MDCAT (UHS entry test) — 2015 · Solved Past Paper

Body: University of Health Sciences, Lahore (UHS) · **Post:** MDCAT (UHS entry test) · **Year:** 2015 · **Questions:** 220 in the original paper — **218 solved and verified**, 2 excluded as defective (Q55, Q56) · **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 2015 sitting.

Source note: mdcatguide.com compilation 'UHS MDCAT 2015' (28 pages, scanned, no text layer), Paper Code B (Blue), 220 MCQs, 150 minutes, 1100 marks (5 per correct, -1 per wrong), held Sunday 30 August 2015. 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 library/ads pages, PDF pp. 22-28). 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 2015, Paper Code B, 220 rows, layout-parsed with the ID row skipped; Learnospot/PLS Academy quiz 'UHS MDCAT Past Paper 5' (quiz id 271, 220 items in a different order than the paper), correct answers extracted from the quiz scripts and mapped to paper letters by option text; textbook fact and worked derivations for every answer. 5 answers correct the official key (Q4, Q14, Q16, Q38, Q156); 2 questions DEFECTIVE-excluded (Q55 two correct options, Q56 no option follows from the printed numbers). 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

One method of creating an inverted population is known as _____ and consist of

the laser material with light.

- A. Optical Pumping ✓ **Correct answer**
- B. Excitation
- C. Bremsstrahlung
- D. Holography

A. Population inversion in a laser is created by optical pumping: illuminating the laser material with light (e.g. a flash lamp) to raise atoms to the excited state.

B. Excitation is the general process of raising atoms to a higher energy level, not the name of the method of creating an inverted population. Note: the paper prints this option under the label "C)" (the B label is misprinted as C in this question); the options are filed positionally.

C. Bremsstrahlung is the braking radiation produced when fast electrons are decelerated, not a laser pumping method.

D. Holography is a method of recording three-dimensional images using laser light, not a method of creating population inversion.

Question 2 Physics

In population inversion (Ruby Laser) atoms can reside in the excited state for:

- A. 10^{-11}
- B. 10^{-8} ✓ **Correct answer**
- C. 10^{-3}
- D. 10^{+3}

A. An ordinary excited state lasts about 10^{-8} s, not 10^{-11} s.

B. An atom in an ordinary excited state stays there for about 10^{-8} s before falling back; the metastable state (about 10^{-3} s) is what sustains population inversion. Note: the paper prints this option under the label "C)" (the B label is misprinted as C in this question); the

iled positionally.

C. 10^{-3} s is the lifetime of the metastable state in a ruby laser, not the ordinary excited state asked for here.

D. 10^{3} s is far longer than any excited-state lifetime.

Question 3 Physics

If electrons of charge 'e' moving with velocity 'v' are accelerated through a potential difference 'V' and strike a metal target, then velocity of electrons is:

- A. Ve/m
- B. √(Ve/m)
- C. √(Ve/2m)
- D. √(2Ve/m) ✓ **Correct answer**

A. The kinetic energy gained is eV = ½mv², so v = √(2Ve/m), not Ve/m.

B. The correct velocity is √(2Ve/m); √(Ve/m) is missing the factor of 2.

C. The correct velocity is √(2Ve/m); √(Ve/2m) has the factor of 2 in the wrong place.

D. From ½mv² = eV, v = √(2eV/m) = √(2Ve/m).

Question 4 Physics

In X-ray tube, electrons after being accelerated through velocity 'v' strike the target, then the wavelength of emitted X-rays is:

- A. Not greater than hc/eV
- B. Not less than hc/eV ✓ **Correct answer**
- C. Equal to the h/mV
- D. Equal to hc/eV

A. The emitted wavelength is never shorter than hc/eV, so "not greater than" is the wrong

≥ hc/eV.

B. By the Duane–Hunt law the shortest wavelength emitted is λ_min = hc/eV, so every emitted wavelength satisfies λ ≥ hc/eV, i.e. it is not less than hc/eV. The official key's D ("Equal to hc/eV") is wrong as a general statement — only the shortest wavelength equals hc/eV; the Learnospot quiz confirms the text "Greater than or equal to hc/eV".

C. h/mV is the de Broglie wavelength of the electron, not the X-ray wavelength.

D. Only the shortest (minimum) wavelength equals hc/eV; longer wavelengths are also emitted, so "equal to" is wrong as a general statement.

Question 5 Physics

In the reaction, $^{234}_{92}Th \longrightarrow {}^{234}_{91}Y + {}^{0}_{-1}e$ the electron ${}^{0}_{-1}e$ emits from the

- A. 1st Orbit
- B. 2nd Orbit
- C. Nucleus ✓ **Correct answer**
- D. Valence Shell

A. The electron emitted in β-decay comes from the nucleus, not from an atomic orbit.

B. The electron emitted in β-decay comes from the nucleus, not from an atomic orbit.

C. In β^- decay a neutron inside the nucleus changes into a proton and an electron, and the electron is emitted from the nucleus.

D. The electron emitted in β-decay comes from the nucleus, not from the valence shell.

Note: Filed option C read "Nudeus" (misprint in the source reproduction); corrected to "Nucleus" as documented in the reviewed file.

Question 6 Physics

According to the equation ${}^{A}_{z}X \longrightarrow Y + 3\alpha$ particles, what are the atomic and mass

- A. Z − 6, A − 12 ✓ **Correct answer**
- B. Z − 2, A − 4
- C. Z + 1, A
- D. Z + 3, A

A. Each α-particle carries away 2 protons and 4 nucleons, so 3 α-particles remove Z − 6 and A − 12.

B. That is the change for a single α-particle, not three.

C. α-emission decreases Z and A; it does not increase Z.

D. α-emission decreases Z and A; it does not increase Z.

Question 7 Physics

A certain radioactive nuclide of mass number 'x' decays by β-emission and α-emission to a second nuclide of mass number 't'. Which of following correctly relates 'x' and 't'?

