MDCAT (UHS entry test) — 2014 · Solved Past Paper

Body: University of Health Sciences, Lahore (UHS) · **Post:** MDCAT (UHS entry test) · **Year:** 2014 · **Questions:** 220 in the original paper — **215 solved and verified**, 5 excluded as defective (Q25, Q40, Q49, Q161, Q172) · **Price:** Free

> **How to use this paper:** each question shows the stem, the four options, and the correct answer. Click “Why each option?” under a question to see all four options explained — one question teaches four topics. General Knowledge answers are as of the 2014 sitting.

Source note: mdcatguide.com compilation 'UHS MDCAT 2014' (29 pages, scanned, no text layer), Paper Code D (Green), 220 MCQs, 150 minutes, 1100 marks (5 per correct, -1 per wrong), held Sunday 31 August 2014. Sections in the paper's order: Physics 44, Chemistry 58, English 30, Biology 88. The official UHS answer key is NOT in this compilation (last pages are mdcatguide ads/book pages, PDF pp. 23-29). Verification: official UHS key as reproduced in the ARK book 'MDCAT Past Papers 2008-2016' (mcats-2008-2016.pdf, 180 pp), key table for Entrance Test 2014, Paper Code D, 220 rows, layout-parsed with the ID row skipped (verified against the raw key table); textbook fact and worked derivations for every answer; no Learnospot/PLS quiz exists for 2014. 5 answers correct the official key (Q48, Q50, Q170, Q195, Q196); 5 questions DEFECTIVE-excluded (Q25 no correct option, Q40 correct atomic number 91 not among the options, Q49 no option fully correct, Q161 two correct options, Q172 two correct options). All 220 stems and options visually verified against the rendered pages of the source scan. Decisions by the assistant under the owner's 8 Nov 2026 delegation.

Question 1 Physics

The formula for electric field strength is 'E = F/Q', where E is electric field strength and F

Q is charge. Which one of the following options gives the correct base units for electric field strength?

- A. $kgms^{-3}A^{-1}$ ✓ **Correct answer**
- B. $kgs^{-2}A^{-3}$
- C. $kg^2m^{-2}s^{-3}A$
- D. $ms^{-1}A^{-3}$

A. $E = F/Q = (kg \cdot m \cdot s^{-2})/(A \cdot s) = kg \cdot m \cdot s^{-3} \cdot A^{-1}$.

B. The units of E are $kg \cdot m \cdot s^{-3} \cdot A^{-1}$, not $kg \cdot s^{-2} \cdot A^{-3}$.

C. The units of E are $kg \cdot m \cdot s^{-3} \cdot A^{-1}$, not $kg^2 \cdot m^{-2} \cdot s^{-3} \cdot A$.

D. The units of E are $kg \cdot m \cdot s^{-3} \cdot A^{-1}$, not $m \cdot s^{-1} \cdot A^{-3}$.

Question 2 Physics

Which set of the prefixes gives values in increasing order?

- A. Pico, Mega, Kilo, Tera
- B. Pico, Micro, Mega, Giga ✓ **Correct answer**
- C. Tera, Pico, Micro, Kilo
- D. Giga, Kilo, Milli, Nano

A. Pico (10^{-12}) < Kilo (10^3) < Mega (10^6) < Tera (10^{12}); the given order is not increasing.

B. Pico (10^{-12}) < Micro (10^{-6}) < Mega (10^6) < Giga (10^9): increasing order.

C. Tera is the largest, so this order is not increasing.

D. Giga is the largest, so this order is not increasing.

Question 3 Physics

Two forces, 5 N and 10 N are acting at 'O' and 'P' respectively on a uniform meter rod suspended at the position of centre of gravity 50 cm mark as shown in the figure. What

on of P on meter rod?

- A. 80 cm
- B. 75 cm ✓ **Correct answer**
- C. 70 cm
- D. 65 cm

A. For balance about the 50 cm pivot, 5 N × 50 cm = 10 N × R, so R = 25 cm and P is at 50 + 25 = 75 cm, not 80 cm.

B. The 5 N force at O (0 cm) is 50 cm from the pivot, so its moment is 5 × 50 = 250 N·cm; the 10 N force at P must have the same moment, so P is 250/10 = 25 cm from the pivot, i.e. at 50 + 25 = 75 cm.

C. P is at 75 cm, not 70 cm.

D. P is at 75 cm, not 65 cm.

Question 4 Physics

An oil film floating on water surface exhibits colour pattern due to the phenomenon of:

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

A. The colours of an oil film are due to interference, not diffraction.

B. The colours of an oil film are due to interference, not polarization.

C. Light reflected from the top and bottom surfaces of the thin oil film interferes, producing the colour pattern.

D. Surface tension keeps the film floating, but the colours are due to interference.

5 Physics

Which of the following is the best graphical representation between drag force 'F' on a spherical object of radius 'r' and its speed 'v' through a fluid of viscosity 'η'?

- A. Graph: F vs v, straight line through the origin ✓ **Correct answer**
- B. Graph: F vs v, decaying curve from a high value
- C. Graph: F vs v, horizontal straight line
- D. Graph: F vs v, vertical straight line

A. By Stokes' law $F = 6\pi\eta rv$, so F is directly proportional to v: a straight line through the origin.

B. F increases with v, it does not decay.

C. F is not constant; it increases with v.

D. F is not independent of v; it increases linearly with v.

Question 6 Physics

What is the speed of an incompressible non-viscous liquid flowing out from 'B' contained in a container as shown in the figure? Where AB = 5 m and g = 10 m/s^2.

- A. 5 m/s
- B. 10 m/s ✓ **Correct answer**
- C. 2 m/s
- D. 50 m/s

A. By Torricelli's theorem $v = \sqrt{(2gh)} = \sqrt{(2 \times 10 \times 5)} = 10$ m/s, not 5 m/s.

B. $v = \sqrt{(2gh)} = \sqrt{(2 \times 10 \times 5)} = \sqrt{100} = 10$ m/s. (The diagram labels the depth "5 cm", but the stem gives AB = 5 m and the options confirm 5 m.)

C. $v = \sqrt{(2gh)} = 10$ m/s, not 2 m/s.

D. $v = \sqrt{(2gh)} = 10$ m/s, not 50 m/s.

7 Physics

For the horizontal pipe, the fluid inside it is flowing horizontally then Bernoulli's equation can be written as

- A. $P + \rho v^2$ = constant
- B. $2P + \rho v^2$ = constant ✓ **Correct answer**
- C. $P + 2\rho v^2$ = constant
- D. $2P + 2\rho v^2$ = constant

A. Bernoulli's equation is $P + \frac{1}{2}\rho v^2$ = constant; multiplying by 2 gives $2P + \rho v^2$ = constant, not $P + \rho v^2$ = constant.

B. $P + \frac{1}{2}\rho v^2$ = constant, multiplied through by 2, is $2P + \rho v^2$ = constant.

C. Bernoulli's equation is $P + \frac{1}{2}\rho v^2$ = constant, not $P + 2\rho v^2$ = constant.

D. Bernoulli's equation, multiplied by 2, is $2P + \rho v^2$ = constant, not $2P + 2\rho v^2$ = constant.

Question 8 Physics

The value of the least distance of distinct vision or near point is _____ for a normal human eye.

- A. 20 cm
- B. 25 cm ✓ **Correct answer**
- C. 10 cm
- D. 15 cm

A. The least distance of distinct vision for a normal human eye is 25 cm, not 20 cm.

B. The near point (least distance of distinct vision) of a normal human eye is 25 cm.

C. The least distance of distinct vision is 25 cm, not 10 cm.

D. The least distance of distinct vision is 25 cm, not 15 cm.

9 Physics

In a compound microscope, the magnification by objective = 20, magnification by eyepiece = 11, then the total magnification is

- A. M = -220
- B. M = -0.19
- C. M = -0.05
- D. M = 220 ✓ **Correct answer**

A. The total magnification is the product 20 × 11 = 220; the official key gives 220 (the negative sign is the inverted-image convention, but the magnifications are given as positive values).

B. 20 × 11 = 220, not −0.19.

C. 20 × 11 = 220, not −0.05.

D. The total magnification of a compound microscope is M = M_o × M_e = 20 × 11 = 220.

Question 10 Physics

The distance between atoms is 0.30 nm. What will be the wavelength of X-rays at angle θ = 30° for 1st order diffraction?

- A. λ = 0.60 nm
- B. λ = 0.30 nm ✓ **Correct answer**
- C. λ = 0.20 nm
- D. λ = 0.90 nm

A. By Bragg's law nλ = 2d sinθ: λ = 2 × 0.30 × sin30° = 0.30 nm, not 0.60 nm.

B. nλ = 2d sinθ with n = 1, d = 0.30 nm, θ = 30°: λ = 2 × 0.30 × 0.5 = 0.30 nm.

C. λ = 0.30 nm, not 0.20 nm.

D. λ = 0.30 nm, not 0.90 nm.

11 Physics

A 100 kg man is standing in an elevator, which accidently falls freely. What will be the weight of the person in the freely falling elevator (take g=10 m/s^2)

- A. 1000 N
- B. 10 N
- C. 500 N
- D. Zero ✓ **Correct answer**

A. In a freely falling elevator the person is weightless; the weight is zero, not 1000 N.

B. In a freely falling elevator the weight is zero, not 10 N.

C. In a freely falling elevator the weight is zero, not 500 N.

D. In free fall the elevator and the person fall together with acceleration g, so the normal reaction (apparent weight) is zero — weightlessness.

Question 12 Physics

Frequency of simple pendulum of length 9.8 m will be

- A. 2 π Hertz
- B. π/2 Hertz
- C. 1/2π Hertz ✓ **Correct answer**
- D. π/4 Hertz

A. $f = (1/2\pi)\sqrt{(g/l)} = (1/2\pi)\sqrt{(10/9.8)} \approx 1/2\pi$ Hz, not 2π Hz.

B. $f \approx 1/2\pi$ Hz, not π/2 Hz.

C. $f = (1/2\pi)\sqrt{(g/l)} = (1/2\pi)\sqrt{(10/9.8)} \approx (1/2\pi) \times 1.01 \approx 1/2\pi$ Hz.

D. $f \approx 1/2\pi$ Hz, not π/4 Hz.

13 Physics

A body performs simple harmonic motion with a period of 0.063 s. The maximum speed of 3.0 ms^{-1}. What are the values of the amplitude 'x_0 (m)' and angular frequency 'ω ($rads^{-1}$)'?

- A. $x_0 = 0.03$, ω = 100 ✓ **Correct answer**
- B. $x_0 = 0.19$, ω = 16
- C. $x_0 = 5.3$, ω = 16
- D. $x_0 = 3.3$, ω = 100

A. ω = 2π/T = 2π/0.063 ≈ 100 rad/s; v_max = x_0ω, so x_0 = 3.0/100 = 0.03 m.

B. ω ≈ 100 rad/s and x_0 = 0.03 m, not 16 and 0.19.

C. ω ≈ 100 rad/s and x_0 = 0.03 m, not 16 and 5.3.

D. ω ≈ 100 rad/s but x_0 = 0.03 m, not 3.3 m.

Question 14 Physics

Food being cooked in microwave oven is an example of

- A. Beats
- B. Overtones
- C. Resonance ✓ **Correct answer**
- D. Stationary waves

A. Microwave cooking is resonance, not beats.

B. Microwave cooking is resonance, not overtones.

C. The microwaves resonate with the water molecules in the food, making them vibrate and heat up.

D. Microwave cooking is resonance, not stationary waves.

15 Physics

Potential energy of a mass spring system with respect to displacement during simple harmonic motion (SHM) is shown in the figure. Which of the following represents the total energy of mass spring system during SHM?

- A. Graph: U-shaped parabola (minimum at 0, maximum at $\pm x_0$)
- B. Graph: inverted U (maximum at 0, zero at $\pm x_0$)
- C. Graph: peaked curve (maximum at 0, zero at $\pm x_0$)
- D. Graph: horizontal straight line ✓ **Correct answer**

A. The U-shaped parabola is the potential energy, not the total energy.

B. The inverted U is the kinetic energy, not the total energy.

C. The peaked curve is the kinetic energy, not the total energy.

D. The total energy of a mass-spring system in SHM is constant ($E = \frac{1}{2}kx_0^2$), so it is a horizontal straight line.

Question 16 Physics

Three graphs for three types of materials are shown in the figure. Which row describes the correct materials?

- A. X: Brittle, Y: Ductile, Z: Polymer
- B. X: Brittle, Y: Polymer, Z: Ductile
- C. X: Polymer, Y: Brittle, Z: Ductile
- D. X: Ductile, Y: Brittle, Z: Polymer ✓ **Correct answer**

A. Graph X (rises to a peak then falls) is a ductile material, not brittle; graph Y (straight line to fracture) is brittle, not ductile.

B. Graph X is ductile, not brittle; graph Y is brittle, not a polymer.

C. Graph X is ductile, not a polymer; graph Z (S-shaped hysteresis loop) is a polymer, not

D. Graph X rises to a maximum then falls (ductile: yield then necking); graph Y is a straight line ending abruptly at fracture (brittle); graph Z is an S-shaped loop with hysteresis (polymer/elastomer).

Question 17 Physics

A gas containing 'N' number of molecules of a gas having mass of each molecule 'm' is in a cubic container having length of each side 'a'. What is the density of gas contained in cube?

- A. N/a^2
- B. m/a^3
- C. Nm/a^3 ✓ **Correct answer**
- D. Na^3/m

A. Density is total mass divided by volume (Nm/a^3), not N/a^2.

B. Density is the total mass Nm divided by the volume a^3, not the mass of one molecule.

C. Total mass = Nm and volume = a^3, so density = Nm/a^3.

D. Density is Nm/a^3, not Na^3/m.

Question 18 Physics

In 'General Gas Equation PV=nRT', 'n' represents the number of moles of gas. Which of the following represents the relation of 'n'?

- A. n = NN_A
- B. n = N/N_A ✓ **Correct answer**
- C. n = N_A/N
- D. n = N + N_A

A. The number of moles is the number of molecules divided by Avogadro's number, not

B. n = N/N_A, where N is the number of molecules and N_A is Avogadro's number.

C. n = N/N_A, not N_A/N.

D. n = N/N_A, not N + N_A.

Question 19 Physics

Which feature of the following graph represents Young's Modulus?

- A. Area under graph
- B. Gradient of the graph
- C. Reciprocal of the gradient ✓ **Correct answer**
- D. Product of gradient and area of the curve.

A. The area under a stress-strain graph is the strain energy, not Young's modulus.

B. The graph plots strain (vertical) against stress (horizontal), so its gradient is strain/stress = 1/Y, not Y.

C. Young's modulus Y = stress/strain, and the graph's gradient is strain/stress, so Y is the reciprocal of the gradient.

D. Young's modulus is the reciprocal of the gradient, not the product of gradient and area.

Question 20 Physics

At triple point of water, the pressure of gas is 2680 Pa, by changing 'T' the pressure increases to 4870 Pa. Then 'T' is:

- A. 496.38 K ✓ **Correct answer**
- B. 438.96 K
- C. Zero
- D. 496.38 °F

stant-volume gas thermometer, T = 273.16 × (P/P_triple) = 273.16 × 4870/2680 = 496.38 K.

B. T = 273.16 × 4870/2680 = 496.38 K, not 438.96 K.

C. The temperature is 496.38 K, not zero.

D. The temperature is 496.38 K (kelvin), not 496.38 °F.

Question 21 Physics

The relation between Celsius and Fahrenheit scales is: C/100 = (F − 32)/180. At what temperature both scales give the same reading?

- A. -100°
- B. -40° ✓ **Correct answer**
- C. -180°
- D. -273°

A. Setting C = F = x: x/100 = (x − 32)/180 gives x = −40, not −100.

B. With C = F = x, x/100 = (x − 32)/180 → 180x = 100x − 3200 → 80x = −3200 → x = −40°.

C. The two scales agree at −40°, not −180°.

D. −273° is absolute zero, not the temperature at which the two scales agree.

Question 22 Physics

A heat engine working according to second law of thermodynamics has 50% efficiency. What will be the temperature of its low temperature reservoir if high temperature reservoir is 327 °C?

