. Absent from the mdcatpapers.com transcription — see push note.

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