- A. x = t + 4 ✓ **Correct answer**
- B. x = t − 4
- C. x − 3 = t
- D. x − 1 = t

A. β-emission leaves the mass number unchanged and α-emission reduces it by 4, so x = t + 4.

B. The first nuclide is heavier by 4, so x = t + 4, not t − 4.

C. α-emission reduces the mass number by 4, not 3.

D. α-emission reduces the mass number by 4, not 1.

8 Physics

During the decay of radioactive isotopes $^{232}_{90}X$ to a stable isotope, six α-particles and four β-particles are emitted, what is the atomic number 'Z' and mass number 'A' of the stable isotopes.

- A. Z = 70, A = 220
- B. Z = 78, A = 212
- C. Z = 82, A = 212
- D. Z = 82, A = 208 ✓ **Correct answer**

A. Six α-particles remove 12 protons and 24 nucleons; four β-particles add back 4 protons: Z = 90 − 12 + 4 = 82 and A = 232 − 24 = 208, not 70 and 220.

B. Z = 90 − 12 + 4 = 82 and A = 232 − 24 = 208, not 78 and 212.

C. Z = 82 is right, but A = 232 − 24 = 208, not 212.

D. Z = 90 − 6×2 + 4×1 = 82 and A = 232 − 6×4 = 208.

Question 9 Physics

Cobalt 60 is used in medicine and is an intense source of:

- A. α-particles
- B. β-particles
- C. γ-rays ✓ **Correct answer**
- D. Neutrons

A. Cobalt-60 is an intense source of γ-rays, not α-particles.

B. Cobalt-60 emits β-particles as it decays, but it is used as an intense source of γ-rays.

C. Cobalt-60 decays by β-emission to excited nickel-60, which emits two intense γ-rays (1.17 and 1.33 MeV); it is used in medicine and industry as a γ-ray source.

D. Cobalt-60 is not a neutron source.

10 Physics

In fluid flow, for the equation of continuity $A_1v_1 = A_2v_2$. If velocity of the fluid at one end is doubled, then what will be the cross-sectional area at this end?

- A. Double
- B. Half ✓ **Correct answer**
- C. $(Half)^2$
- D. $(Double)^2$

A. By continuity $A_1v_1 = A_2v_2$, doubling the velocity halves the area; it does not double it.

B. From $A_1v_1 = A_2v_2$, if $v_2 = 2v_1$ then $A_2 = A_1/2$, i.e. the area becomes half.

C. The area is inversely proportional to the velocity (first power), so it becomes half, not $(half)^2$.

D. The area is inversely proportional to the velocity, so it becomes half, not $(double)^2$.

Question 11 Physics

The value of least distance vision for normal eye is

- A. 20 cm
- B. 30 cm
- C. 25 cm ✓ **Correct answer**
- D. 40 cm

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

B. The least distance of distinct vision for a normal eye is 25 cm, not 30 cm.

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

D. The least distance of distinct vision for a normal eye is 25 cm, not 40 cm.

12 Physics

The distance between two dark adjacent fringes is mathematically written as:

- A. $\Delta Y = \lambda L/d$ ✓ **Correct answer**
- B. $\Delta Y = \lambda/dL$
- C. $\Delta Y = \lambda d/L$
- D. $\Delta Y = d/\lambda L$

A. The fringe separation is $\Delta Y = \lambda L/d$ (wavelength × slit-to-screen distance ÷ slit separation).

B. The correct formula is $\Delta Y = \lambda L/d$; λ/dL is dimensionally wrong.

C. The correct formula is $\Delta Y = \lambda L/d$; $\lambda d/L$ inverts L and d.

D. The correct formula is $\Delta Y = \lambda L/d$; $d/\lambda L$ is its reciprocal.

Question 13 Physics

In Young's Double Slit Experiment, slit separation x = 0.05 cm, distance between screen and slit D = 200 cm, fringes separation x = 0.13 cm, then the wavelength 'λ' of light is:

- A. $\lambda = 1.23 \times 10^{-2}$ m
- B. $\lambda = 3.25 \times 10^{-7}$ m ✓ **Correct answer**
- C. $\lambda = 4.55 \times 10^{-5}$ m
- D. $\lambda = 5.1 \times 10^{-7}$ m

A. $\lambda = x \cdot d/D = 0.13 \times 0.05 / 200$ cm $= 3.25 \times 10^{-7}$ m, not 1.23×10^{-2} m.

B. $\lambda = x \cdot d/D = (0.13 \text{ cm} \times 0.05 \text{ cm}) / 200 \text{ cm} = 3.25 \times 10^{-5}$ cm $= 3.25 \times 10^{-7}$ m. The official key gives B; the Learnospot quiz keys D (5.1×10^{-7} m), which does not follow from the printed numbers.

C. $\lambda = x \cdot d/D = 3.25 \times 10^{-7}$ m, not 4.55×10^{-5} m.

D. 5.1×10^{-7} m does not follow from the printed numbers (x = 0.13 cm, d = 0.05 cm, D =

3.25 × 10⁻⁷ m).

Question 14 Physics

In normal adjustment of compound microscope, the eye piece is positioned so that the final image is formed at:

- A. Optical Center
- B. Infinity ✓ **Correct answer**
- C. Principal Focus
- D. Near Point

A. In normal adjustment the final image is formed at infinity, not at the optical center.

B. In normal adjustment (relaxed eye) the intermediate image is formed at the focal point of the eyepiece, so the final image is at infinity. The official key's D (Near Point) describes near-point adjustment, not normal adjustment; the Learnospot quiz confirms Infinity.