- A. 27 °C ✓ **Correct answer**
- B. 127 °C
- C. 300 °C

A. $\eta = 1 - T_2/T_1$; $T_1 = 327 + 273 = 600$ K, so $0.5 = 1 - T_2/600 \rightarrow T_2 = 300$ K = 27 °C.

B. $T_2 = 300$ K = 27 °C, not 127 °C.

C. $T_2 = 300$ K = 27 °C, not 300 °C.

D. $T_2 = 300$ K = 27 °C, not 600 °C.

Question 23 Physics

Three NAND gates are connected as shown in the figure. Which of the following logic gate is formed in the connected circuit?

- A. OR ✓ **Correct answer**
- B. AND
- C. NOR
- D. NAND

A. The first two NAND gates (inputs tied) act as NOT gates, giving $\bar{A}$ and $\bar{B}$; the third NAND gives $X = \text{NOT}(\bar{A}\cdot\bar{B}) = A + B$, which is the OR gate (De Morgan's theorem).

B. The circuit forms an OR gate, not an AND gate.

C. The circuit forms an OR gate, not a NOR gate.

D. The circuit is built from NAND gates but forms an OR gate.

Question 24 Physics

What is the output of the truth table? Output x = AB + A$\dot{B}$ (A with a bar over B in the second term)

- A. X: 0, 0, 1, 1 ✓ **Correct answer**
- B. X: 1, 1, 1, 0
- C. X: 1, 0, 0, 1

A. x = AB + AḂ = A(B + Ḃ) = A, so the output is 0, 0, 1, 1 for (A, B) = (0,0), (0,1), (1,0), (1,1). (The overbars in the printed expression are faint in the scan; the expression is read as AB + AḂ, which simplifies to A, and the official key gives A.)

B. That is the NAND output, not x = A.

C. That is the XNOR output, not x = A.

D. That is the OR output, not x = A.

Question 25 Physics

What is the reading of Ammeter as shown in the circuit diagram?

- A. 1 A
- B. 15 A
- C. 5 A
- D. 10 A

No answer is given for this question, and none is taught. DEFECTIVE — excluded as DEFECTIVE, 15 Nov 2026 (decided by assistant under owner's 8 Nov 2026 delegation). The circuit has two 6 V cells in series aiding (total EMF 12 V) and a 3 Ω resistor, so the current is I = 12/3 = 4 A — but 4 A is not among the options (1 A, 15 A, 5 A, 10 A). The official key's C (5 A) would need 15 V across the 3 Ω resistor, which the printed circuit does not give. This question must never be taught as having an answer.

A. The current is 12/3 = 4 A, not 1 A.

B. The current is 12/3 = 4 A, not 15 A.

C. The current is 12/3 = 4 A, not 5 A; the official key gives C, which is wrong.

D. The current is 12/3 = 4 A, not 10 A.

26 Physics

Three 6 Ω are connected as shown in the diagram. What is the resistance between points 'A' and 'B'?

- A. 6 Ω
- B. 16 Ω
- C. 4 Ω
- D. 2 Ω ✓ **Correct answer**

A. The bypass wires put all three resistors in parallel, so the resistance is 6/3 = 2 Ω, not 6 Ω.

B. The resistance is 2 Ω, not 16 Ω.

C. The resistance is 2 Ω, not 4 Ω.

D. The top wire shorts the junction between the first and second resistors to B, and the bottom wire shorts A to the junction between the second and third resistors, so all three 6 Ω resistors are in parallel between A and B: R = 6/3 = 2 Ω.

Question 27 Physics

The difference between the plates of a parallel plate capacitor is 2.0 mm and area of each plate is 2.0 m^2. The plates are in a vacuum. A potential difference of 1.0 x 10^4 V is applied across the plates. Find the capacitance.

- A. 4 x 10^{-3} F
- B. 3.54 x 10^{-9} F
- C. 8.85 x 10^{-9} F ✓ **Correct answer**
- D. 9.0 x 10^{-9} F

A. $C = \varepsilon_0 A/d = 8.85\times10^{-12} \times 2.0/(2\times10^{-3}) = 8.85\times10^{-9}$ F, not 4×10^{-3} F.

B. $C = 8.85\times10^{-9}$ F, not 3.54×10^{-9} F.

$= (8.85\times10^{-12} \times 2.0)/(2.0\times10^{-2}) = 8.85\times10^{-9}$ F (the applied potential difference does not affect the capacitance).

D. C = 8.85×10^{-9} F, not 9.0×10^{-9} F.

Question 28 Physics

A solenoid 15 cm long has 300 turns of wire. A current of 5 A flows through it. What is the magnitude of magnetic field inside the solenoid?

- A. 75 x 10^{7} T
- B. 60 x 10^{+3} T
- C. 4π x 10^{-3} T ✓ **Correct answer**
- D. 750π x 10^{+3} T

A. B = $\mu_0(N/l)I = 4\pi\times10^{-7} \times (300/0.15) \times 5 = 4\pi\times10^{-3}$ T, not 75×10^{7} T.

B. B = $4\pi\times10^{-3}$ T, not 60×10^{3} T.

C. B = $\mu_0 nI = (4\pi\times10^{-7})(300/0.15)(5) = 4\pi\times10^{-7} \times 2000 \times 5 = 4\pi\times10^{-3}$ T.

D. B = $4\pi\times10^{-3}$ T, not $750\pi\times10^{3}$ T.

Question 29 Physics

Due to current in a straight conductor the difference between magnetic field lines

- A. Increases away from conductor ✓ **Correct answer**
- B. Decreases away from conductor
- C. Increases towards conductor
- D. Decreases and then increases towards conductor

A. The magnetic field weakens with distance from a straight conductor, so the field lines (circles) spread further apart — the spacing between them increases away from the conductor.

ng between the field lines increases away from the conductor, not decreases.

C. The spacing increases away from the conductor, not towards it.

D. The spacing increases steadily away from the conductor.

Question 30 Physics

Magnetic Resonance Imaging (MRI) is used to identify the image of

- A. Tumors and inflamed tissues ✓ **Correct answer**
- B. Blood cells
- C. Skin cells
- D. Bone structures

A. MRI is used to image soft tissues, especially tumours and inflamed tissues.

B. MRI is not used to image individual blood cells.

C. MRI is not used to image individual skin cells.

D. X-rays (not MRI) are the standard way to image bone structures.

Question 31 Physics

Stimulated emission of two photons 'A' and 'B' during LASER action is shown in figure:

What is the relation of wavelengths of two photons?

- A. $\lambda_A = \lambda_B$ ✓ **Correct answer**
- B. $\lambda_A > \lambda_B$
- C. $\lambda_A < \lambda_B$
- D. $\lambda_A = 2\lambda_B$

A. In stimulated emission, the emitted photon (B) is identical to the incident photon (A) — same wavelength, same phase, same direction.

B. The two photons have the same wavelength.

photons have the same wavelength.

D. The two photons have the same wavelength.

Question 32 Physics

Bones absorb greater amount of incident X-rays than flesh. This is because of the fact that

- A. Bones lie between the flesh
- B. Bones are light in color
- C. Bones contain material of low densities
- D. Bones contain material of high densities ✓ **Correct answer**

A. Bones absorb more X-rays because they are denser, not because they lie between the flesh.

B. The colour of bones is irrelevant to X-ray absorption.

C. Bones contain material of high density, not low density.

D. Bones (calcium compounds) are denser and have a higher atomic number than flesh, so they absorb more X-rays.

Question 33 Physics

Which of the following techniques is the practical application of X-rays?

- A. Magnetic Resonance Imaging
- B. Ultrasonography
- C. Computerized Axial Topography ✓ **Correct answer**
- D. Positron Emission Tomography

A. MRI uses magnetic fields and radio waves, not X-rays.

B. Ultrasonography uses ultrasound, not X-rays.

canning is the practical application of X-rays (cross-sectional images from X-ray absorption).

D. PET uses positrons (annihilation gamma rays), not X-rays.

Question 34 Physics

Which one of the following spectra is most typical of the output of an X-ray tube?

- A. Graph: Intensity vs Wavelength, rising curve levelling off
- B. Graph: Intensity vs Wavelength, single broad peak
- C. Graph: Intensity vs Wavelength, continuous curve with two sharp peaks ✓ **Correct answer**
- D. Graph: Intensity vs Wavelength, several peaks of varying height

A. The X-ray tube output is a continuous spectrum with sharp characteristic peaks, not a levelling-off curve.

B. The X-ray spectrum has a continuous background plus sharp peaks, not a single broad peak.

C. An X-ray tube gives a continuous (bremsstrahlung) spectrum with two sharp characteristic peaks (Kα and Kβ).

D. The X-ray spectrum has two sharp characteristic peaks on a continuous background, not several peaks.

Question 35 Physics

Which one of the following has the largest energy content?

- A. γ-rays ✓ **Correct answer**
- B. X-rays
- C. Infra-red radiations
- D. Ultra-violet radiations

ays have the highest frequency (and therefore the largest photon energy E = hf) of the four.

B. X-rays have less energy than γ-rays.

C. Infra-red radiations have much less energy than γ-rays.

D. Ultra-violet radiations have less energy than γ-rays.

Question 36 Physics

What will be the energy of accelerated electron used to produce X-rays when the accelerating potential is 2 kV?

- A. 2×10^{-19} J
- B. 1.6×10^{-19} J
- C. 3.2×10^{19} J
- D. 3.2×10^{-16} J ✓ **Correct answer**

A. $E = eV = 1.6\times10^{-19} \times 2000 = 3.2\times10^{-16}$ J, not 2×10^{-19} J.

B. That is the energy for 1 V, not 2000 V.

C. $E = 3.2\times10^{-16}$ J, not 3.2×10^{19} J.

D. $E = eV = (1.6\times10^{-19}\ C)(2000\ V) = 3.2\times10^{-16}$ J.

Question 37 Physics

Process of generating three dimensional images of objects by using laser beam is called

- A. Photography
- B. 3-D cinema
- C. Holography ✓ **Correct answer**
- D. Tomography

A. Photography records two-dimensional images, not three-dimensional images by laser

B. 3-D cinema is a display technique, not the laser process for generating three-dimensional images.

C. Holography uses a laser beam to record and reconstruct three-dimensional images.

D. Tomography builds cross-sectional images (e.g. CT), not three-dimensional images by laser beam.

Question 38 Physics

Which one of the following isotopes of Iodine is used for the treatment of thyroid cancer?

- A. I - 113
- B. I - 120
- C. I - 131 ✓ **Correct answer**
- D. I - 140

A. Iodine-131 (not I-113) is used for thyroid cancer treatment.

B. Iodine-131 (not I-120) is used for thyroid cancer treatment.

C. Iodine-131 is the radioisotope used for the treatment of thyroid cancer.

D. Iodine-131 (not I-140) is used for thyroid cancer treatment.

Question 39 Physics

A beta (β) particle is a fast-moving electron. During a β− decay how the atomic number and mass number of a nucleus change?

- A. Atomic Number: Remains the same, Mass Number: Increases by one
- B. Atomic Number: Increases by one, Mass Number: Decreases by two
- C. Atomic Number: Increases by one, Mass Number: Remains the same ✓ **Correct**

- D. Atomic Number: Decreases by two, Mass Number: Decreases by four

A. In β− decay a neutron changes into a proton, so the atomic number increases by one and the mass number stays the same.

B. The mass number remains the same in β− decay.

C. In β− decay ($n \rightarrow p + e^-$), the atomic number increases by one and the mass number is unchanged.

D. That is α decay, not β− decay.

Question 40 Physics

A Uranium isotope $^{232}_{92}U$ undergoes one α−decay and one $^{0}_{-1}\beta$−decay. What is the final product?

- A. 90
- B. 92
- C. 89
- D. 88

No answer is given for this question, and none is taught. DEFECTIVE — excluded as DEFECTIVE, 15 Nov 2026 (decided by assistant under owner's 8 Nov 2026 delegation). The options are the atomic number (Z) of the final product. One α-decay takes Z from 92 to 90 ($^{228}_{90}Th$); one β− decay then takes Z from 90 to 91 ($^{228}_{91}Pa$). The correct atomic number is 91, which is not among the options (90, 92, 89, 88). The official key's B (92) is wrong. This question must never be taught as having an answer.

A. 90 is the atomic number after the α-decay alone, before the β− decay.

B. 92 is the original atomic number; the official key gives B, which is wrong (the net change is Z − 1 = 91).

be the result of an α-decay followed by a β^+ decay, not the β− decay printed.

D. 88 is not the atomic number of the final product.

Question 41 Physics

A naturally occurring radioactive element decays two alpha particles. Which one of the following represents status of daughter element with respect to mass number 'A' and charge number 'Z'?

- A. 'Z' decreases by 4 and 'A' decreases by 2
- B. 'Z' decreases by 2 and 'A' decreases by 4
- C. 'Z' decreases by 4 and 'A' decreases by 8 ✓ **Correct answer**
- D. 'Z' decreases by 8 and 'A' decreases by 4

A. Two α decays decrease A by 8 (not 2) and Z by 4.

B. That is the change for ONE α decay, not two.

C. Each α decay decreases Z by 2 and A by 4, so two α decays decrease Z by 4 and A by 8.

D. Two α decays decrease Z by 4 and A by 8, not the other way round.

Question 42 Physics

A radioactive isotope 'W' decays to 'X' which decays to 'Y' and 'Y' decays to 'Z' as represented by the figure below: [W → X by β− decay, X → Y by α decay, Y → Z by α decay] What is the change in the atomic number from 'W' to 'Z'?

- A. Increases by 3
- B. Decreases by 3 ✓ **Correct answer**
- C. Increases by 5
- D. Decreases by 5

A. The net change is a decrease of 3, not an increase.

increases Z by 1, and each α decay decreases Z by 2, so the net change is +1 − 2 − 2 = −3 (a decrease of 3).

C. The net change is a decrease of 3, not an increase of 5.

D. The net change is a decrease of 3, not 5.

Question 43 Physics

Three paths of radioactive radiations are observed as shown in the figure in the presence of electric field. Which type of radiation is shown in path 1?

- A. Alpha
- B. Beta
- C. Gamma ✓ **Correct answer**
- D. Cathode rays

A. Alpha particles are positively charged and bend toward the negative plate (path 2), not the straight path 1.

B. Beta particles are negatively charged and bend toward the positive plate (path 3), not the straight path 1.

C. Gamma rays are uncharged, so they are not deflected by the electric field and travel straight (path 1).

D. Cathode rays are electrons (negatively charged) and would bend toward the positive plate, not travel straight.

Question 44 Physics

What is the absorbed dose 'D' of a sample of 2 kg which is given an amount of 100 J of radioactive energy?

- A. 200 Gy
- B. 102 Gy

Gy ✓ Correct answer

- D. 98 Gy

A. D = E/m = 100/2 = 50 Gy, not 200 Gy.

B. D = 100/2 = 50 Gy, not 102 Gy.

C. Absorbed dose D = energy absorbed/mass = 100 J/2 kg = 50 Gy.

D. D = 100/2 = 50 Gy, not 98 Gy.

Question 45 Chemistry

A polymer of empirical formula CH_2 has molar mass of 28000 g mol^{-1}. Its molecular formula will be

- A. 100 times that of its empirical formula
- B. 200 times that of its empirical formula
- C. 500 times that of its empirical formula
- D. 2000 times that of its empirical formula ✓ **Correct answer**

A. n = 28000/14 = 2000, not 100.

B. n = 28000/14 = 2000, not 200.

C. n = 28000/14 = 2000, not 500.

D. The empirical formula mass of CH_2 is 14 g/mol, so n = 28000/14 = 2000; the molecular formula is $(CH_2)_{2000}$.

Question 46 Chemistry

The number of molecules in 9 g of ice (H_2O) is

- A. 6.02×10^{24}
- B. 6.02×10^{23}
- C. 3.01×10^{24}

| $\times 10^{24}$ ✓ Correct answer

A. 9 g of water is 0.5 mol, which is 3.01×10^{23} molecules, not 6.02×10^{24}.

B. 9 g is 0.5 mol, not 1 mol.

C. 0.5 mol is 3.01×10^{23} molecules, not 3.01×10^{24}.

D. Moles = 9/18 = 0.5 mol; molecules = $0.5 \times 6.02\times10^{23} = 3.01\times10^{23}$.

Question 47 Chemistry

Ice is less dense than water at:

- A. 0 °C ✓ **Correct answer**
- B. 4 °C
- C. -4 °C
- D. 2 °C

A. At 0 °C ice floats on water (ice is less dense than water at its melting point).

B. At 4 °C water is at its maximum density (liquid), and ice does not exist at 4 °C.

C. Ice is less dense than water at 0 °C (its melting point), not −4 °C.

D. Ice is less dense than water at 0 °C, not 2 °C.

Question 48 Chemistry

At a given temperature and pressure, the one which shows marked deviation from ideal behavior is

- A. N_2
- B. NH_3 ✓ **Correct answer**
- C. CO_2
- D. He

shows only slight deviation from ideal behaviour.

B. Ammonia (printed "N_3", the H lost in the scan) shows the greatest deviation: it is polar, forms hydrogen bonds and is easily liquefied (largest van der Waals 'a' constant, 4.17 $L^2 \cdot atm/mol^2$, of the four).

C. Carbon dioxide deviates from ideal behaviour, but less than ammonia (van der Waals 'a' = 3.59); the official key gives C, which is wrong.

D. Helium shows the least deviation from ideal behaviour.

Question 49 Chemistry

According to the number of protons, neutrons and electrons given in the table, which one of the following options is correct? [Table: As — Proton 33, Neutron 42, Electron 30; Ga — Proton 31, Neutron 39, Electron 28; Ca — Proton 20, Neutron 20, Electron 20]

- A. As^{-3}, Ga^{+3}, Ca
- B. As^{+1}, Ga^{+2}, Ca
- C. As^{+3}, Ga^{+3}, Ca^{+2}
- D. As^{+1}, Ga, Ca^{+2}

No answer is given for this question, and none is taught. DEFECTIVE — excluded as DEFECTIVE, 15 Nov 2026 (decided by assistant under owner's 8 Nov 2026 delegation). From the table, As has 33 protons and 30 electrons (charge +3 → As^{3+}), Ga has 31 protons and 28 electrons (charge +3 → Ga^{3+}), and Ca has 20 protons and 20 electrons (neutral → Ca). No option is fully correct: A gets As wrong (As^{-3} instead of As^{+3}) and C gets Ca wrong (Ca^{+2} instead of neutral Ca). The official key gives C, which contradicts the table (Ca has 20 electrons, so it is neutral, not Ca^{2+}). This question must never be taught as having an answer.

A. As is As^{3+} (33 − 30 = +3), not As^{-3}.

B. As is +3 and Ga is +3, not +1 and +2.

Ca^{2+} are right, but Ca has 20 protons and 20 electrons, so it is neutral Ca, not Ca^{2+}; the official key gives C, which is wrong.

D. As is +3, Ga is +3 and Ca is neutral.

Question 50 Chemistry

If the e/m value of electron is 1.7588×10^{11} coulombs Kg^{-1}, then what would be the mass of electron in grams (charge on electron is 1.6022×10^{-19} coulombs)?

- A. 9.1095×10^{-31} g
- B. 91.095×10^{-31} g
- C. 9.1095×10^{-28} g ✓ **Correct answer**
- D. 0.919095×10^{-33} g

A. $m = e/(e/m) = 1.6022\times10^{-19}/1.7588\times10^{11} = 9.1095\times10^{-31}$ kg, which is 9.1095×10^{-28} g; the official key gives A, which is the mass in kilograms, not grams.

B. The mass is 9.1095×10^{-28} g, not 91.095×10^{-31} g.

C. $m = 1.6022\times10^{-19}/1.7588\times10^{11} = 9.1095\times10^{-31}$ kg $= 9.1095\times10^{-28}$ g.

D. The mass is 9.1095×10^{-28} g, not 0.919095×10^{-33} g.

Question 51 Chemistry

The suitable representation of dot structure of chlorine molecule is:

- A. Dot structure: two Cl atoms, each with 7 dots, no clear shared pair between them
- B. Dot structure: two Cl atoms joined by a shared pair (:) between them, three lone pairs on each Cl ✓ **Correct answer**
- C. Dot structure: two Cl atoms joined by a double bond (||)
- D. Dot structure: two Cl atoms joined by a shared pair (:), two dots on each Cl

A. The chlorine molecule must show one shared pair between the two Cl atoms.

n Cl shares one pair of electrons (the single bond) and carries three lone pairs, giving each Cl an octet.

C. Chlorine forms a single bond, not a double bond.

D. Each Cl must have three lone pairs (six dots) plus the shared pair; two dots per Cl leaves each Cl short of an octet.

Question 52 Chemistry

When the two partially filled atomic orbitals overlap in such a way that the probability of finding electron is maximum around the line joining the two nuclei, the result is the formation of

- A. Sigma Bond ✓ **Correct answer**
- B. Pi-Bond
- C. Hydrogen Bond
- D. Metallic Bond

A. Head-on overlap of orbitals gives maximum electron density along the line joining the two nuclei — a sigma (σ) bond.

B. A pi bond forms by sideways overlap, with maximum electron density above and below the internuclear line, not along it.

C. A hydrogen bond is an intermolecular attraction, not formed by orbital overlap.

D. A metallic bond is the attraction between metal ions and delocalised electrons, not formed by orbital overlap.

Question 53 Chemistry

$2H_2 + O_2 \longrightarrow 2H_2O$, $\Delta H = +285.5$ kJ mol^{-1}. What will be the enthalpy change in the above reaction?

- A. 285.5 kJ/mol

- C. -285.5 kJ/mol ✓ **Correct answer**
- D. 1 kJ/mol

A. The formation of water is exothermic, so the enthalpy change is negative.

B. The enthalpy change is not zero.

C. The formation of water is exothermic ($\Delta H = -285.5$ kJ/mol per mole of H_2O); the paper misprints the magnitude as 205.5 (for 285.5) and the sign in the stem as + (for −), and the official key gives the negative value C.

D. The enthalpy change is −285.5 kJ/mol (per mole of water), not 1 kJ/mol.

Note: Filed option A read "205.5 kJ/mol" (misprint in the source reproduction); corrected to "285.5 kJ/mol" as documented in the reviewed file. Filed option C read "-205.5 kJ/mol" (misprint in the source reproduction); corrected to "-285.5 kJ/mol" as documented in the reviewed file.

Question 54 Chemistry

Combustion of graphite to form CO_2 can be done by two ways. Reactions are given as follows: $C + O_2 \longrightarrow CO_2$, ΔH = -393.7 kJ mol^{-1}; $C + \frac{1}{2}O_2 \longrightarrow CO$, ΔH = ?; $CO + \frac{1}{2}O_2 \longrightarrow CO_2$, ΔH = -283 kJ mol^{-1}. What will be enthalpy of formation of CO?

- A. -676 kJ mol^{-1}
- B. -110 kJ mol^{-1} ✓ **Correct answer**
- C. 110 kJ mol^{-1}
- D. 676 kJ mol^{-1}

A. By Hess's law, ΔH(CO formation) = −393.7 − (−283) = −110.7 kJ/mol, not −676 kJ/mol.

B. $\Delta H_1 = \Delta H_2 + \Delta H_3$, so $\Delta H_2 = -393.7 - (-283) = -110.7 \approx -110$ kJ/mol. (The third reaction prints "$CO + \frac{1}{2}O_2 \longrightarrow CO$" — a misprint for CO_2.)

lpy of formation of CO is negative (−110 kJ/mol), not positive.

D. ΔH = −110 kJ/mol, not +676 kJ/mol.

Question 55 Chemistry

The value of equilibrium constant (Kc) for the reaction $2HF(s) \rightleftharpoons H_2(g) + F_2(g)$ is 10^{-13} at 2000 °C. Calculate the value of Kp for this reaction:

- A. 2×10^{-13}
- B. 10^{-13} ✓ **Correct answer**
- C. 186×10^{-13}
- D. 3.48×10^{-9}

A. Kp = Kc(RT)^Δn with Δn = 0, so Kp = Kc = 10^{-13}, not 2×10^{-13}.

B. The reaction prints "2HF(s)" but HF is a gas at 2000 °C (the "(s)" is evidently a misprint for "(g)"); with HF as a gas, Δn = 2 − 2 = 0, so Kp = Kc$(RT)^0$ = Kc = 10^{-13}.

C. That would be Kc$(RT)^1$; Δn = 0, not 1.

D. That would be Kc$(RT)^2$ (treating HF as a solid); HF is a gas at 2000 °C, so Δn = 0.

Question 56 Chemistry

The vapor pressure lines for pure as well as solutions of different concentrations are shown. Which line represents pure water?

- A. (i) ✓ **Correct answer**
- B. (ii)
- C. (iii)
- D. (iv)

A. Pure water has the highest vapour pressure at any temperature (a dissolved solute lowers the vapour pressure), so it is the topmost curve (i), which also boils at the lowest temperature.

s a solution (lower vapour pressure than pure water).

C. Curve (iii) is a more concentrated solution.

D. Curve (iv) is the most concentrated solution (lowest vapour pressure, highest boiling point).

Question 57 Chemistry

In SO_4^{-2} the oxidation number of Sulphur is

- A. -8
- B. +8
- C. -6
- D. +6 ✓ **Correct answer**

A. In SO_4^{2-}, $x + 4(-2) = -2$, so $x = +6$, not -8.

B. The oxidation number of sulphur in SO_4^{2-} is +6, not +8.

C. The oxidation number is +6, not -6.

D. $x + 4(-2) = -2 \rightarrow x = +6$.

Question 58 Chemistry

Coinage metals Cu, Ag, and Au are the least reactive because they have:

- A. Negative reduction potential
- B. Positive reduction potential ✓ **Correct answer**
- C. Negative oxidation potential
- D. Positive oxidation potential

A. Coinage metals have positive reduction potentials (they are easily reduced, hard to oxidise), which is why they are unreactive.

B. Cu, Ag and Au have positive standard reduction potentials, so they are not easily

are the least reactive metals.

C. Coinage metals have positive reduction potentials (negative oxidation potentials would make them reactive).

D. Coinage metals have positive reduction potentials, not positive oxidation potentials.

Question 59 Chemistry

What will be the pH of a solution of NaOH with a concentration of 10^{-3} M?

- A. 3
- B. 14
- C. 11 ✓ **Correct answer**
- D. 7

A. $[OH^-] = 10^{-3}$ M gives pOH = 3, so pH = 14 − 3 = 11, not 3.

B. pH = 11, not 14.

C. pOH = $-\log(10^{-3})$ = 3, so pH = 14 − 3 = 11.

D. A 10^{-3} M NaOH solution is basic (pH 11), not neutral.

Question 60 Chemistry

If the reactant or product of a chemical reaction can absorb ultraviolet, visible or infrared radiation, then the rate of a chemical reaction can best be measured by which one of the following methods?

- A. Chemical method
- B. Spectrometry ✓ **Correct answer**
- C. Graphical method
- D. Differential method

A. The chemical method (titration) is used when the species cannot be followed

cally.

B. If a reactant or product absorbs UV, visible or IR radiation, its concentration can be followed by spectrometry (absorbance), which is the best method.

C. The graphical method is a way of analysing rate data, not a method of following the reaction.

D. The differential method is a way of determining the rate law, not a method of following the reaction.

Question 61 Chemistry

For the reaction $2NO + O_2 \rightleftharpoons 2NO_2$, the rate equation for the forward reaction is

- A. Rate = k $[NO]$ $[O_2]$
- B. Rate = k $[NO]^2[O_2]$ ✓ **Correct answer**
- C. Rate = k $[NO_2]^2$
- D. Rate = k $[NO_2]$

A. The forward rate is proportional to $[NO]^2[O_2]$ (two NO molecules and one O_2 in the elementary step).

B. By the law of mass action, the forward rate = $k[NO]^2[O_2]$.

C. That is the rate of the reverse reaction, not the forward reaction.

D. That is not the forward rate law.

Question 62 Chemistry

Radon is _____ emitter and being radioactive is used in _____ treatment in radiotherapy:

- A. β, cancer
- B. α, cancer ✓ **Correct answer**

- D. β, kidney stone

A. Radon is an α-emitter, not a β-emitter.

B. Radon is an α-emitter and is used in cancer treatment (radiotherapy).

C. Radon is used in cancer treatment, not kidney-stone treatment.

D. Radon is an α-emitter used in cancer treatment.

Question 63 Chemistry

One mole of glucose was dissolved in 1 kg of water, ethanol, ether and benzene separately and the molal boiling point constant of each individual solution was found to be 0.52, 1.75, 2.16 and 2.70 in the units of / °C kg mol^{-1} respectively. Which of the following figures shows benzene as solvent in solution? [Figures I–IV show a vapour-pressure apparatus with Solvent Vapour, Solution and Hg; figure I has the highest Hg level, figure IV the lowest]

- A. I ✓ **Correct answer**
- B. II
- C. III
- D. IV

A. Benzene has the largest molal boiling point constant (2.70 °C kg mol^{-1}), so its 1 molal glucose solution shows the greatest vapour-pressure lowering and the lowest vapour pressure; the vapour pushes the Hg column down the least, so the Hg level is highest — figure I.

B. Figure II (lower Hg level) is a solvent with a smaller Kb.

C. Figure III (still lower Hg level) is a solvent with a smaller Kb.

D. Figure IV (lowest Hg level, highest vapour pressure) is water (Kb = 0.52, the smallest).

64 Chemistry

The trends, in melting points of the elements of 3rd period, are depicted in figure below. [Graph: Melting Point vs Atomic Number: Na, Mg, Al, Si (peak), P, S, Cl, Ar] The sharp decrease observed from 'Si' to 'P' is due to

- A. Decrease in atomic radius from 'Si' to 'P'
- B. Change in bonding and structure of two elements ✓ **Correct answer**
- C. Different universities of two elements
- D. Increase in electron density from 'Si' to 'P'

A. The sharp drop is due to the change in bonding, not the small decrease in atomic radius.

B. Silicon is a giant covalent network solid (strong covalent bonds, very high melting point), while phosphorus is a molecular solid (P_4 molecules held by weak van der Waals forces), so the melting point drops sharply.

C. The option is garbled as printed (evidently a misprint); the sharp drop is due to the change in bonding and structure.

D. The sharp drop is due to the change in bonding and structure, not electron density.

Question 65 Chemistry

Arrange the following elements according to the trend of ionization energies. (C, N, Ne, B)

- A. Ne < N < C < B
- B. B < N < C < Na
- C. B < C < N < Ne ✓ **Correct answer**
- D. Ne < B < C < N

A. The ionization energies increase B < C < N < Ne, not Ne < N < C < B.

B. Nitrogen (1402 kJ/mol) has a higher ionization energy than carbon (1086 kJ/mol), so B <

C. The ionization energies increase B (801) < C (1086) < N (1402) < Ne (2081 kJ/mol); the option prints "Na" (evidently a misprint for "Ne" — sodium is not in the given list).

D. Neon has the highest ionization energy (2081 kJ/mol), not the lowest.

Note: Filed option C read "B < C < N < Na" (misprint in the source reproduction); corrected to "B < C < N < Ne" as documented in the reviewed file.

Question 66 Chemistry

Which one of the following noble gases is used for providing an inert atmosphere for welding?

- A. Helium ✓ **Correct answer**
- B. Neon
- C. Argon
- D. Krypton

A. Helium is used as an inert shielding gas in welding (e.g. TIG welding of aluminium and magnesium).

B. Neon is used in discharge tubes and signs, not as a welding shielding gas.

C. Argon is also used as a welding shielding gas, but the official key gives helium.

D. Krypton is used in lamps, not as a welding shielding gas.

Question 67 Chemistry

Electronic configuration of Manganese (Mn) is

- A. Mn (Ar) [3d: ↑ ↑ ↑ ↑ ↑] [4s: ↑↓] ✓ **Correct answer**
- B. Mn (Ar) [3d: ↑↓ ↑↓ ↑↓ ↑↓ ↑↓] [4s: ↑]
- C. Mn (Ar) [3d: ↑↓ ↑↓ ↑ ↑ ↑] [4s: ↑↓]

(Ar) [3d: ↑↓ ↑↓ ↑↓ ↑ ↑] [4s: ↑]

A. Manganese (Z = 25) is [Ar] $3d^5$ $4s^2$: five unpaired electrons in the 3d orbitals and a filled 4s orbital.

B. That is $3d^{10}$ $4s^1$ (copper), not manganese.

C. That is $3d^7$ $4s^2$ (cobalt), not manganese.

D. That is $3d^8$ $4s^1$ (nickel), not manganese.

Question 68 Chemistry

The percentage of carbon in different types of iron products is in the order of

- A. Cast Iron > Wrought Iron > Steel
- B. Wrought Iron > Steel > Cast Iron
- C. Cast Iron > Steel > Wrought Iron ✓ **Correct answer**
- D. Cast Iron > Steel > Wrought Iron

A. Steel contains more carbon than wrought iron, so this order is wrong.

B. Cast iron contains the most carbon, not the least.

C. Cast iron has 2–4.5% carbon, steel 0.1–2% and wrought iron less than 0.1%, so the order is Cast Iron > Steel > Wrought Iron. (Option D is identical to C as printed; both give the correct order.)