C. The intermediate image is formed at the principal focus of the eyepiece, but the final image in normal adjustment is at infinity.

D. The final image is formed at the near point only in near-point adjustment; in normal adjustment it is at infinity.

Note: Filed option C read "Principle Focus" (misprint in the source reproduction); corrected to "Principal Focus" as documented in the reviewed file.

Question 15 Physics

Mathematical formula of maximum velocity (v_0) for a body executing simple harmonic motion is:

- A. $v_0 = \omega x_0$ ✓ **Correct answer**
- B. $v_0 = (k/m)\sqrt{(x_0^2 - x^2)}$
- C. $v_0 = v\sqrt{(1 - x^2/x_0^2)}$

$mv(x_0^2 - x^2)$

A. The maximum velocity in SHM is $v_0 = \omega x_0$ (at the mean position).

B. The velocity at displacement x is $v = \omega\sqrt{(x_0^2 - x^2)}$ with $\omega = \sqrt{(k/m)}$; $(k/m)\sqrt{(x_0^2 - x^2)}$ is dimensionally wrong.

C. $v = v_0\sqrt{(1 - x^2/x_0^2)}$ is the velocity at displacement x, not the maximum velocity v_0 itself.

D. That is dimensionally wrong (mass × length is not a velocity).

Question 16 Physics

A body is having weight 20 N, when the elevator is descended with a = 0.1 ms^{-2}, then the value of tension 'T' is:

- A. 196 N
- B. 19.8 N ✓ **Correct answer**
- C. 1.98 N
- D. 2 N

A. 196 N would be the tension for a 20 kg mass (weight 200 N) at rest; here the weight is 20 N.

B. The mass is m = W/g = 20/10 = 2 kg; descending with a = 0.1 m/s^2, T = m(g − a) = 2 × (10 − 0.1) = 19.8 N. The paper prints this option under the label "C)" (both the 1.98 N and 19.8 N options are labelled "C)" in the print); the official key's "C" refers to the 19.8 N option as printed, which is positionally B — filed as B, confirmed by the Learnospot quiz (correct text 19.8 N).

C. 1.98 N is a factor of 10 too small; T = m(g − a) = 19.8 N.

D. 2 N is the mass (2 kg), not the tension.

17 Physics

Sodium 24 has half-life of 15 hour and it is used in medicine to estimate:

- A. Kidney Function
- B. Plasma Blood Volume ✓ **Correct answer**
- C. Iron in Plasma
- D. Thyroid Function

A. Sodium-24 is used to estimate plasma blood volume, not kidney function.

B. Sodium-24 (half-life 15 hours) is injected as a tracer and its dilution is used to estimate the plasma blood volume.

C. Sodium-24 is used to estimate plasma blood volume, not iron in plasma.

D. Iodine-131, not sodium-24, is used to study thyroid function.

Question 18 Physics

The unit of temperature in base unit is:

- A. Celsius
- B. Degree
- C. Kelvin ✓ **Correct answer**
- D. Fahrenheit

A. Celsius is a derived (practical) scale, not the SI base unit of temperature.

B. "Degree" is not a unit of temperature on its own.

C. The SI base unit of temperature is the kelvin.

D. Fahrenheit is not the SI base unit of temperature.

19 Physics

The dimensions of pressure is:

- A. $[M^{-1}L^{2}T^{-2}]$
- B. $[ML^{-1}T]$
- C. $[M^{-1}L^{-2}T^{-2}]$
- D. $[ML^{-1}T^{-2}]$ ✓ **Correct answer**

A. Pressure = force/area = $[MLT^{-2}]/[L^{2}] = [ML^{-1}T^{-2}]$, not $[M^{-1}L^{2}T^{-2}]$.

B. Pressure has dimensions $[ML^{-1}T^{-2}]$, not $[ML^{-1}T]$.

C. Pressure has dimensions $[ML^{-1}T^{-2}]$, not $[M^{-1}L^{-2}T^{-2}]$.

D. Pressure = force per unit area = $[MLT^{-2}]/[L^{2}] = [ML^{-1}T^{-2}]$.

Question 20 Physics

In Wilson Cloud Chamber which of the following tracks represented β-particles?

- A. Diagram: thick straight lines radiating from a source
- B. Diagram: short scattered dashes
- C. Diagram: long wavy thin tracks ✓ **Correct answer**
- D. Diagram: dense crossing tangled tracks

A. Thick, straight, dense tracks are made by α-particles (heavy, strongly ionising, short range).

B. Short scattered dashes are the tracks of secondary electrons knocked out by γ-rays.

C. β-particles are light and easily deflected, so they leave long, thin, wavy (straggling) tracks in the cloud chamber.

D. A dense tangle of crossing tracks is not the β-particle track pattern.

21 Physics

Mass flow per second of the fluid is given by:

- A. ρAv ✓ **Correct answer**
- B. Av
- C. ρv
- D. Av/ρ

A. The volume flowing per second is Av, so the mass flowing per second is density × volume per second = ρAv.

B. Av is the volume flow rate, not the mass flow rate.

C. ρv is the mass flow per unit area, not the mass flow per second (it lacks the area A).

D. Av/ρ is dimensionally wrong for a mass flow rate.

Question 22 Physics

The dimension of coefficient of viscosity is:

- A. $[M^{-2}L^{-1}T^{-1}]$
- B. $[ML^{-2}T^{-1}]$
- C. $[ML^{-2}T^{1}]$
- D. $[ML^{-1}T^{-1}]$ ✓ **Correct answer**

A. The coefficient of viscosity has dimensions $[ML^{-1}T^{-1}]$, not $[M^{-2}L^{-1}T^{-1}]$.

B. The coefficient of viscosity has dimensions $[ML^{-1}T^{-1}]$, not $[ML^{-2}T^{-1}]$.

C. The coefficient of viscosity has dimensions $[ML^{-1}T^{-1}]$, not $[ML^{-2}T^{1}]$.

D. From $F = \eta A(dv/dx)$, $\eta = F/(A \cdot dv/dx) = [MLT^{-2}]/([L^{2}][T^{-1}]) = [ML^{-1}T^{-1}]$.

23 Physics

What should be the length of simple pendulum whose period is 6.28 second at a place where g = 10 ms^{-2}.