D. This is identical to option C as printed and gives the same correct order; the official key gives C.

Question 69 Chemistry

Which one of the following is correct equation of 1st ionization of sulphuric acid?

- A. $H_2SO_4(aq) + H_2O(l) \longrightarrow 2H^+ + SO_4^{2-}$
- B. $H_2SO_4(aq) + H_2O(l) \longrightarrow H^+(aq) + HSO_4^-$ ✓ **Correct answer**

- D. $H_2SO_4(aq) + H_2O(l) \longrightarrow H_3O^+ + SO_4^{2-}$

A. That is the overall (two-step) ionization, not the 1st ionization (which gives HSO_4^-).

B. The 1st ionization of sulphuric acid gives H^+ (H_3O^+) and the hydrogen sulphate ion HSO_4^-.

C. That is the overall ionization, not the 1st ionization.

D. That gives the sulphate ion (the product of the 2nd ionization), not the 1st ionization.

Question 70 Chemistry

Which one of the following is the correct chemical reaction for Ammonia formation by Haber process?

- A. $N_2(g) + 3H_2(g) \longrightarrow 2NH_3(g)$
- B. $2N(g) + 3H_2(g) \rightleftharpoons NH_3(g)$
- C. $2N(g) + 3H_2(g) \longrightarrow 2NH_3(g)$
- D. $N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ ✓ **Correct answer**

A. The Haber process is a reversible reaction, so the equilibrium arrow (⇌) is required.

B. The reactants are N_2 molecules, not N atoms, and the equation is unbalanced.

C. The reactants are N_2 molecules, not N atoms, and the reaction is reversible.

D. The Haber process is the reversible reaction $N_2 + 3H_2 \rightleftharpoons 2NH_3$.

Question 71 Chemistry

The pH of acid rain is

- A. 7
- B. Between 5 and 7
- C. Below 5 ✓ **Correct answer**

ween 7 and 14

A. Acid rain is acidic (pH below 5), not neutral.

B. Normal rain has pH about 5.6; acid rain is defined by a pH below 5.

C. Acid rain has a pH below 5 (normal rain is about 5.6).

D. Acid rain is acidic, not basic.

Question 72 Chemistry

Which one of the following products is obtained when sulphur trioxide is absorbed in concentrated sulphuric acid?

- A. Oleum ✓ **Correct answer**
- B. Aqua Regia
- C. Hydrogen sulphide
- D. Sulphate ion

A. SO_3 absorbed in concentrated H_2SO_4 gives oleum (fuming sulphuric acid, $H_2S_2O_7$).

B. Aqua regia is a mixture of nitric and hydrochloric acids, not the product of SO_3 in H_2SO_4.

C. Hydrogen sulphide is not formed from SO_3 and H_2SO_4.

D. The product is oleum, not the sulphate ion.

Question 73 Chemistry

Which one of the following pair of compounds is cis and trans isomers of each other?

- A. Pair: cis-2-pentene (CH_3CH_2 and CH_3 on the same side) and trans-2-pentene (CH_3CH_2 and CH_3 on opposite sides) ✓ **Correct answer**
- B. Pair: cis-2-butene and cis-2-butene (same isomer drawn twice)
- C. Pair: cis-1-bromo-2-chloroethene and cis-1-bromo-2-chloroethene (same isomer drawn twice)

∴ 3-bromo-2-chloropent-2-ene and 2,3-dibromopent-2-ene (different compounds)

A. The two structures are the cis and trans isomers of 2-pentene (the ethyl and methyl groups on the same side in one, on opposite sides in the other).

B. Both structures are cis-2-butene (both methyl groups on the same side), so they are the same compound, not cis/trans isomers.

C. Both structures are cis-1-bromo-2-chloroethene (Br and Cl on the same side), so they are the same compound.

D. The two structures have different molecular formulas, so they are not isomers at all.

Question 74 Chemistry

Which one of the following compound is a ketone?

- A. CH_3 — O — CH_2 — CH_3
- B. CH_3 — CO — CH_2 — CH_3 ✓ **Correct answer**
- C. $CH_3COCOOH$
- D. CH_3 — CH_2CHO

A. That is diethyl ether (an ether), not a ketone.

B. Butan-2-one has the carbonyl group (C=O) between two carbon groups — a ketone.

C. Pyruvic acid is a keto-acid (carboxylic acid), not a ketone.

D. Propanal is an aldehyde, not a ketone.

Question 75 Chemistry

Addition of unsymmetrical reagent to an unsymmetrical alkene is governed by:

- A. Cannizzaro's Reaction
- B. Kirchhoff Rule

- D. Markownikov's Rule ✓ **Correct answer**

A. The Cannizzaro reaction is the disproportionation of aldehydes without α-hydrogen, not the addition to alkenes.

B. There is no Kirchhoff rule for addition to alkenes.

C. Aldol condensation is the reaction of carbonyl compounds, not the addition to alkenes.

D. The addition of an unsymmetrical reagent (e.g. HX) to an unsymmetrical alkene follows Markovnikov's rule (the H adds to the carbon with more hydrogens).

Question 76 Chemistry

Ethylene glycols are used as

- A. Anesthetic
- B. Knocking agent
- C. Freezing agent
- D. Anti-freezing agent ✓ **Correct answer**

A. Ethylene glycol is not used as an anesthetic.

B. Ethylene glycol is not a knocking agent.

C. Ethylene glycol lowers the freezing point of water (it is an anti-freezing agent, not a freezing agent).

D. Ethylene glycol is used as an antifreeze in car radiators (it lowers the freezing point of water).

Question 77 Chemistry

The halothane used in hospitals as an anesthetic is chemically

- A. 1-Bromo-1-chloro-2, 2, 2-trifluoroethane

- -romo-2-chloro-1, 1, 1-trifluoroethane ✓ **Correct answer**
- C. 1, 1, 1-Trifluoro-2-bromo-2-chloroethane
- D. 2-Chloro-2-bromo-1, 1, 1-trifluoromethane

A. That names the same molecule (CF_3—CHBrCl) but with non-standard numbering (the correct IUPAC numbering gives the CF_3 carbon as C1).

B. Halothane is CF_3—CHBrCl, correctly named 2-bromo-2-chloro-1,1,1-trifluoroethane.

C. That is the same name written in a different substituent order, but the official key gives B.

D. Halothane is an ethane (two carbons), not a methane.

Question 78 Chemistry

If halogenoalkanes are mixed with an excess of ethanoic ammonia and heated under pressure, amine are formed. Which amine is formed in the following reaction? $CH_2CH_3Br + NH_3 \longrightarrow$ Amine

- A. CH_3—CH_2—NH—CH_2—CH_3
- B. CH_3—CH_2—NH_2 ✓ **Correct answer**
- C. CH_3—CH_2—CH_2—NH_2
- D. H_2N—CH_2—CH_2—NH_2

A. With an excess of ammonia the primary amine (ethylamine) is formed, not the secondary amine diethylamine.

B. Bromoethane reacts with excess ammonia to give ethylamine ($CH_3CH_2NH_2$).

C. That is propylamine, which would come from bromopropane, not bromoethane.

D. That is ethane-1,2-diamine, not formed from bromoethane and ammonia.

79 Chemistry

Primary, secondary and tertiary alcohols can be identified and distinguished by

- A. Lucas test ✓ **Correct answer**
- B. Iodoform test
- C. Baeyer's test
- D. Silver mirror test

A. The Lucas test (conc. HCl + $ZnCl_2$) distinguishes 1°, 2° and 3° alcohols by how quickly turbidity appears (3° immediate, 2° in minutes, 1° only on heating).

B. The iodoform test identifies methyl ketones and $CH_3CH(OH)$— alcohols, not 1°/2°/3° alcohols.

C. Baeyer's test (alkaline $KMnO_4$) identifies unsaturation, not alcohol class.

D. The silver mirror (Tollen's) test identifies aldehydes, not alcohol class.

Question 80 Chemistry

Which one of the following alcohol is indicated by formation of yellow crystals in Iodoform test?

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

A. Methanol (CH_3OH) has no $CH_3CH(OH)$— group and gives a negative iodoform test.

B. Ethanol (CH_3CH_2OH) contains the $CH_3CH(OH)$— group and gives yellow crystals of iodoform (CHI_3).

C. 1-Butanol has no $CH_3CH(OH)$— group and gives a negative iodoform test.

D. 1-Propanol has no $CH_3CH(OH)$— group and gives a negative iodoform test.

81 Chemistry

Ethyl butyrate and butyl butanoate are esters with the flavor of

- A. Pear
- B. Banana
- C. Pineapple ✓ **Correct answer**
- D. Apple

A. Ethyl butyrate and butyl butanoate have a pineapple flavour, not pear.

B. Ethyl butyrate and butyl butanoate have a pineapple flavour, not banana.

C. Ethyl butyrate (and butyl butanoate) is the ester with a pineapple flavour.

D. Ethyl butyrate and butyl butanoate have a pineapple flavour, not apple.

Question 82 Chemistry

The formula of 2, 4, 6-tribromo phenol is

- A. Structure: benzene ring with Br at the top-left, top-right and bottom (no OH group)
- B. Structure: benzene ring with OH at the top and Br at the top-left, top-right and bottom ✓ **Correct answer**
- C. Structure: benzene ring with HO at the bottom-left and Br at the top, top-right and bottom-right
- D. Structure: benzene ring with OH at the top and Br at the top-left, top-right and bottom-right

A. That is 1,3,5-tribromobenzene (no hydroxyl group), not a phenol.

B. With OH at position 1, the bromine atoms are at the two ortho positions (2 and 6) and the para position (4) — 2,4,6-tribromophenol.

C. That is 2,3,4-tribromophenol, not 2,4,6-tribromophenol.

,6-tribromophenol, not 2,4,6-tribromophenol.

Question 83 Chemistry

Which one of the following groups is indicated when HCl is formed by reaction of ethanol with phosphorous pentachloride?

- A. Amino group
- B. Hydroxyl group ✓ **Correct answer**
- C. Halide group
- D. Hydride group

A. Ethanol has no amino group; the HCl is formed from the hydroxyl group.

B. Ethanol (CH_3CH_2OH) reacts with PCl_5: the —OH group is replaced by —Cl, and HCl is formed — the reaction indicates the hydroxyl group.

C. The halide is the product (ethyl chloride), not the group indicated by the HCl.

D. Ethanol has no hydride group.

Question 84 Chemistry

A student mixed ethyl alcohol with small amount of sodium dichromate and added it to the hot solution of dilute sulphuric acid. A vigorous reaction took place. He distilled the product formed immediately. What was the product?

- A. Acetone
- B. Acetic acid
- C. Dimethyl ether
- D. Acetaldehyde ✓ **Correct answer**

A. Acetone is not formed by oxidising ethanol.

B. Acetic acid would be formed only if the product were not distilled off (further oxidation); distilling immediately gives acetaldehyde.

ether is not formed by oxidising ethanol.

D. Ethanol is oxidised by acidified dichromate to acetaldehyde (ethanal); distilling it off immediately prevents further oxidation to acetic acid.

Question 85 Chemistry

The structural formula of the product of reaction of acetone with 2, 4-dinitrophenyl hydrazine is:

- A. Structure: CH_3—CH=N—NH—C_6H_4—NO_2 (para-nitro only)
- B. Structure: $(CH_3)_2$C=N—NH—C_6H_4—NO_2 (para-nitro only)
- C. Structure: CH_3—CH=N—NH—$C_6H_3(NO_2)_2$ (2,4-dinitro)
- D. Structure: $(CH_3)_2$C=N—NH—$C_6H_3(NO_2)_2$ (2,4-dinitro) ✓ **Correct answer**

A. That is the 4-nitrophenylhydrazone of acetaldehyde, not the 2,4-dinitrophenylhydrazone of acetone.

B. That is the 4-nitrophenylhydrazone of acetone (only one nitro group, para), not the 2,4-dinitrophenylhydrazone.

C. That is the 2,4-dinitrophenylhydrazone of acetaldehyde (CH_3CH=N—), not of acetone.

D. Acetone (CH_3COCH_3) condenses with 2,4-dinitrophenylhydrazine to give acetone 2,4-dinitrophenylhydrazone, $(CH_3)_2$C=N—NH—$C_6H_3(NO_2)_2$.

Question 86 Chemistry

For the reaction: ? + HCN —Base→ $(CH_3)(OH)C(C_2H_5)(CN)$. [Product: a cyanohydrin with CH_3, OH, C_2H_5 and CN on one carbon]

- A. $C_2H_5COCH_3$ ✓ **Correct answer**
- B. $C_2H_5CH(CH_3)OH$
- C. CH_3COCH_3
- D. $C_2H_5CH_2CHO$

ne ($CH_3COC_2H_5$) adds HCN across the carbonyl group to give the cyanohydrin $(CH_3)(OH)C(C_2H_5)(CN)$.

B. That is butan-2-ol (an alcohol), which does not add HCN to give a cyanohydrin.

C. Acetone would give the cyanohydrin $(CH_3)_2C(OH)(CN)$, not the product shown (which has an ethyl group).

D. Butanal would give the cyanohydrin $C_2H_5CH_2CH(OH)(CN)$, not the product shown.

Question 87 Chemistry

Acetamide is formed by dehydration of

- A. Oxalic acid
- B. Ethanoic acid ✓ **Correct answer**
- C. Butanoic acid
- D. Propanoic acid

A. Oxalic acid does not give acetamide.

B. Ethanoic (acetic) acid reacts with ammonia to give ammonium ethanoate, which on dehydration gives acetamide (CH_3CONH_2).

C. Butanoic acid would give butanamide, not acetamide.

D. Propanoic acid would give propanamide, not acetamide.

Question 88 Chemistry

Organic compounds 'X' and 'Y' both can react with Na-Metal to evolve hydrogen gas. If 'X' and 'Y' react with each other form an organic compound 'Z' which gives fruity smell. What type of compound 'X', 'Y' and 'Z' are?

- A. X: Alcohol, Y: Ester, Z: Acetic Acid
- B. X: Alcohol, Y: Ester, Z: Mineral Acid

- Alcohol, Y: Acetic Acid, Z: Ester ✓ **Correct answer**
- D. X: Alcohol, Y: Mineral Acid, Z: Ester

A. An ester does not react with sodium metal to evolve hydrogen, and an alcohol + ester does not give acetic acid.

B. An ester does not react with sodium metal, and the product is not a mineral acid.

C. Both an alcohol and a carboxylic acid (acetic acid) react with sodium to evolve hydrogen, and an alcohol + a carboxylic acid react to give an ester (fruity smell).

D. A mineral acid would react with an alcohol, but the acid here is an organic acid (acetic acid), not a mineral acid.

Question 89 Chemistry

The amino acids which are not prepared in human body are called

- A. Essential amino acids ✓ **Correct answer**
- B. Non-essential amino acids
- C. Alpha amino acids
- D. Beta amino acids

A. Essential amino acids cannot be synthesised by the human body and must be obtained from the diet.

B. Non-essential amino acids are synthesised in the human body.

C. Alpha amino acids are classified by the position of the amino group, not by whether the body makes them.

D. Beta amino acids are classified by the position of the amino group, not by whether the body makes them.

90 Chemistry

Indicate the cyclic amino acid from the following:

- A. Cysteine
- B. Serine
- C. Haloamine
- D. Proline ✓ **Correct answer**

A. Cysteine is an acyclic (sulphur-containing) amino acid.

B. Serine is an acyclic (hydroxy) amino acid.

C. Haloamine is not an amino acid.

D. Proline is the cyclic amino acid (its side chain forms a ring with the amino group — a secondary amine).

Question 91 Chemistry

Which one of the following is Glutamic Acid?

- A. Structure: $H_2N—CH(H)—COOH$ with side chain $CH_2CH_2CO_2H$ ✓ **Correct answer**
- B. Structure: $H_2N—CH(H)—COOH$ with side chain CH_2COOH
- C. Structure: $H_2N—CH(H)—COOH$ with side chain H
- D. Structure: $H_2N—CH(H)—COOH$ with side chain CH_3

A. Glutamic acid is $HOOC—CH_2—CH_2—CH(NH_2)—COOH$ (a 5-carbon amino acid with a second carboxyl group).

B. That is aspartic acid (one CH_2 fewer).

C. That is glycine.

D. That is alanine.

92 Chemistry

At low pH or in acidic condition amino acid exists as

- A. Anion
- B. Cation ✓ **Correct answer**
- C. Zwitter ion
- D. Neutral specie

A. At high pH (basic conditions) an amino acid exists as an anion.

B. At low pH the amino group is protonated (—NH_3^+) and the carboxyl group is unionised (—COOH), so the amino acid exists as a cation.

C. The zwitter ion exists at the isoelectric point (neutral pH), not at low pH.

D. At low pH the amino acid is a cation, not a neutral species.

Question 93 Chemistry

The structure shown below represents: [Structure: an imidazole ring attached via CH_2 to $CH(NH_2)$—COOH]

- A. Proline
- B. Histidine ✓ **Correct answer**
- C. Glycine
- D. Lysine

A. Proline has a cyclic (pyrrolidine) side chain, not an imidazole ring.

B. The structure shows an imidazole ring attached by a CH_2 group to the α-carbon — histidine.

C. Glycine has H as its side chain, not an imidazole ring.

D. Lysine has a $(CH_2)_4NH_2$ side chain, not an imidazole ring.

94 Chemistry

Which one of the following reagent is used for identification of amino acids?

- A. Fehling's solution
- B. Benedict's solution
- C. Ninhydrin ✓ **Correct answer**
- D. Copper (II) Sulphate

A. Fehling's solution identifies reducing sugars and aldehydes, not amino acids.

B. Benedict's solution identifies reducing sugars, not amino acids.

C. Ninhydrin reacts with amino acids to give a purple colour (Ruhemann's purple) and is used for their identification.

D. Copper(II) sulphate is not the reagent for identifying amino acids.

Question 95 Chemistry

Which one of the following is an example of condensation polymer?

- A. Polyvinylchloride
- B. Polystyrene
- C. Polyethene
- D. Polyamide ✓ **Correct answer**

A. Polyvinyl chloride is an addition polymer.

B. Polystyrene is an addition polymer.

C. Polyethene is an addition polymer.

D. Polyamide (nylon) is formed by condensation polymerisation (with loss of water).

96 Chemistry

Among the most common disaccharides, which one of the following is present in the milk?

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

A. Sucrose is table sugar (cane sugar), not milk sugar.

B. Maltose is malt sugar, not milk sugar.

C. Fructose is a monosaccharide (fruit sugar), not a disaccharide in milk.

D. Lactose is milk sugar, the disaccharide present in milk.

Question 97 Chemistry

Fats are a type of lipid called glycerides. They are esters of long chain carboxylic acids:

- A. Propene-1, 2, 3-triol
- B. Propane-1, 2, 3-triol ✓ **Correct answer**
- C. Propene-1, 2, 3-diol
- D. Propane-1, 2, 3-diol

A. Glycerol is propane-1,2,3-triol (a saturated triol), not propene-1,2,3-triol.

B. Fats (glycerides) are esters of long-chain fatty acids with glycerol (propane-1,2,3-triol).

C. Glycerol is a triol (three —OH groups), not a diol, and it is propane, not propene.

D. Glycerol is a triol (three —OH groups), not a diol.

98 Chemistry

Which one of the following base is NOT present in RNA?

- A. Cytosine
- B. Adenine
- C. Thymine ✓ **Correct answer**
- D. Guanine

A. Cytosine is present in RNA.

B. Adenine is present in RNA.

C. Thymine is present in DNA, not RNA (RNA has uracil in place of thymine).

D. Guanine is present in RNA.

Question 99 Chemistry

Collagen proteins are present in _____ throughout the body

- A. Muscle
- B. Red blood cells
- C. Tendons ✓ **Correct answer**
- D. Blood plasma

A. Collagen is the main structural protein of tendons (and skin, bone and cartilage), not muscle.

B. Collagen is not present in red blood cells.

C. Collagen is the main protein of tendons (and ligaments, skin and bone).

D. Collagen is not present in blood plasma.

100 Chemistry

_____ is an eye irritant.

- A. Peroxyacetyl nitrate ✓ **Correct answer**
- B. Peroxyacetyl nitrite
- C. Peroxymethoxy aniline
- D. Peroxyacetyl aniline

A. Peroxyacetyl nitrate (PAN), a photochemical smog component, is a strong eye irritant (lachrymator).

B. Peroxyacetyl nitrite is not the eye irritant of photochemical smog.

C. Peroxymethoxy aniline is not the eye irritant of photochemical smog.

D. Peroxyacetyl aniline is not the eye irritant of photochemical smog.

Question 101 Chemistry

Polystyrene is an addition polymer. Which one of the following structures represents the monomer of polystyrene?

- A. $CH_2=CH_2$
- B. $CH_2=CH—CH_3$
- C. $CH_2=CH—Cl$
- D. $CH_2=CH—C_6H_5$ ✓ **Correct answer**

A. Ethene is the monomer of polyethene, not polystyrene.

B. Propene is the monomer of polypropene, not polystyrene.

C. Vinyl chloride is the monomer of polyvinyl chloride, not polystyrene.

D. Styrene (phenylethene, $CH_2=CH—C_6H_5$) is the monomer of polystyrene.

102 Chemistry

Which one of the following pollutants can cause death of a person by binding with haemoglobin of red blood cells?

- A. Chlorofluorocarbons
- B. Oxides of Sulphur
- C. Carbon monoxide ✓ **Correct answer**
- D. Oxides of nitrogen

A. Chlorofluorocarbons damage the ozone layer; they do not bind to haemoglobin.

B. Sulphur oxides cause respiratory irritation, not death by binding to haemoglobin.

C. Carbon monoxide binds to haemoglobin (forming carboxyhaemoglobin, ~200 times more strongly than oxygen) and can cause death by asphyxiation.

D. Nitrogen oxides cause respiratory problems, not death by binding to haemoglobin.

Question 103 English

It is our national duty to _____ our vote in the general election.

- A. Throw
- B. Cast ✓ **Correct answer**
- C. Drop
- D. Refuse

A. One does not "throw" a vote; the idiom is "cast a vote".

B. "Cast our vote" is the correct idiom for voting in an election.

C. One does not "drop" a vote.

D. "Refuse our vote" is not the idiom.

104 English

She is intelligent enough to _____ things to serve her own purpose.

- A. Pick
- B. Maneuver ✓ **Correct answer**
- C. Give
- D. Take

A. "Pick things to serve her own purpose" is not the idiom.

B. "Maneuver things" (manipulate events) to serve her own purpose is the correct sense.

C. "Give things to serve her own purpose" is not the sense.

D. "Take things to serve her own purpose" is not the sense.

Question 105 English

She _____ about the excitement on hearing the news of her sister's wedding.

- A. Ran
- B. Jigged ✓ **Correct answer**
- C. Talked
- D. Wept

A. "Ran about the excitement" is not the idiom.

B. "Jigged" (danced/jumped with joy) on hearing the happy news is the correct word.

C. "Talked about the excitement" is possible, but the sentence describes her joyful reaction (dancing), and the official key gives "Jigged".

D. "Wept about the excitement" is not the idiom.

106 English

Everyone should be _____ duties and assignments according to his/her abilities.

- A. Prevented
- B. Advised
- C. Delegated ✓ **Correct answer**
- D. Suggested

A. "Prevented duties" makes no sense.

B. "Advised duties" is not the idiom.

C. Duties and assignments are delegated (assigned) to people according to their abilities.

D. "Suggested duties" is not the idiom.

Question 107 English

SPOT THE ERROR: We were ten miles up the highway when I happened to saw this classified advertisement in the newspaper. [The underlined segments are: A "We were", B "up the", C "to saw this", D "in the".]

- A. We were
- B. up the
- C. to saw this ✓ **Correct answer**
- D. in the

A. "We were ten miles up the highway" is correct.

B. "up the highway" is correct.

C. After "happened to" the bare infinitive is needed: "happened to see", not "happened to saw".

D. "in the newspaper" is correct.

108 English

SPOT THE ERROR: "All is well what ends well", said the father when he had finished the story. [The underlined segments are: A "is well what", B "said the", C "when he had", D "the story".]

- A. is well what ✓ **Correct answer**
- B. said the
- C. when he had
- D. the story

A. The proverb is "All's well that ends well" — "what" should be "that".

B. "said the father" is correct.

C. "when he had finished" is correct.

D. "the story" is correct.

Question 109 English

SPOT THE ERROR: Rubber tubes upon which children had swing in backyards hung suspended like stopped clock pendulums in the blazing air. [The underlined segments are: A "upon which", B "had swing in backyards", C "suspended like", D "in the".]

- A. upon which
- B. had swing in backyards ✓ **Correct answer**
- C. suspended like
- D. in the

A. "upon which" is correct.

B. After "had" the past participle is needed: "had swung", not "had swing".

C. "suspended like stopped clock pendulums" is correct.

D. "in the blazing air" is correct.

110 English

SPOT THE ERROR: The child was fully dressed and sitting in her father's lap near the kitchen table. [The underlined segments are: A "fully", B "sitting", C "in", D "kitchen table".]

- A. fully
- B. sitting
- C. in ✓ **Correct answer**
- D. kitchen table

A. "fully dressed" is correct.

B. "sitting" is correct.

C. One sits ON a lap, not IN a lap: "sitting on her father's lap".

D. "near the kitchen table" is correct.

Question 111 English

SPOT THE ERROR: The three Abdal Rahman, like his illustrious predecessor, was a young man of twenty-three when he took office. [The underlined segments are: A "The three", B "like his", C "was a", D "when he".]

- A. The three ✓ **Correct answer**
- B. like his
- C. was a
- D. when he

A. The ruler is Abdal Rahman III (the third), so "The three Abdal Rahman" should be "Abdal Rahman the Third".

B. "like his illustrious predecessor" is correct.

C. "was a young man" is correct (singular subject).

took office" is correct.

Question 112 English

SPOT THE ERROR: Enlarged and beautified by later Caliphs, Al-Zahra become the nucleus of a royal suburb whose remain partly evacuated in and after 1910, can still be seen. [The underlined segments are: A "by later", B "become the", C "whose remain", D "in and after".]

- A. by later
- B. become the
- C. whose remain ✓ **Correct answer**
- D. in and after

A. "by later Caliphs" is correct.

B. "become" (for "became") is also non-standard, but the official key gives C.

C. "whose remain" should be "whose remains" (the noun is "remains", plural).

D. "in and after 1910" is correct.

Question 113 English

Choose the CORRECT sentence:

- A. I thought it over very carefully before broaching the subject to Asma. ✓ **Correct answer**
- B. I thought it on very carefully before broaching the subject to Asma.
- C. I thought it by very carefully before broaching the subject to Asma.
- D. I thought it upon very carefully before broaching the subject to Asma.

A. "Think it over" is the correct idiom (to consider carefully).

B. "Think it on" is not the idiom.

y" is not the idiom.

D. "Think it upon" is not the idiom.

Question 114 English

Choose the CORRECT sentence:

- A. He left into a blaze of anger.
- B. He left with a blaze of anger.
- C. He left in a blaze of anger. ✓ **Correct answer**
- D. He left back in a blaze of anger.

A. The idiom is "in a blaze of anger", not "into a blaze of anger".

B. The idiom is "in a blaze of anger", not "with a blaze of anger".

C. "In a blaze of anger" is the correct idiom.

D. "Left back in a blaze of anger" is not the idiom.

Question 115 English

Choose the CORRECT sentence:

- A. Shahid battered Anwar down submission.
- B. Shahid battered Anwar into submission. ✓ **Correct answer**
- C. Shahid down battered Anwar into submission.
- D. Shahid was battered Anwar down submission.

A. The idiom is "batter into submission", not "batter down submission".

B. "Batter into submission" is the correct idiom.

C. "Down battered" is not correct word order.

D. "Was battered Anwar" is not grammatical.

116 English

Choose the CORRECT sentence:

- A. Pride was an intrinsic component of his personal makeup. ✓ **Correct answer**
- B. Pride was a intrinsic component of his personal makeup.
- C. Pride an intrinsic component of his personal makeup.
- D. Pride were an intrinsic component of his personal makeup.

A. Correct: "an intrinsic" (an before a vowel sound) and "was" (singular agreement with "Pride").

B. "a intrinsic" is wrong (it should be "an intrinsic").

C. The sentence has no verb.

D. "were" is wrong (the subject "Pride" is singular).

Question 117 English

Choose the CORRECT sentence:

- A. The government introduced tax laws which gave incentives to factory workers to reduce pollution. ✓ **Correct answer**
- B. The government introduced tax laws who gave incentives to factory workers to reduce pollution.
- C. The government introduced tax laws which have incentives to factory workers to reduce pollution.
- D. The government introduced tax laws which has incentives to factory workers to reduce pollution.

A. Correct: "which gave" (relative pronoun "which" for laws, past tense "gave").

B. "who" is for people, not laws.

C. "have incentives" is the wrong tense and sense.

s not agree with the plural "laws".

Question 118 English

Choose the CORRECT sentence:

- A. It was cold and foggy, and he dared not to going out.
- B. It was cold and foggy, and he dared not for going out.
- C. It was cold and foggy, and he dared not go out. ✓ **Correct answer**
- D. It was cold and foggy, and he dared not gone out.

A. "dared not to going" is wrong.

B. "dared not for going" is wrong.

C. Correct: "dare not" takes the bare infinitive ("go").

D. "dared not gone" is wrong.

Question 119 English

Choose the CORRECT sentence:

- A. There was much cheering and singing and a bread fighting across the dining hall.
- B. There was much cheering and singing and a bread fight across the dining hall. ✓ **Correct answer**
- C. There was more cheer and singing and a bread fighting across the dining hall.
- D. There was much cheer and singing and a bread fighting across the dining hall.

A. "a bread fighting" is wrong (the noun "fight" is needed after "a").

B. Correct: "a bread fight" (the noun).

C. "more cheer" is wrong and "a bread fighting" is wrong.

D. "a bread fighting" is wrong.

120 English

Choose the CORRECT sentence:

- A. Both parents of Jameel were then long died.
- B. Both parents of Jameel were then long dead.
- C. Both parents of Jameel were by then long dead. ✓ **Correct answer**
- D. Both parents of Jameel were by then long died.

A. "long died" is wrong (the adjective "dead" is needed).

B. "were then long dead" is also grammatically correct, but the official key gives C.

C. Correct: "by then long dead" (the official key gives C).

D. "long died" is wrong.

Question 121 English

Choose the CORRECT sentence:

- A. But the men ate their supper with good appetites. ✓ **Correct answer**
- B. But the men ate their supper in good appetites.
- C. But the men ate their supper for good appetites.
- D. But the men ate their supper into good appetites.

A. "With good appetite(s)" is the correct idiom.

B. "in good appetites" is not the idiom.

C. "for good appetites" is not the idiom.

D. "into good appetites" is not the idiom.

Question 122 English

Choose the CORRECT sentence:

boy was afraid of going to jail. ✓ **Correct answer**

- B. The boy was afraid off going to jail.
- C. The boy was afraid on going to jail.
- D. The boy was afraid by going to jail.

A. "Afraid of" is the correct idiom.

B. "afraid off" is not the idiom.

C. "afraid on" is not the idiom.

D. "afraid by" is not the idiom.

Question 123 English

DISDAIN

- A. Vice
- B. Dislike
- C. Contempt ✓ **Correct answer**
- D. Ignorance

A. "Vice" (a bad habit) is not the meaning of "disdain".

B. "Dislike" is too weak; "disdain" is contempt (the feeling that something is unworthy of respect).

C. "Disdain" means contempt (scorn for something considered unworthy).

D. "Ignorance" (lack of knowledge) is not the meaning of "disdain".

Question 124 English

SAGACITY

- A. Suspicious
- B. Cruelty

dom ✓ **Correct answer**

- D. Foolishness

A. "Suspicious" (distrustful) is not the meaning of "sagacity".

B. "Cruelty" is not the meaning of "sagacity".

C. "Sagacity" means wisdom (keen judgment and discernment).

D. "Foolishness" is the opposite of "sagacity".

Question 125 English

FLAUNT

- A. Snipe
- B. Dance
- C. Show off ✓ **Correct answer**
- D. Preserve

A. "Snipe" (to shoot or criticise) is not the meaning of "flaunt".

B. "Dance" is not the meaning of "flaunt".

C. "Flaunt" means to show off (to display ostentatiously).

D. "Preserve" is not the meaning of "flaunt".

Question 126 English

URBANE

- A. Suave ✓ **Correct answer**
- B. Rough
- C. Bad
- D. Dishonest

means suave (polished, courteous and refined in manner).