- A. 0.28 m
- B. 10.8 m
- C. 6.28 m
- D. 10 m ✓ **Correct answer**

A. From $T = 2\pi\sqrt{(l/g)}$, $l = gT^2/4\pi^2 = 10 \times (6.28)^2/4\pi^2 = 10$ m, not 0.28 m.

B. $l = gT^2/4\pi^2 = 10$ m, not 10.8 m.

C. $l = gT^2/4\pi^2 = 10$ m, not 6.28 m.

D. $T = 2\pi\sqrt{(l/g)}$ gives $\sqrt{(l/10)} = 6.28/2\pi = 1$, so $l = 10$ m.

Question 24 Physics

What should be the ration of kinetic energy to total energy for simple harmonic oscillator?

- A. $1 - x^2/x_0^2$ ✓ **Correct answer**
- B. 1
- C. $(x_0^2 - x^2)$
- D. $½x^2$

A. $KE = ½m\omega^2(x_0^2 - x^2)$ and total energy $= ½m\omega^2x_0^2$, so $KE/TE = (x_0^2 - x^2)/x_0^2 = 1 - x^2/x_0^2$.

B. KE equals the total energy only at the mean position ($x = 0$); in general the ratio is $1 - x^2/x_0^2$.

C. $(x_0^2 - x^2)$ is the numerator of the ratio, not the ratio itself (it must be divided by x_0^2).

D. $½x^2$ is not the KE/total-energy ratio.

25 Physics

An observer moves with velocity 'v_0' toward a stationary source, then the number of waves received in one second is:

- A. $f' = f(v/(v+v_0))$
- B. $f' = f(v/(v-v_0))$
- C. $f' = f((v+v_0)/v)$ ✓ **Correct answer**
- D. $f' = f((v-v_0)/v)$

A. That is the frequency heard when the observer moves AWAY from the source (it is less than f).

B. That is the frequency when the SOURCE moves toward the observer.

C. By the Doppler effect, an observer moving toward a stationary source at speed v_0 receives $f' = f(v + v_0)/v$ waves per second.

D. That is the frequency when the observer moves away from the source.

Question 26 Physics

Strain energy in a deformed energy is stored in the form of:

- A. Elastic Energy
- B. Potential Energy ✓ **Correct answer**
- C. Plastic Energy
- D. Kinetic Energy

A. Strain energy is stored as potential energy in the deformed material, not as "elastic energy" as such.

B. The work done in deforming a body is stored in it as (elastic) potential energy — the strain energy.

C. Plastic deformation dissipates energy as heat; the stored strain energy is potential

D. The deformed body is at rest; its stored strain energy is potential, not kinetic.

Question 27 Physics

A wire of area of cross section 'A' and original length 'l' is subjected to a load 'L'. A second wire of same material with an area is '2A' and length '2l' is subjected to the same load 'L'. If the extension in first wire is 'X' and second wire is 'Y', find the ratio 'X/Y'.

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

A. Extension e = FL/(AY): the first wire extends X = FL/(AY) and the second Y = F(2l)/(2A·Y) = FL/(AY) = X, so X/Y = 1, not 1/4.

B. The second wire's extension is Y = F(2l)/(2A·Y) = FL/(AY) = X, so X/Y = 1, not 1/2.

C. Doubling both the area and the length leaves the extension unchanged ($e \propto l/A$), so Y = X and X/Y = 1.

D. The second wire's extension is Y = X, so X/Y = 1, not 2/1.

Question 28 Physics

Two sample of gases '1' and '2' are taken at same temperature and pressure but the ratio of number of their volume is $V_1:V_2 = 2:3$. What is the ration of number of moles of the gas sample?

- A. 3:2
- B. √2:√3
- C. 4:9
- D. 2:3 ✓ **Correct answer**

dro's law the number of moles is proportional to the volume, so $n_1:n_2 = V_1:V_2 = 2:3$, not 3:2.

B. The mole ratio equals the volume ratio directly (2:3), not its square root.

C. The mole ratio equals the volume ratio (2:3), not its square (4:9).

D. At the same temperature and pressure, equal volumes contain equal numbers of moles (Avogadro's law), so $n_1:n_2 = V_1:V_2 = 2:3$.

Question 29 Physics

Root mean square velocity of a gas having pressure 'P' and density 'ρ' is given by:

- A. √(3P/ρ) ✓ **Correct answer**
- B. 3P/ρ
- C. √(3ρ/P)
- D. 3ρ/P

A. From kinetic theory, v_rms = √(3P/ρ). The official key gives A; the Learnospot quiz keys D (3ρ/P), which is wrong (it is not even a velocity).

B. v_rms is the square root of 3P/ρ, not 3P/ρ itself.

C. v_rms = √(3P/ρ); √(3ρ/P) inverts P and ρ.

D. 3ρ/P is not a velocity; v_rms = √(3P/ρ).

Question 30 Physics

When the rate of gas changes without change in temperature, the gas is said to undergo:

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

A. A change at constant temperature is an isothermal process. (The paper prints "rate of gas", evidently a misprint for "volume of gas".)

B. An adiabatic process is one with no heat exchange, not one at constant temperature.

C. An isochoric process is one at constant volume, not one at constant temperature.

D. An isobaric process is one at constant pressure, not one at constant temperature.

Question 31 Physics

What is the 273 k on the Celsius scale of temperature?

- A. 0.15 °C
- B. 273.15 °C
- C. −0.15 °C ✓ **Correct answer**
- D. −273.15 °C

A. 273 K = 273 − 273.15 = −0.15 °C, not +0.15 °C.

B. 273.15 °C would be 546.3 K, not 273 K.

C. Since 0 °C = 273.15 K, 273 K = 273 − 273.15 = −0.15 °C.

D. −273.15 °C is absolute zero (0 K), not 273 K.

Question 32 Physics

If heat 'Q_1' is absorbed at temperature 'T' and heat 'Q_2' is absorbed at temperature of triple point of water, then unknown temperature of system (in K) is:

- A. 273.16
- B. 273.16 Q_2/Q_1
- C. 273.16 Q
- D. 273.16 Q_1/Q_2 ✓ **Correct answer**

s the triple-point temperature itself, not the unknown temperature T.

B. By the thermodynamic temperature definition $T/273.16 = Q_1/Q_2$, so $T = 273.16\ Q_1/Q_2$, not $273.16\ Q_2/Q_1$.

C. "273.16 Q" is incomplete as printed and is not the temperature.

D. On the thermodynamic scale $T = 273.16 \times (Q_1/Q_2)$, where Q_1 is the heat absorbed at T and Q_2 the heat absorbed at the triple point (273.16 K).

Question 33 Physics

If the fundamental logic gates are connected as: [two NOR gates (OR symbol with a bubble at the output), each with inputs A and B, feeding an AND gate with output X] What are the mathematical notation for this logic gate?

- A. (A with a bar + B with a bar)·(A + B)
- B. ((A + B) with a bar over it)·((A + B) with a bar over it) ✓ **Correct answer**
- C. ((A + B) with a bar over it)(A with a bar + B with a bar)
- D. (A.B with a bar over it) + (A.B with a bar over it)

A. The two input gates are NOR gates, not NAND gates: each outputs (A + B) with a bar over it, not (A with a bar + B with a bar).

B. Each NOR gate outputs (A + B) with a bar over it (NOT of A OR B), and the AND gate multiplies the two outputs, giving X = (A + B with a bar over it)·(A + B with a bar over it).

C. The second factor is a NAND output, but both input gates are NOR gates, so both factors are (A + B) with a bar over it.

D. That is the OR of two NAND outputs; the circuit ANDs two NOR outputs instead.

Question 34 Physics

Which combinations of seven identical resistors each of 2 Ω gives rise to the resultant of

- A. 5 Parallel, 2 Series
- B. 4 Parallel, 3 Series
- C. 3 Parallel, 4 Series
- D. 2 Parallel, 5 Series ✓ **Correct answer**

A. 5 in parallel give 0.4 Ω and 2 in series give 4 Ω; in parallel that is (0.4 × 4)/4.4 = 0.36 Ω, not 10/11 Ω.

B. 4 in parallel give 0.5 Ω and 3 in series give 6 Ω; in parallel that is (0.5 × 6)/6.5 = 0.46 Ω, not 10/11 Ω.

C. 3 in parallel give 2/3 Ω and 4 in series give 8 Ω; in parallel that is (2/3 × 8)/(26/3) = 0.62 Ω, not 10/11 Ω.

D. 2 in parallel give 1 Ω and 5 in series give 10 Ω; the two groups in parallel give (1 × 10)/(1 + 10) = 10/11 Ω. (The Learnospot twin is a different 10-resistor question asking for 10.4 Ω, so it is not a cross-check here.)

Question 35 Physics

If a resistor having resistance 'R' is cut into three equal parts, then the equivalent of parallel combination is:

- A. 6/R
- B. 3/R
- C. R/9 ✓ **Correct answer**
- D. R/3

A. 6/R has the units of a conductance (1/Ω), not a resistance.

B. 3/R has the units of a conductance, not a resistance; the Learnospot quiz keys B, which is dimensionally wrong.

C. Each part has resistance R/3; three R/3 resistors in parallel give 1/R_eq = 3/(R/3) = 9/R,

D. R/3 is the resistance of one part alone, not of the three parts in parallel.

Question 36 Physics

Which of the following is the truth table for the logic gate; [OR gate with inputs A and B, output Y]

- A. Truth table: A=0, B=0 → Y=0; A=0, B=1 → Y=1; A=1, B=0 → Y=1; A=1, B=1 → Y=1 ✓ **Correct answer**
- B. Truth table: A=0, B=0 → Y=0; A=0, B=1 → Y=0; A=1, B=0 → Y=0; A=1, B=1 → Y=1
- C. Truth table: A=0, B=0 → Y=1; A=0, B=1 → Y=0; A=1, B=0 → Y=0; A=1, B=1 → Y=1
- D. Truth table: A=0, B=0 → Y=0; A=0, B=1 → Y=1; A=1, B=0 → Y=1; A=1, B=1 → Y=0

A. An OR gate gives output 1 whenever at least one input is 1, and 0 only when both inputs are 0.

B. That is the truth table of an AND gate, not an OR gate.

C. That is the truth table of an XNOR gate, not an OR gate.

D. That is the truth table of an XOR gate, not an OR gate.

Question 37 Physics

A bar of length 'L' pivoted at 'O' is acted by a force 'F' at an angle 'θ' with vertical line as shown in figure; [a horizontal bar of length L pivoted at O (left end), force F applied at the right end at angle θ from the vertical] What is the moment of force?

- A. L sinθ
- B. L cosθ
- C. LF cosθ ✓ **Correct answer**
- D. LF sinθ

A. The moment is force × perpendicular distance (FL cosθ); L sinθ has no force in it.

ent is force × perpendicular distance (FL cosθ); L cosθ has no force in it.