B. "Rough" is the opposite of "urbane".

C. "Bad" is not the meaning of "urbane".

D. "Dishonest" is not the meaning of "urbane".

Question 127 English

DIASPORA

- A. Gathering
- B. Dispersion ✓ **Correct answer**
- C. Alliance
- D. Animosity

A. "Gathering" is the opposite of "diaspora".

B. "Diaspora" means the dispersion (scattering) of a people from their homeland.

C. "Alliance" is not the meaning of "diaspora".

D. "Animosity" (hostility) is not the meaning of "diaspora".

Question 128 English

IMPETUOUS

- A. Honest
- B. Impulsive ✓ **Correct answer**
- C. Lazy
- D. Liar

A. "Honest" is not the meaning of "impetuous".

B. "Impetuous" means impulsive (acting hastily without thought).

of the meaning of "impetuous".

D. "Liar" is not the meaning of "impetuous".

Question 129 English

VOCIFEROUS

- A. Hidden
- B. Loud ✓ **Correct answer**
- C. Strong
- D. Weak

A. "Hidden" is the opposite of "vociferous".

B. "Vociferous" means loud and vehement (noisily outspoken).

C. "Strong" is not the nearest meaning of "vociferous".

D. "Weak" is the opposite of "vociferous".

Question 130 English

TRANSIENT

- A. Permanent
- B. Temporary ✓ **Correct answer**
- C. Long
- D. Good

A. "Permanent" is the opposite of "transient".

B. "Transient" means temporary (lasting only a short time).

C. "Long" is the opposite of "transient".

D. "Good" is not the meaning of "transient".

131 English

PROWESS

- A. Hindrance
- B. Skill ✓ **Correct answer**
- C. Reservation
- D. Bad name

A. "Hindrance" is the opposite of "prowess".

B. "Prowess" means skill (outstanding ability, especially in battle or a field).

C. "Reservation" is not the meaning of "prowess".

D. "Bad name" is not the meaning of "prowess".

Question 132 English

BEQUEATH

- A. Grant ✓ **Correct answer**
- B. Imbibe
- C. Irrigate
- D. Hope

A. "Bequeath" means to grant (to leave property by will).

B. "Imbibe" (to absorb/drink) is not the meaning of "bequeath".

C. "Irrigate" is not the meaning of "bequeath".

D. "Hope" is not the meaning of "bequeath".

Question 133 Biology

The use of living organisms in industry for the production of useful products is known as

- B. Biochemistry
- C. Biotechnology ✓ **Correct answer**
- D. Molecular Biology

A. Parasitology is the study of parasites, not the industrial use of organisms.

B. Biochemistry is the study of chemical processes in living organisms, not the industrial use of organisms.

C. Biotechnology is the use of living organisms in industry for the production of useful products.

D. Molecular biology is the study of molecules in cells, not the industrial use of organisms.

Question 134 Biology

Plants having foreign DNA incorporated into their cells are called:

- A. Clone plants
- B. Transgenic plants ✓ **Correct answer**
- C. Parthenocarpic plants
- D. Mutant giants

A. Clone plants are genetically identical copies, not plants with foreign DNA.

B. Plants with foreign DNA incorporated into their cells are transgenic plants.

C. Parthenocarpic plants produce fruit without fertilisation, not plants with foreign DNA.

D. Mutant giants are not plants with foreign DNA.

Question 135 Biology

Treatment by using attenuated culture of bacteria is called

- A. Chemotherapy

- C. Antisepsis
- D. Vaccination ✓ **Correct answer**

A. Chemotherapy is treatment with chemicals/drugs, not attenuated bacterial cultures.

B. Sterilization is the killing of microbes, not treatment with attenuated cultures.

C. Antisepsis is the prevention of infection by antiseptics, not treatment with attenuated cultures.

D. Vaccination is treatment (immunisation) using attenuated (weakened) cultures of bacteria or viruses.

Question 136 Biology

The major cause of hepatitis B is

- A. Blood transfusion ✓ **Correct answer**
- B. Blood clotting
- C. Absence of fibrinogen
- D. Contaminated soil

A. Hepatitis B is transmitted mainly through infected blood (blood transfusion is a major cause).

B. Blood clotting is not a cause of hepatitis B.

C. Absence of fibrinogen is not a cause of hepatitis B.

D. Contaminated soil is not a cause of hepatitis B.

Question 137 Biology

During animal cell division, the spindle fibres are formed from

- A. Mitochondria

trioles ✓ **Correct answer**

- C. Ribosomes
- D. Lysosomes

A. Mitochondria produce energy; they do not form spindle fibres.

B. In animal cells the spindle fibres are organised by the centrioles (centrosomes).

C. Ribosomes synthesise proteins; they do not form spindle fibres.

D. Lysosomes digest waste; they do not form spindle fibres.

Question 138 Biology

Which component of the cell is concerned with cell secretions?

- A. Plasma membrane
- B. Golgi complex ✓ **Correct answer**
- C. Cytoskeleton
- D. Mitochondria

A. The plasma membrane controls entry and exit, but the Golgi complex packages and secretes cell products.

B. The Golgi complex (Golgi apparatus) modifies, packages and secretes proteins and other cell products.

C. The cytoskeleton gives the cell shape and support; it is not concerned with secretions.

D. Mitochondria produce energy; they are not concerned with secretions.

Question 139 Biology

During which period of interphase (cell cycle) DNA is synthesized?

- A. G_1
- B. G_2

Correct answer

- D. G_0

A. DNA is synthesised in the S phase, not G_1 (G_1 is the growth phase before DNA synthesis).

B. DNA is synthesised in the S phase, not G_2 (G_2 is the growth phase after DNA synthesis).

C. DNA replication (synthesis) takes place in the S (synthesis) phase of interphase.

D. G_0 is the resting phase (no division, no DNA synthesis).

Question 140 Biology

Peptidoglycan or murein is a special or distinctive feature of cell wall in

- A. Algae
- B. Fungi
- C. Bacteria ✓ **Correct answer**
- D. Plants

A. Algal cell walls are made of cellulose, not peptidoglycan.

B. Fungal cell walls are made of chitin, not peptidoglycan.

C. Peptidoglycan (murein) is the distinctive component of the bacterial cell wall.

D. Plant cell walls are made of cellulose, not peptidoglycan.

Question 141 Biology

In mitochondria, small knob-like structures called F1 particles are found in:

- A. Outer membrane
- B. Outer compartment
- C. Inner membrane ✓ **Correct answer**
- D. Inner compartment

…es (ATP synthase) are on the inner membrane, not the outer membrane.

B. F1 particles are on the inner membrane, not in the outer compartment.

C. The F1 particles (ATP synthase complexes) are knob-like structures on the inner mitochondrial membrane (facing the matrix).

D. F1 particles are on the inner membrane, not free in the inner compartment (matrix).

Question 142 Biology

The most critical phase of mitosis which ensures equal distribution of chromatids in the daughter cells is

- A. Prophase
- B. Metaphase
- C. Anaphase ✓ **Correct answer**
- D. Telophase

A. In prophase the chromosomes condense; the chromatids are not yet distributed.

B. In metaphase the chromosomes align at the equator; the chromatids are not yet separated.

C. In anaphase the sister chromatids separate and move to opposite poles, ensuring equal distribution to the daughter cells.

D. In telophase the nuclei reform; the distribution has already happened in anaphase.

Question 143 Biology

Non-disjunction of 21st pair of chromosomes in one of the gamete leads to 47 chromosomes in one individual. This condition is called

- A. Turner's syndrome
- B. Klinefelter's syndrome

- D. Jacob's syndrome

A. Turner's syndrome is monosomy X (45 chromosomes), not trisomy 21.

B. Klinefelter's syndrome is XXY (47 chromosomes, sex chromosomes), not trisomy 21.

C. Non-disjunction of chromosome 21 gives trisomy 21 (47 chromosomes) — Down's syndrome.

D. Jacob's (XYY) syndrome is an extra Y chromosome, not trisomy 21.

Question 144 Biology

The intake of liquid materials across the cell membrane is

- A. Phagocytosis
- B. Endocytosis
- C. Pinocytosis ✓ **Correct answer**
- D. Exocytosis

A. Phagocytosis is the intake of solid particles ("cell eating").

B. Endocytosis is the general term for intake by vesicles; pinocytosis is the specific term for liquids.

C. Pinocytosis ("cell drinking") is the intake of liquid materials across the cell membrane.

D. Exocytosis is the release of materials from the cell, not intake.

Question 145 Biology

Which one of the following is the site of oxidative phosphorylation in mitochondria?

- A. Cristae ✓ **Correct answer**
- B. Matrix
- C. Outer membrane

A. Oxidative phosphorylation (electron transport chain and ATP synthase) takes place on the cristae (the folds of the inner mitochondrial membrane).

B. The matrix is the site of the Krebs cycle, not oxidative phosphorylation.

C. Oxidative phosphorylation takes place on the inner membrane (cristae), not the outer membrane.

D. Mitochondrial ribosomes synthesise proteins, not ATP by oxidative phosphorylation.

Question 146 Biology

Organelle involved in the synthesis of ATP is

- A. Ribosome
- B. Mitochondria ✓ **Correct answer**
- C. Nucleus
- D. Centriole

A. Ribosomes synthesise proteins, not ATP.

B. Mitochondria are the site of ATP synthesis (oxidative phosphorylation).

C. The nucleus contains DNA; it does not synthesise ATP.

D. Centrioles organise the spindle; they do not synthesise ATP.

Question 147 Biology

The most common respiratory substrate as a source of energy is

- A. Glucose ✓ **Correct answer**
- B. Sucrose
- C. Fructose
- D. Insulin

the most common respiratory substrate (the main fuel for cellular respiration).

B. Sucrose must be broken down to glucose and fructose before respiration.

C. Fructose is a respiratory substrate but less common than glucose.

D. Insulin is a hormone, not a respiratory substrate.

Question 148 Biology

The simplest monosaccharide containing keto group is

- A. Glyceraldehyde
- B. Dihydroxy acetone ✓ **Correct answer**
- C. Glucose
- D. Ribose

A. Glyceraldehyde is the simplest aldose (aldehyde group), not a ketose.

B. Dihydroxyacetone is the simplest ketose (a triose with a keto group).

C. Glucose is a hexose (aldohexose), not the simplest ketose.

D. Ribose is a pentose aldose, not the simplest ketose.

Question 149 Biology

If the genetic code is made up of three nucleotides, then total possible genetic codes will be

- A. 4
- B. 20
- C. 64 ✓ **Correct answer**
- D. 61

A. With 4 bases in triplets there are $4^3 = 64$ possible codons, not 4.

number of amino acids, not the number of possible codons.

C. There are 4 bases, so the number of possible 3-letter codons is 4 × 4 × 4 = 64.

D. 61 is the number of sense codons (64 minus 3 stop codons), not the total possible codons.

Question 150 Biology

Waterproof surfaces like cuticle of leaf and protective covering of an insect's body are

- A. Phospholipids
- B. Waxes ✓ **Correct answer**
- C. Terpenoids
- D. Acyl glycerols

A. Phospholipids form cell membranes, not the waterproof cuticle.

B. Waxes (long-chain esters) form the waterproof cuticle of leaves and the protective covering of insects.

C. Terpenoids are a class of lipids (e.g. carotenoids), not the waterproof cuticle.

D. Acyl glycerols (fats/oils) are energy stores, not the waterproof cuticle.

Question 151 Biology

In translation the terminating codon is

- A. GUA
- B. UAA ✓ **Correct answer**
- C. UUG
- D. AGU

A. GUA codes for valine (a sense codon), not a stop codon.

B. UAA is a stop (terminating) codon in translation.

s for leucine, not a stop codon.

D. AGU codes for serine, not a stop codon.

Question 152 Biology

All co-enzymes are derived from

- A. Proteins
- B. Carbohydrates
- C. Metal ions
- D. Vitamins ✓ **Correct answer**

A. Co-enzymes are organic molecules derived from vitamins, not proteins.

B. Co-enzymes are derived from vitamins, not carbohydrates.

C. Metal ions are co-factors (activators), not co-enzymes.

D. Co-enzymes are derived from vitamins (e.g. NAD from niacin, FAD from riboflavin).

Question 153 Biology

The competitive inhibitors have structural similarity with

- A. Active site
- B. Binding site
- C. Substrate ✓ **Correct answer**
- D. Co-enzyme

A. Competitive inhibitors resemble the substrate, not the active site (they bind to the active site).

B. Competitive inhibitors resemble the substrate, not the binding site.

C. Competitive inhibitors are structurally similar to the substrate and compete with it for the enzyme's active site.

ve inhibitors resemble the substrate, not the co-enzyme.

Question 154 Biology

Which one of the following is the optimum pH of pancreatic lipase enzyme?

- A. 7.60
- B. 8.00
- C. 9.00 ✓ **Correct answer**
- D. 9.70

A. The textbook optimum pH for pancreatic lipase is 9.00, not 7.60.

B. The textbook optimum pH for pancreatic lipase is 9.00, not 8.00.

C. Pancreatic lipase works best in the alkaline medium of the small intestine, at an optimum pH of 9.00 (as given in the textbook).

D. The textbook optimum pH for pancreatic lipase is 9.00, not 9.70.

Question 155 Biology

A co-factor tightly bound to the enzyme on the permanent basis is called

- A. Activator
- B. Co-enzyme
- C. Prosthetic group ✓ **Correct answer**
- D. Apo-enzyme

A. An activator is a metal ion that activates an enzyme; it is not a tightly bound co-factor.

B. A co-enzyme is a loosely bound organic co-factor, not one tightly bound permanently.

C. A prosthetic group is a co-factor tightly (permanently) bound to the enzyme.

D. The apo-enzyme is the protein part of the enzyme alone (without its co-factor).

156 Biology

Which one of the following cells are mainly infected by HIV?

- A. T-killer lymphocytes
- B. T-helper lymphocytes ✓ **Correct answer**
- C. B-plasma cells
- D. B-memory cells

A. HIV mainly infects T-helper (CD4) lymphocytes, not T-killer (CD8) lymphocytes.

B. HIV (AIDS virus) mainly infects and destroys T-helper (CD4) lymphocytes.

C. HIV mainly infects T-helper lymphocytes, not B-plasma cells.

D. HIV mainly infects T-helper lymphocytes, not B-memory cells.

Question 157 Biology

Which one of the following antibiotic causes permanent discoloration of teeth in young children if it is misused?

- A. Penicillin
- B. Streptomycin
- C. Sulfonamide
- D. Tetracycline ✓ **Correct answer**

A. Penicillin does not cause permanent discoloration of teeth.

B. Streptomycin does not cause permanent discoloration of teeth.

C. Sulfonamide does not cause permanent discoloration of teeth.

D. Tetracycline (if given to young children) causes permanent yellow-brown discoloration of the teeth.

158 Biology

What are the sequence of steps in which a bacteriophage attacks bacteria and injects its DNA?

- A. Landing → Tail contraction → Penetration → DNA Injection ✓ **Correct answer**
- B. Penetration → Landing → Tail contraction → DNA Injection
- C. Tail contraction → Landing → DNA Injection → Penetration
- D. Landing → Penetration → Tail contraction → DNA Injection

A. The bacteriophage lands (adsorbs) on the bacterium, its tail contracts, the tail core penetrates the cell wall, and then the DNA is injected.

B. Landing comes first, not penetration.

C. Landing comes first, and penetration comes before DNA injection.

D. Tail contraction comes before penetration, not after it.

Question 159 Biology

Athlete's Foot is a disease caused by

- A. Bacteria
- B. Virus
- C. Fungus ✓ **Correct answer**
- D. Arthropod

A. Athlete's foot (tinea pedis) is a fungal infection, not bacterial.

B. Athlete's foot is a fungal infection, not viral.

C. Athlete's foot is caused by a fungus (a dermatophyte, e.g. Trichophyton).

D. Athlete's foot is caused by a fungus, not an arthropod.

160 Biology

Ascaris is which one of the following?