C. The moment about O is F × L × sin(angle between the bar and F) = FL sin(90° − θ) = FL cosθ.

D. The angle between the bar (horizontal) and the force is 90° − θ, so the moment is FL sin(90° − θ) = FL cosθ, not FL sinθ.

Question 38 Physics

The resistance of a piece of wire is 12 Ω. It is bent to form an equilateral triangle. What is the equivalent resistance between any two corners of the triangles?

- A. 1.3 Ω
- B. 2.0 Ω
- C. 4.0 Ω
- D. 2.7 Ω ✓ **Correct answer**

A. Each side is 4 Ω; between two corners one 4 Ω side is in parallel with the other two sides in series (8 Ω), giving (4 × 8)/12 = 2.67 Ω, not 1.3 Ω.

B. The parallel combination of 4 Ω and 8 Ω is 8/3 = 2.67 Ω, not 2.0 Ω.

C. 4 Ω is the resistance of one side alone, not the equivalent between two corners.

D. Each side is 12/3 = 4 Ω; between two corners, 4 Ω in parallel with 4 + 4 = 8 Ω gives (4 × 8)/(4 + 8) = 32/12 = 2.67 ≈ 2.7 Ω. The official key's B (2.0 Ω) is wrong; the Learnospot quiz confirms 2.7 Ω.

Question 39 Physics

Magnetic field strength is measure in:

- A. Wbm^{-1}
- B. Wbm^{-2} ✓ **Correct answer**
- C. Wbm^{2}

A. Magnetic flux density (field strength) B is measured in tesla = Wb/m², not Wb/m.

B. Magnetic flux density B = flux/area, so its unit is the tesla = Wb/m².

C. Wb·m² is not the unit of magnetic field strength.

D. The weber is the unit of magnetic flux, not of field strength (flux per unit area).

Question 40 Physics

Force on current carrying conductor per unit length is given by:

- A. IL sinθ
- B. IL
- C. ILB
- D. IB sinθ ✓ **Correct answer**

A. Force per unit length is F/L = IB sinθ; IL sinθ lacks the field B.

B. Force per unit length is F/L = IB sinθ, not IL.

C. ILB is the total force (when θ = 90°), not the force per unit length. Note: the paper prints this option under the label "B)" (the C label is misprinted as B in this question); the options are filed positionally.

D. From F = ILB sinθ, the force per unit length is F/L = IB sinθ.

Question 41 Physics

In the case when the electrons lose all their kinetic energy (K.E.) in the first collision, the X-ray photon emitted has which of the following set of frequency and wavelength?

- A. f_max, λ_min ✓ **Correct answer**
- B. f_max, λ_max
- C. f_min, λ_max

in, λ_min

A. Losing all its kinetic energy, the electron gives the photon the maximum possible energy E = eV, hence the maximum frequency f_max and, since λ = c/f, the minimum wavelength λ_min. The official key gives A; the Learnospot quiz keys C (f_min, λ_max), which is the minimum-energy photon, not the maximum.

B. Maximum frequency goes with minimum wavelength, not maximum.

C. That is the lowest-energy photon; losing all its KE gives the highest-energy photon.

D. Minimum frequency goes with maximum wavelength, not minimum.

Question 42 Physics

If 'A' is fundamental dimension of ampere then the dimension of magnetic field strength is:

- A. $[MT^2A^{-2}]$
- B. $[MT^{-2}A^{-1}]$ ✓ **Correct answer**
- C. $[MT^2L^2A^{-1}]$
- D. $[MT^2L^{-2}A^{-2}]$

A. Magnetic field strength B = F/(IL) has dimensions $[MLT^{-2}]/([A][L]) = [MT^{-2}A^{-1}]$, not $[MT^2A^{-2}]$.

B. B = F/(IL) = $[MLT^{-2}]/([A][L]) = [MT^{-2}A^{-1}]$.

C. Magnetic field strength has dimensions $[MT^{-2}A^{-1}]$, not $[MT^2L^2A^{-1}]$.

D. Magnetic field strength has dimensions $[MT^{-2}A^{-1}]$, not $[MT^2L^{-2}A^{-2}]$.

Question 43 Physics

The potential difference between target and cathode of an X-rays tube is 20 kV and current is 20 mA. What is the λ_min of the emitted X-ray?

- B. 6.19×10^{-14} m
- C. 6.19×10^{-11} m ✓ **Correct answer**
- D. 6.19×10^{-19} m

A. $\lambda_{min} = hc/eV = 6.626\times10^{-34} \times 3\times10^{8}/(1.6\times10^{-19} \times 2\times10^{4}) = 6.19 \times 10^{-11}$ m, not 10^{-4} m.

B. $\lambda_{min} = hc/eV = 6.19 \times 10^{-11}$ m, not 10^{-14} m.

C. By the Duane–Hunt law $\lambda_{min} = hc/eV = (6.626 \times 10^{-34} \times 3 \times 10^{8})/(1.6 \times 10^{-19} \times 20{,}000) = 6.19 \times 10^{-11}$ m. (The 20 mA current is irrelevant.)

D. $\lambda_{min} = hc/eV = 6.19 \times 10^{-11}$ m, not 10^{-19} m.

Question 44 Physics

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

- A. Intensity–wavelength graph: continuous curve with two sharp peaks ✓ **Correct answer**
- B. Intensity–wavelength graph: low broad hump
- C. Intensity–wavelength graph: smooth bell-shaped curve
- D. Intensity–wavelength graph: curve rising to a plateau

A. The X-ray output spectrum is a continuous (bremsstrahlung) curve with sharp characteristic lines superimposed on it, exactly as drawn here.

B. A low broad hump with no sharp peaks is not the X-ray spectrum.

C. A smooth bell curve with no characteristic peaks is not the X-ray spectrum.

D. A curve rising to a plateau is not the X-ray spectrum.

Question 45 Chemistry

'K_a' values of few organic acids are given: [table: CH_3COOH 1.85×10^{-5}; CCl_3COOH 2.3 ×

OOH 5.0×10^{-3}, $CH_2ClCOOH$ 1.3×10^{-3}] The order of acid strength is:

- A. $CCl_3COOH > CHCl_2COOH > CH_2ClCOOH > CH_3COOH$ ✓ **Correct answer**
- B. $CH_3COOH > CHCl_2COOH > CCl_3COOH > CH_2ClCOOH$
- C. $CHCl_2COOH > CH_3COOH > CCl_3COOH > CH_2ClCOOH$
- D. $CCl_3COOH > CH_3COOH > CHCl_2COOH > CH_2ClCOOH$

A. Acid strength follows K_a: CCl_3COOH (2.3×10^{-2}) > $CHCl_2COOH$ (5.0×10^{-3}) > $CH_2ClCOOH$ (1.3×10^{-3}) > CH_3COOH (1.85×10^{-5}).

B. CH_3COOH has the smallest K_a, so it is the weakest acid, not the strongest.

C. CCl_3COOH has the largest K_a, so it is the strongest acid.

D. CH_3COOH has the smallest K_a, so it is the weakest acid, not the second strongest.

Question 46 Chemistry

An organic acid 'z' reacts separately with sodium bicarbonate, sodium hydroxide and sodium carbonate. Which one of the following represent the structure of 'z'?

- A. $HCOOC_2H_5$
- B. $CH_3{-}CH{=}CH_2$
- C. CH_3CH_2OH
- D. $H_3C{-}CH_2{-}COOH$ ✓ **Correct answer**

A. Ethyl formate is an ester; it does not react with sodium bicarbonate.

B. Propene is an alkene; it does not react with sodium bicarbonate, sodium hydroxide or sodium carbonate.

C. Ethanol is too weak an acid to react with sodium bicarbonate or sodium carbonate.

D. Propanoic acid is a carboxylic acid; it reacts with sodium bicarbonate (releasing CO_2), with sodium hydroxide and with sodium carbonate.

47 Chemistry

Carboxylic acids are rather hard to reduce, which powerful reducing agent can be used to convert them to the corresponding primary alcohol:

- A. $H_2SO_4/HgSO_4$
- B. V_2O_5
- C. $LiAlH_4$ ✓ **Correct answer**
- D. $K_2Cr_2O_7/H_2SO_4$

A. Sulphuric acid with mercuric sulphate is a hydration catalyst, not a reducing agent for carboxylic acids.

B. Vanadium pentoxide is an oxidation catalyst, not a reducing agent for carboxylic acids.

C. Lithium aluminium hydride is the powerful reducing agent that reduces carboxylic acids to the corresponding primary alcohols.

D. Potassium dichromate in sulphuric acid is a strong oxidising agent, the opposite of what is needed.

Question 48 Chemistry

[Structure: $H_2N-CH(H)-C(=O)-NH-CH(CH_3)-C(=O)-OH$] This structure is

- A. Gly-Ala (dipeptide) ✓ **Correct answer**
- B. Asp-Gly (dipeptide)
- C. Gly-Val (dipeptide)
- D. Asp-Val (dipeptide)

A. The first residue has H as its side chain (glycine) and the second has CH_3 as its side chain (alanine), joined by a peptide bond: Gly-Ala. (The Learnospot twin is a different question about unsaturated fatty acids, so it is not a cross-check here.)

B. Neither residue has the CH_2COOH side chain of aspartic acid.

d residue has a CH_3 side chain (alanine), not the $(CH_3)_2CH-$ side chain of valine.

D. Neither residue is aspartic acid or valine.

Question 49 Chemistry

Which one of the following amino acids is basic in nature?

- A. Glycine
- B. Alanine
- C. Lysine ✓ **Correct answer**
- D. Glutamic acid

A. Glycine is a neutral amino acid (one amino and one carboxyl group).

B. Alanine is a neutral amino acid (one amino and one carboxyl group).

C. Lysine carries an extra amino group in its side chain, so it is basic in nature.

D. Glutamic acid carries an extra carboxyl group in its side chain, so it is acidic, not basic.

Question 50 Chemistry

Which one of the following structures shows the correct formula of glutamic acid?

- A. H_2N-CH_2-COOH
- B. $HOOC-(CH_2)_2-CH(NH_2)-COOH$ ✓ **Correct answer**
- C. $H_2N-CH(COOH)-COOH$
- D. $H_2N-CH-COOH$ with a $-CH(CH_3)-COOH$ side chain

A. That is glycine, not glutamic acid.

B. Glutamic acid is 2-aminopentanedioic acid: $HOOC-CH_2-CH_2-CH(NH_2)-COOH$. (The Learnospot twin is a different question about lipid synthesis, so it is not a cross-check here.)

aminomalonic acid, not glutamic acid.

D. That is a methyl-substituted aspartic acid, not glutamic acid.

Question 51 Chemistry

Select the correct Zwitter ionic structures of an amino acid.

- A. $R-C^{+}(H)(NH_2)-COOH$ (charge on R)
- B. $H_3N^{+}-C(R)(H)-COO^{-}$ ✓ **Correct answer**
- C. $H_2N^{+}-CH_2-COO^{-}$
- D. $H_3N^{+}-C(R^{+})(H)-COO^{-}$ (charge on R)

A. The amino group is neutral NH_2 and the carboxyl is neutral COOH, so this is not a zwitterion (and the positive charge is wrongly placed on R).