- A. Ectoparasite
- B. Intestinal parasite ✓ **Correct answer**
- C. Respiratory tract parasite
- D. Urinogenital tract parasite

A. Ascaris lives inside the host (endoparasite), not on the surface.

B. Ascaris lumbricoides is an intestinal parasite (it lives in the small intestine).

C. Ascaris is an intestinal parasite, not a respiratory tract parasite.

D. Ascaris is an intestinal parasite, not a urinogenital tract parasite.

Question 161 Biology

Polymorphism is a feature exhibited by members of

- A. Coelenterates
- B. Arthropoda
- C. Porifera
- D. Platyhelminthes

No answer is given for this question, and none is taught. DEFECTIVE — excluded as DEFECTIVE, 15 Nov 2026 (decided by assistant under owner's 8 Nov 2026 delegation). Both A and B are correct: coelenterates exhibit polymorphism (the same species exists as polyp and medusa, e.g. Obelia) and arthropods exhibit polymorphism (social insects such as honey bees and ants have queen, drone and worker castes). There is no unique correct answer. The official key gives B. This question must never be taught as having an answer.

A. Coelenterates (e.g. Obelia) exhibit polymorphism (polyp and medusa forms) — this is also correct.

ls (social insects) exhibit polymorphism (castes); the official key gives B.

C. Sponges do not exhibit polymorphism in this sense.

D. Flatworms do not exhibit polymorphism in this sense.

Question 162 Biology

Which one of the following is the primary host of liver fluke?

- A. Man
- B. Sheep ✓ **Correct answer**
- C. Snail
- D. Dog

A. Man is an accidental host of liver fluke, not the primary (definitive) host.

B. The primary (definitive) host of the liver fluke (Fasciola hepatica) is the sheep (or cattle).

C. The snail is the intermediate host of liver fluke, not the primary host.

D. The dog is not the primary host of liver fluke.

Question 163 Biology

Which one of the following is an example of a free living carnivorous flatworm?

- A. Liver fluke
- B. Dugesia ✓ **Correct answer**
- C. Tapeworm
- D. Schistosoma

A. Liver fluke is a parasitic flatworm, not free-living.

B. Dugesia (Planaria) is a free-living carnivorous flatworm.

C. Tapeworm is a parasitic flatworm, not free-living.

ma (blood fluke) is a parasitic flatworm, not free-living.

Question 164 Biology

The sources of staple food for man are plants which belong to the family:

- A. Mimosaceae
- B. Poaceae ✓ **Correct answer**
- C. Rosaceae
- D. Fabaceae

A. The staple food plants (wheat, rice, maize) belong to Poaceae, not Mimosaceae.

B. The staple food plants (cereals: wheat, rice, maize) belong to the grass family Poaceae.

C. The staple food plants belong to Poaceae, not Rosaceae.

D. The staple food plants belong to Poaceae, not Fabaceae (legumes).

Question 165 Biology

In human, Escherichia coli is involved in the formation of

- A. Calcium
- B. Vitamin D
- C. Vitamin A
- D. Vitamin K ✓ **Correct answer**

A. E. coli in the gut is not involved in the formation of calcium.

B. E. coli in the gut is not involved in the formation of vitamin D.

C. E. coli in the gut is not involved in the formation of vitamin A.

D. Escherichia coli in the human gut synthesises vitamin K.

166 Biology

The function of Goblet cells is to secrete

- A. Gastrin
- B. Hydrochloric acid
- C. Pepsinogen
- D. Mucus ✓ **Correct answer**

A. Gastrin is secreted by G cells, not Goblet cells.

B. Hydrochloric acid is secreted by oxyntic (parietal) cells, not Goblet cells.

C. Pepsinogen is secreted by chief cells, not Goblet cells.

D. Goblet cells secrete mucus (which protects the gut lining).

Question 167 Biology

Gastric glands are composed of _____ types of cells

- A. Two
- B. Three ✓ **Correct answer**
- C. Four
- D. Five

A. Gastric glands are composed of three types of cells, not two.

B. Gastric glands are composed of three types of cells (mucous cells, chief/peptic cells and oxyntic/parietal cells).

C. Gastric glands are composed of three types of cells, not four.

D. Gastric glands are composed of three types of cells, not five.

168 Biology

HCl in gastric juice is secreted by which one of the following cells?

- A. Chief cells
- B. Oxyntic cells ✓ **Correct answer**
- C. Mucous cells
- D. Kupffer cells

A. Chief cells secrete pepsinogen, not HCl.

B. Oxyntic (parietal) cells secrete HCl in the gastric juice.

C. Mucous cells secrete mucus, not HCl.

D. Kupffer cells are liver macrophages, not gastric HCl-secreting cells.

Question 169 Biology

Histamine is produced by which one of the following cells?

- A. Basophils ✓ **Correct answer**
- B. Platelets
- C. Monocyte
- D. Eosinophils

A. Histamine is produced by basophils (and mast cells) and released in allergic reactions.

B. Platelets are involved in clotting; they do not produce histamine.

C. Monocytes are phagocytic white blood cells; they do not produce histamine.

D. Eosinophils combat parasites and are involved in allergy, but histamine is produced by basophils (and mast cells).

170 Biology

Which one of the following is the most numerous / commonest of white blood cells?

- A. Eosinophils
- B. Monocytes
- C. Neutrophils ✓ **Correct answer**
- D. Lymphocytes

A. Eosinophils make up only about 1–4% of white blood cells.

B. Monocytes make up only about 2–8% of white blood cells.

C. Neutrophils are the most numerous white blood cells (about 60–70% of all leucocytes).

D. Lymphocytes make up about 20–30% of white blood cells (the second most numerous); the official key gives D, which is wrong.

Question 171 Biology

The oxygenated blood from lungs to heart is transported by the

- A. Pulmonary artery
- B. Coronary artery
- C. Pulmonary vein ✓ **Correct answer**
- D. Hepatic artery

A. The pulmonary artery carries deoxygenated blood from the heart to the lungs.

B. The coronary artery supplies blood to the heart muscle itself.

C. The pulmonary vein carries oxygenated blood from the lungs to the left atrium of the heart.

D. The hepatic artery supplies blood to the liver.

172 Biology

Which one of the following proteins takes part in blood clotting?

- A. Prothrombin
- B. Fibrinogen
- C. Immunoglobulin
- D. Globulin

No answer is given for this question, and none is taught. DEFECTIVE — excluded as DEFECTIVE, 15 Nov 2026 (decided by assistant under owner's 8 Nov 2026 delegation). Both A and B take part in blood clotting: prothrombin is converted to thrombin, and fibrinogen is converted by thrombin to fibrin (the clot). There is no unique correct answer. The official key gives B. This question must never be taught as having an answer.

A. Prothrombin takes part in blood clotting (it is converted to thrombin, which converts fibrinogen to fibrin) — this is also correct.

B. Fibrinogen takes part in blood clotting (it is converted to fibrin); the official key gives B.

C. Immunoglobulin (antibody) is involved in immunity, not blood clotting.

D. Globulin is a general class of plasma proteins (including immunoglobulins); it is not the clotting protein.

Question 173 Biology

Which one of the following is responsible for the production of concentrated urine?

- A. Juxtamedullary nephrons ✓ **Correct answer**
- B. Cortical nephrons
- C. Proximal tubule
- D. Distal tubule

A. Juxtamedullary nephrons (with long loops of Henle dipping deep into the medulla) produce concentrated urine.

ephrons (short loops) produce dilute urine.

C. The proximal tubule reabsorbs most solutes and water, but concentrated urine is produced by the juxtamedullary nephrons.

D. The distal tubule is involved in fine-tuning, not the production of concentrated urine.

Question 174 Biology

Reabsorption of useful constituents normally takes place in which one of the following?

- A. Proximal tubule ✓ **Correct answer**
- B. Distal tubule
- C. Bowman's capsule
- D. Glomerulus

A. Most reabsorption of useful constituents (glucose, amino acids, ions, water) takes place in the proximal convoluted tubule.

B. The distal tubule reabsorbs some ions and water, but most reabsorption occurs in the proximal tubule.

C. Bowman's capsule collects the filtrate; reabsorption does not take place there.

D. The glomerulus filters the blood; reabsorption does not take place there.

Question 175 Biology

Which one of the following parts of excretory system in humans acts as countercurrent multiplier?

- A. Kidney
- B. Cortex
- C. Medulla
- D. Loop of Henle ✓ **Correct answer**

of Henle (within the kidney) acts as the countercurrent multiplier, not the kidney as a whole.

B. The cortex is not the countercurrent multiplier.

C. The medulla contains the loops of Henle, but the loop of Henle itself is the countercurrent multiplier.

D. The loop of Henle acts as a countercurrent multiplier (establishing the medullary osmotic gradient).

Question 176 Biology

Anti-Diuretic Hormone (ADH) is released from

- A. Anterior pituitary lobe
- B. Posterior pituitary lobe ✓ **Correct answer**
- C. Hypothalamus
- D. Thalamus

A. ADH is released from the posterior pituitary lobe, not the anterior lobe.

B. ADH (vasopressin) is released from the posterior pituitary lobe (it is synthesised in the hypothalamus).

C. ADH is synthesised in the hypothalamus but released from the posterior pituitary.

D. The thalamus does not release ADH.

Question 177 Biology

Which one of the following is the main nitrogenous waste product in humans?

- A. Urea ✓ **Correct answer**
- B. Ammonia
- C. Salts

A. Humans are ureotelic: urea is the main nitrogenous waste product.

B. Ammonia is the main nitrogenous waste in aquatic animals (ammonotelic), not humans.

C. Salts are not nitrogenous waste products.

D. Uric acid is the main nitrogenous waste in birds and reptiles (uricotelic), not humans.

Question 178 Biology

The right and left cerebral hemispheres are connected by a thick band of nerve fibres called:

- A. Medulla
- B. Corpus callosum ✓ **Correct answer**
- C. Pons
- D. Hippocampus

A. The medulla is part of the brain stem, not the band connecting the hemispheres.

B. The corpus callosum is the thick band of nerve fibres connecting the right and left cerebral hemispheres.

C. The pons is part of the brain stem, not the band connecting the hemispheres.

D. The hippocampus is involved in memory, not the band connecting the hemispheres.

Question 179 Biology

The part of the brain which guides smooth and accurate motions and maintains body position is called

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

A. The cerebrum is responsible for conscious thought and voluntary actions, not the coordination of smooth motions.

B. The cerebellum guides smooth and accurate motions and maintains body position and balance.

C. The pons relays signals between the cerebrum and cerebellum; it does not coordinate motions.

D. The medulla controls involuntary functions (heartbeat, breathing), not the coordination of motions.

Question 180 Biology

Which one of the following is the effect of sympathetic nervous system?

- A. Constriction of bronchi
- B. Decrease in heart rate
- C. Promotes digestion or peristalsis
- D. Dilates the pupil ✓ **Correct answer**

A. The sympathetic system dilates the bronchi; constriction is a parasympathetic effect.

B. The sympathetic system increases the heart rate; a decrease is a parasympathetic effect.

C. The sympathetic system inhibits digestion; promotion is a parasympathetic effect.

D. The sympathetic system dilates the pupil (mydriasis).

Question 181 Biology

High levels of aluminium may contribute to the onset of which one of the following?

- A. Parkinson's disease

- C. Alzheimer's disease ✓ **Correct answer**
- D. Gonorrhea

A. High aluminium levels are linked to Alzheimer's disease, not Parkinson's disease.

B. High aluminium levels are linked to Alzheimer's disease, not epilepsy.

C. High levels of aluminium in the brain have been linked to the onset of Alzheimer's disease.

D. Gonorrhea is a bacterial sexually transmitted infection, not linked to aluminium.

Question 182 Biology

Testosterone is produced by which one of the following?

- A. Sertoli cells
- B. Germinal epithelium
- C. Interstitial cells ✓ **Correct answer**
- D. Spermatogonia

A. Sertoli cells nourish the developing sperm, they do not produce testosterone.

B. The germinal epithelium produces spermatogonia, not testosterone.

C. Interstitial (Leydig) cells of the testes produce testosterone.

D. Spermatogonia are the stem cells that give rise to sperm, they do not produce testosterone.

Question 183 Biology

The oocyte released during ovulation is in

- A. Anaphase I
- B. Prophase I

aphase I

- D. Metaphase II ✓ **Correct answer**

A. The oocyte released at ovulation is a secondary oocyte arrested in metaphase II, not anaphase I.

B. The primary oocyte is arrested in prophase I before ovulation; the released oocyte is in metaphase II.

C. The oocyte completes meiosis I before ovulation; it is arrested in metaphase II when released.

D. The secondary oocyte released at ovulation is arrested in metaphase II (it completes meiosis II only if fertilised).

Question 184 Biology

Yellowish glandular structure formed after the release of egg from follicle is called

- A. Corpus callosum
- B. Graafian follicle
- C. Corpus luteum ✓ **Correct answer**
- D. Follicle atresia

A. The corpus callosum is the band of nerve fibres in the brain, not an ovarian structure.

B. The Graafian follicle is the mature follicle before ovulation, not the structure formed after it.

C. After ovulation the ruptured follicle becomes the yellowish glandular corpus luteum (which secretes progesterone).

D. Follicle atresia is the degeneration of a follicle, not the structure formed after ovulation.

185 Biology

On puberty, the development of primary follicles is stimulated by

- A. ICSH
- B. FSH ✓ **Correct answer**
- C. LH
- D. Estrogen

A. ICSH (interstitial cell stimulating hormone = LH in males) does not stimulate follicle development.

B. Follicle stimulating hormone stimulates the development of primary follicles at puberty.

C. LH triggers ovulation, it does not stimulate the development of primary follicles.

D. Estrogen is produced by the developing follicle; it does not stimulate its development.

Question 186 Biology

Causative agent of a sexually transmitted disease that affects mucous membrane of the urinogenital tract is

- A. Staphylococcus aureus
- B. Treponema pallidum
- C. Neisseria gonorrhoeae ✓ **Correct answer**
- D. Escherichia coli

A. Staphylococcus aureus causes skin and wound infections, not gonorrhea.

B. Treponema pallidum causes syphilis (a genital ulcer disease), not the mucous-membrane infection of gonorrhea.

C. Neisseria gonorrhoeae causes gonorrhea, which affects the mucous membrane of the urinogenital tract.

D. Escherichia coli is a gut bacterium, not the cause of this sexually transmitted disease.

187 Biology

In a human vertebral column, the number of _____ vertebrae is 7.

- A. Cervical ✓ **Correct answer**
- B. Thoracic
- C. Lumbar
- D. Sacrum

A. There are 7 cervical vertebrae in the human vertebral column.

B. There are 12 thoracic vertebrae, not 7.

C. There are 5 lumbar vertebrae, not 7.

D. The sacrum is formed of 5 fused vertebrae, not 7.

Note: Filed option C read "Lumber" (misprint in the source reproduction); corrected to "Lumbar" as documented in the reviewed file.

Question 188 Biology

Which one of the following structures holds the bones together?

- A. Joints
- B. Cartilages
- C. Fibrous capsules
- D. Ligaments ✓ **Correct answer**

A. A joint is the place where bones meet; the ligaments hold them together.

B. Cartilages cushion the bones at joints; they do not hold the bones together.

C. A fibrous capsule encloses a joint, but the ligaments hold the bones together.

D. Ligaments (bands of connective tissue) hold the bones together at a joint.

189 Biology

Which one of the following cartilages is the most abundant in the human body?

- A. Elastic cartilage
- B. Chondrous cartilage
- C. Fibrous Cartilage
- D. Hyaline Cartilage ✓ **Correct answer**

A. Elastic cartilage is found in the ear and epiglottis; it is not the most abundant.

B. "Chondrous cartilage" is not a standard type (the types are hyaline, elastic and fibrous).

C. Fibrous cartilage is found in the intervertebral discs; it is not the most abundant.

D. Hyaline cartilage is the most abundant cartilage in the human body (nose, trachea, ends of long bones).

Question 190 Biology

The repeated protein pattern of myofibrils is called

- A. Sarcomere ✓ **Correct answer**
- B. Zyomere
- C. Sarcolemma
- D. Cross bridges

A. The sarcomere is the repeating unit (protein pattern) of a myofibril (between two Z-lines).

B. "Zyomere" is not the repeating unit of a myofibril.

C. The sarcolemma is the cell membrane of a muscle fibre, not the repeating unit.

D. Cross bridges are the myosin heads that pull actin; they are not the repeating unit.

191 Biology

When more energy is required in muscle contraction then that energy can also be produced by _____ as a secondary source.

- A. Glucose
- B. Phosphocreatine ✓ **Correct answer**
- C. Fructose
- D. Lactic acid

A. Glucose is the primary fuel for respiration, not the secondary (immediate) energy source in muscle.

B. Phosphocreatine (creatine phosphate) is the secondary (immediate) source of energy for muscle contraction (it regenerates ATP).

C. Fructose is not the secondary energy source in muscle.

D. Lactic acid is a product of anaerobic respiration, not an energy source.

Question 192 Biology

Which one of the following is a steroid hormone?

- A. Glucagon
- B. Thyroxine
- C. Epinephrine
- D. Oestrogen ✓ **Correct answer**

A. Glucagon is a peptide hormone, not a steroid hormone.

B. Thyroxine is an amino-acid derivative (iodinated tyrosine), not a steroid hormone.

C. Epinephrine (adrenaline) is an amino-acid derivative, not a steroid hormone.

D. Oestrogen is a steroid hormone (derived from cholesterol).

193 Biology

The gonadotrophic hormones of anterior lobe of pituitary include:

- A. Prolactin, Thyroid Stimulating Hormone, Somatotropin Hormone
- B. Follicle Stimulating Hormone, Luteinizing Hormone, Prolactin ✓ **Correct answer**
- C. Adrenocorticotrophic Hormone, Luteinizing Hormone, Follicle Stimulating Hormone
- D. Luteinizing Hormone, Follicle Stimulating Hormone, Thyroid Stimulating Hormone

A. Thyroid stimulating hormone and somatotropin are not gonadotrophic hormones.

B. The gonadotrophic hormones of the anterior pituitary are FSH, LH (and prolactin, which acts on the gonads/mammary glands).

C. ACTH acts on the adrenal cortex, not the gonads.

D. Thyroid stimulating hormone acts on the thyroid, not the gonads.

Question 194 Biology

Over-activity of cortical hormone of adrenal gland causes

- A. Addison's disease
- B. Parkinson's disease
- C. Cushing's disease ✓ **Correct answer**
- D. Down's syndrome

A. Addison's disease is caused by under-activity (deficiency) of adrenal cortical hormones.

B. Parkinson's disease is a nervous disorder, not caused by adrenal cortical hormones.

C. Over-activity (excess) of adrenal cortical hormones (cortisol) causes Cushing's disease.

D. Down's syndrome is a chromosomal disorder (trisomy 21), not caused by adrenal hormones.

195 Biology

How many iodine atoms are present in thyroxine?

- A. 3
- B. 4 ✓ **Correct answer**
- C. 2
- D. 5

A. Thyroxine (T4) contains four iodine atoms, not three (three iodine atoms are present in triiodothyronine, T3); the official key gives A, which is wrong.

B. Thyroxine is tetraiodothyronine (T4) — it contains four iodine atoms.

C. Thyroxine contains four iodine atoms, not two.

D. Thyroxine contains four iodine atoms, not five.

Question 196 Biology

T-lymphocytes recognize antigen and attack microorganisms or transplanted organ and tissues. This effect is called

- A. Cell-mediated response ✓ **Correct answer**
- B. Humoral immune response
- C. Active immunity
- D. Passive immunity

A. T-lymphocytes mediate the cell-mediated immune response (they directly attack infected cells and transplanted tissue).

B. The humoral response is mediated by B-lymphocytes (antibodies), not T-lymphocytes; the official key gives B, which is wrong.

C. Active immunity is immunity developed by the body itself (by exposure or vaccination), not the specific T-cell effect.

mmunity is immunity from readymade antibodies, not the T-cell effect.

Question 197 Biology

Which part of antibody recognizes the antigen during immune response?

- A. Heavy part
- B. Light part
- C. Constant part
- D. Variable part ✓ **Correct answer**

A. The heavy chain alone does not recognise the antigen; the variable region does.

B. The light chain alone does not recognise the antigen; the variable region does.

C. The constant part determines the antibody class, not antigen recognition.

D. The variable part (variable region) of the antibody recognises and binds the antigen.

Question 198 Biology

What type of immunity is achieved by injecting antibodies, antiserum, anti-venom serum?

- A. Active immunity
- B. Passive immunity ✓ **Correct answer**
- C. Artificially induced immunity
- D. Naturally induced immunity

A. Active immunity is developed by the body itself (by infection or vaccination), not by injecting readymade antibodies.

B. Injecting readymade antibodies (antiserum, anti-venom) gives passive immunity.

C. Both vaccination (active) and antibody injection (passive) are artificially induced, so this does not distinguish the type.

antibodies is artificial, not naturally induced.

Question 199 Biology

Which one of the following glands is involved in the production of lymphocytes?

- A. Pineal
- B. Pituitary
- C. Thymus ✓ **Correct answer**
- D. Adrenal

A. The pineal gland secretes melatonin; it is not involved in lymphocyte production.

B. The pituitary gland secretes tropic hormones; it is not involved in lymphocyte production.

C. The thymus is the gland involved in the production and maturation of (T-)lymphocytes.

D. The adrenal gland secretes corticosteroids and adrenaline; it is not involved in lymphocyte production.

Question 200 Biology

Antibodies are proteins and made up of how many polypeptide chains?

- A. One
- B. Two
- C. Three
- D. Four ✓ **Correct answer**

A. An antibody is made of four polypeptide chains, not one.

B. An antibody is made of four polypeptide chains, not two.

C. An antibody is made of four polypeptide chains, not three.

D. An antibody (immunoglobulin) is made of four polypeptide chains: two heavy chains

Question 201 Biology

Oxidative phase of glycolysis starts with dehydrogenation of

- A. Glycolysis
- B. Ribulose Bisphosphate
- C. Glyceraldehyde 3-phosphate ✓ **Correct answer**
- D. NADH

A. Glycolysis is the pathway, not the molecule dehydrogenated.

B. Ribulose bisphosphate is a Calvin-cycle intermediate, not the molecule dehydrogenated in glycolysis.

C. The oxidative (energy-yielding) phase of glycolysis starts with the dehydrogenation of glyceraldehyde-3-phosphate (to 1,3-bisphosphoglycerate, producing NADH).

D. NADH is the product of the dehydrogenation, not the molecule dehydrogenated.

Question 202 Biology

In one turn, the Krebs's cycle produces one molecule of ATP, one molecule of $FADH_2$ and _____ molecules of NADH

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

A. One turn of the Krebs cycle produces 3 NADH, not 1.

B. One turn of the Krebs cycle produces 3 NADH, not 2.

C. One turn of the Krebs cycle produces 3 NADH (plus 1 $FADH_2$ and 1 ATP/GTP).

of the Krebs cycle produces 3 NADH, not 4.

Question 203 Biology

Which one of the following is the stage of cellular respiration for which oxygen is not essential?

- A. Glycolysis ✓ **Correct answer**
- B. Pyruvate oxidation
- C. Krebs's cycle
- D. Electron Transport Chain

A. Glycolysis is anaerobic (it does not require oxygen).

B. Pyruvate oxidation (link reaction) feeds the aerobic pathway and requires oxygen indirectly.

C. The Krebs cycle is part of aerobic respiration and requires oxygen.

D. The electron transport chain requires oxygen as the final electron acceptor.

Question 204 Biology

Pyruvate, the end product of glycolysis moves from cytosol to mitochondrial matrix where it is oxidized into _____ producing CO_2 as a by-product.

- A. Acetic acid (active) ✓ **Correct answer**
- B. Citrate
- C. NAD
- D. FAD

A. Pyruvate is oxidised (decarboxylated) to acetyl-CoA ("active acetate"), producing CO_2.

B. Citrate is formed later (acetyl-CoA + oxaloacetate), not directly from pyruvate.

C. NAD is reduced to NADH in the reaction, it is not the product of pyruvate oxidation.

: involved in pyruvate oxidation.

Question 205 Biology

Pyruvate ⟶ Acetyl CoA [The curved arrow in the diagram shows the co-enzyme change: ? → ?]

- A. FAD^+ → FADH
- B. NAD^+ → NADH ✓ **Correct answer**
- C. NADH → NAD + H^+
- D. $FADH^+$ → FAD + H^+

A. The pyruvate dehydrogenase reaction uses NAD^+, not FAD^+.

B. Pyruvate is oxidised to acetyl-CoA with NAD^+ reduced to NADH (and CO_2 released).

C. NAD^+ is reduced to NADH in this reaction, not oxidised.

D. The pyruvate dehydrogenase reaction uses NAD^+, not FAD.

Question 206 Biology

pBr 322 have antibiotic resistance gene for

- A. Ampicillin and aspirin
- B. Streptomycin and metronidazole
- C. Ampicillin and Tetracycline ✓ **Correct answer**
- D. Penicillin and metronidazole

A. Aspirin is not an antibiotic; pBR322 carries ampicillin and tetracycline resistance genes.

B. pBR322 does not carry streptomycin or metronidazole resistance genes.

C. The plasmid pBR322 carries the ampicillin-resistance (amp^R) and tetracycline-resistance (tet^R) genes.

D. pBR322 carries ampicillin and tetracycline resistance genes, not penicillin and

Question 207 Biology

Cystic Fibrosis affects which one of the following cells of the body?

- A. Epithelial cells ✓ **Correct answer**
- B. Endothelial cells
- C. Plasma cells
- D. Blood cells

A. Cystic fibrosis affects the epithelial cells (the CFTR chloride channel in epithelial cells is defective, producing thick mucus).

B. Cystic fibrosis affects epithelial cells, not endothelial cells.

C. Cystic fibrosis affects epithelial cells, not plasma cells.

D. Cystic fibrosis affects epithelial cells, not blood cells.

Question 208 Biology

The enzymes which act as molecular scissors in recombinant DNA technology is

- A. Exonucleases
- B. Endonucleases ✓ **Correct answer**
- C. Polymerases
- D. Reverse transcriptases

A. Exonucleases cut DNA at the ends; the molecular scissors are restriction endonucleases (which cut within the DNA).

B. Restriction endonucleases act as molecular scissors in recombinant DNA technology (they cut DNA at specific sites).

C. Polymerases synthesise DNA; they are not the molecular scissors.

transcriptase makes DNA from RNA; it is not the molecular scissors.

Question 209 Biology

Which of the following is the correct sequence of PCR?

- A. Heating → Cooling → Add Primer → Copying of strand ✓ **Correct answer**
- B. Heating → Add Primer → Cooling → Copying of strand
- C. Add Primer → Heating → Cooling → Copying of strand
- D. Cooling → Add Primer → Heating → Copying of strand

A. In PCR the DNA is heated (denaturation), cooled so the primers anneal (bind), and then the strand is copied (extension).

B. The primer binds (anneals) when the mixture is cooled, not before cooling.

C. Denaturation (heating) comes first, not primer addition.

D. Denaturation (heating) comes first, not cooling.

Question 210 Biology

When two different pieces of DNA are joined together, the result is which one of the following?

- A. Complementary DNA
- B. Mutated DNA
- C. Recombinant DNA ✓ **Correct answer**
- D. Cloned DNA

A. Complementary DNA (cDNA) is DNA made from mRNA, not two pieces of DNA joined together.

B. Joining two different pieces of DNA gives recombinant DNA, not mutated DNA.

C. Joining two different pieces of DNA (e.g. a gene and a vector) gives recombinant DNA.

NA is DNA copied in a host, the joining itself gives recombinant DNA.

Question 211 Biology

Individual successions are known as

- A. Primary successions
- B. Secondary successions
- C. Seres ✓ **Correct answer**
- D. Xeroses

A. Primary succession is succession on bare rock/lifeless ground, not the name for individual successions.

B. Secondary succession is succession on disturbed ground, not the name for individual successions.

C. The individual stages (successions) in ecological succession are called seres (singular: sere).

D. A xerosere is succession in a dry habitat, not the general name for individual successions.

Question 212 Biology

Which one of the following is the ultimate distributional unit within which a species is restrained by the limitations of its physical structure and physiology?

- A. Niche ✓ **Correct answer**
- B. Biome
- C. Ecosystem
- D. Habitat

A. The niche is the ultimate distributional unit (the functional role and range of a species, limited by its structure and physiology).

s a large regional community, not the distributional unit of a species.

C. An ecosystem is a community plus its environment, not the distributional unit of a species.

D. The habitat is where a species lives; the niche is its functional role and distributional unit.

Question 213 Biology

All herbivores belong to which trophic level in the food chain?

- A. T1
- B. T2 ✓ **Correct answer**
- C. T3
- D. T4

A. T1 is the producers (plants), not herbivores.

B. Herbivores are primary consumers, trophic level T2.

C. T3 is the secondary consumers (small carnivores), not herbivores.

D. T4 is the tertiary consumers (top carnivores), not herbivores.

Question 214 Biology

How many food chains are present in following food web? [Food web: Leaves → Caterpillar → Beetle → Spider → Dog → Fox; Leaves → Slug → Frog → Snake → Fox; Wood → Wood Boring Beetle → Spider → Dog → Fox; Bark → Wood Louse → Spider → Dog → Fox]

- A. 5
- B. 3
- C. 6
- D. 4 ✓ **Correct answer**

4 food chains in the web, not 5.

B. There are 4 food chains in the web, not 3.

C. There are 4 food chains in the web, not 6.

D. The four food chains are: (1) Leaves → Caterpillar → Beetle → Spider → Dog → Fox; (2) Leaves → Slug → Frog → Snake → Fox; (3) Wood → Wood Boring Beetle → Spider → Dog → Fox; (4) Bark → Wood Louse → Spider → Dog → Fox.

Question 215 Biology

The relationship in which one organism gets benefit and the other is not affected is called

- A. Mutualism
- B. Commensalism ✓ **Correct answer**
- C. Predation
- D. Parasitism

A. Mutualism benefits both organisms, not one only.

B. Commensalism is the relationship in which one organism benefits and the other is neither harmed nor benefited.

C. Predation harms (kills) one organism.

D. Parasitism benefits one organism and harms the other.

Question 216 Biology

When a gene expresses the effects of a gene at another focus, this is known as

- A. Epistasis ✓ **Correct answer**
- B. Co-dominance
- C. Complete dominance

A. Epistasis is when a gene at one locus suppresses or masks the expression of a gene at another locus.

B. Co-dominance is when both alleles of a gene are expressed, not the effect of one gene on another.

C. Complete dominance is when one allele masks another at the same locus, not at another locus.

D. Mutation is a change in the DNA, not the interaction between genes.

Question 217 Biology

In male the sex determining gene is

- A. XY
- B. SRY ✓ **Correct answer**
- C. SYX
- D. SXX

A. XY is the male chromosome pair, not the sex-determining gene.

B. The SRY gene (sex-determining region Y) on the Y chromosome determines maleness.

C. SYX is not the sex-determining gene.

D. SXX is not the sex-determining gene.

Question 218 Biology

A gene which affects two or more unrelated characteristics is called

- A. Pleiotropic ✓ **Correct answer**
- B. Epistatic
- C. Dominant

A. A pleiotropic gene affects two or more unrelated characteristics (pleiotropy).

B. An epistatic gene masks the effect of another gene, it does not affect unrelated characteristics.

C. A dominant gene is one whose effect is expressed in the heterozygote, not one affecting unrelated characteristics.

D. A mutant gene is a changed gene, not one affecting unrelated characteristics.

Question 219 Biology

Position of a gene within a DNA molecule is

- A. Locus ✓ **Correct answer**
- B. Origin
- C. Amplicon
- D. Filial

A. The position of a gene on a chromosome/DNA molecule is its locus.

B. The origin is where DNA replication starts, not the position of a gene.

C. An amplicon is a piece of DNA amplified by PCR, not the position of a gene.

D. "Filial" refers to offspring generations, not the position of a gene.

Question 220 Biology

Sickle cell anemia is a type of

- A. Insertion
- B. Transposition
- C. Deletion
- D. Base Substitution ✓ **Correct answer**

anemia is caused by a single base change, not an insertion.

B. Sickle cell anemia is caused by a single base change, not a transposition.

C. Sickle cell anemia is caused by a single base change, not a deletion.

D. Sickle cell anemia is caused by a point mutation — a single base substitution (A → T) in the β-globin gene, changing glutamic acid to valine.

This paper remains the paper of the University of Health Sciences, Lahore. Ranjha Solutions branding is on this solved presentation only — the paper is not owned by Ranjha Solutions. UHS publishes the official question paper for this sitting — see the source note.

Past papers are **free** — no charge is taken from any student for papers. General Knowledge answers are as of the 2014 sitting.

Source: (accessed 8 Nov 2026). See the source note on this page about the fold-in corrections.