B. The zwitterion of an amino acid has the amino group protonated (H_3N^{+}) and the carboxyl group deprotonated (COO^{-}).

C. The amino group must be H_3N^{+}, not H_2N^{+}, and the central carbon must carry R and H.

D. The positive charge is wrongly placed on R as well as on the amino group; the zwitterion has the charges only on H_3N^{+} and COO^{-}.

Question 52 Chemistry

How many moles of sodium are present in 0.1 g of sodium?

- A. 4.3×10^{-3} ✓ **Correct answer**
- B. 4.03×10^{-1}
- C. 4.01×10^{-2}
- D. 4.3×10^{-2}

A. Moles = mass/molar mass = $0.1/23 = 4.35 \times 10^{-3} \approx 4.3 \times 10^{-3}$ mol.

B. $0.1/23 = 4.3 \times 10^{-3}$ mol, not 4.03×10^{-1} mol.

$.3 \times 10^{-3}$ mol, not 4.01×10^{-2} mol.

D. 0.1/23 = 4.3×10^{-3} mol, not 4.3×10^{-2} mol.

Question 53 Chemistry

The structural formula for alanine is:

- A. $(CH_3)_2CH-CH(NH_2)-COOH$
- B. $H-CH(NH_2)-COOH$
- C. $HO-CH_2-CH(NH_2)-COOH$
- D. $CH_3-CH(NH_2)-COOH$ ✓ **Correct answer**

A. That is valine (side chain $(CH_3)_2CH-$), not alanine.

B. That is glycine (side chain H), not alanine.

C. That is serine (side chain $HO-CH_2-$), not alanine.

D. Alanine is 2-aminopropanoic acid, $CH_3-CH(NH_2)-COOH$ (side chain CH_3).

Question 54 Chemistry

With the help of spectral data given calculate the mass of Neon and encircle the best option. (Percentage of $_{10}Ne^{20}$, $_{10}Ne^{21}$ and $_{10}Ne^{22}$ are 90.92%, 0.26% and 8.82% respectively).

- A. 22.18 amu
- B. 21.18 amu
- C. 20.18 amu ✓ **Correct answer**
- D. 22.20 amu

A. The weighted average is (20 × 90.92 + 21 × 0.26 + 22 × 8.82)/100 = 20.18 amu, not 22.18 amu.

B. The weighted average is 20.18 amu, not 21.18 amu.

tomic mass = (20 × 90.92 + 21 × 0.26 + 22 × 8.82)/100 = 2017.9/100 = 20.18 amu.

D. The weighted average is 20.18 amu, not 22.20 amu.

Question 55 Chemistry

Which one of the following pairs has the same electronic configuration as possessed by Neon (Ne-10)?

- A. Na^+, Cl^-
- B. K^+, Cl^-
- C. Na^+, Mg^{2+}
- D. Na^+, F^-

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). Two options are correct: both C (Na^+, Mg^{2+}) and D (Na^+, F^-) are isoelectronic with neon — Na^+, Mg^{2+} and F^- each have 10 electrons ($1s^2 2s^2 2p^6$), the neon configuration — so the question has no unique correct answer. The official key gives D. This question must never be taught as having a single answer.

A. Wrong: Cl^- has 18 electrons (the argon configuration), not the neon configuration.

B. Wrong: K^+ and Cl^- both have 18 electrons (the argon configuration), not the neon configuration.

C. Both ions have 10 electrons ($1s^2 2s^2 2p^6$), the neon configuration — this option is also correct, so it is not uniquely correct.

D. Both ions have 10 electrons ($1s^2 2s^2 2p^6$), the neon configuration — this is the option the official key gives, but C is equally correct, so it is not uniquely correct.

56 Chemistry

If the volume of a gas collected at a temperature of 600 °C and pressure of 1.05×10^5 Nm^{-2} is 60 dm^3, what would be the volume of gas at STP ($P=1.01 \times 10^3$ Nm^{-2}, T = 273 K)?

- A. 25 cm^3
- B. 75 cm^3
- C. 100 cm^3
- D. 51 cm^3

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). No listed option follows from the printed numbers: by the combined gas law $V_2 = P_1V_1T_2/(P_2T_1)$ = $(1.05 \times 10^5 \times 60 \times 273)/(1.01 \times 10^5 \times 873)$ = 19.5 dm^3 = 19,500 cm^3, which is not among the options (and taking the printed STP pressure 1.01×10^3 literally gives 1,951 dm^3). The official key's D (51 cm^3) would be correct only if the temperature were 60 °C (not 600 °C) and the volume 60 cm^3 (not 60 dm^3). This question must never be taught as having an answer.

A. Wrong: the combined gas law gives 19.5 dm^3 (19,500 cm^3) from the printed numbers, not 25 cm^3.

B. Wrong: the combined gas law gives 19.5 dm^3 (19,500 cm^3) from the printed numbers, not 75 cm^3.

C. Wrong: the combined gas law gives 19.5 dm^3 (19,500 cm^3) from the printed numbers, not 100 cm^3.

D. The official key gives D, but 51 cm^3 does not follow from the printed numbers (it would require the temperature to be 60 °C and the volume 60 cm^3), so it is not uniquely correct.

Question 57 Chemistry

There are four orbitals s, p, d and f. Which order is correct with respect to the increasing

ıe orbitals?

- A. 4s < 4p < 4d < 4f ✓ **Correct answer**
- B. 4p < 4s < 4f < 4d
- C. 4s < 4f < 4p < 4d
- D. 4f < 4s < 4d < 4p

A. For the same principal quantum number (n = 4), the energy increases with the azimuthal quantum number l: s (l = 0) < p (l = 1) < d (l = 2) < f (l = 3).

B. For n = 4 the energy increases s < p < d < f, not p < s < f < d.

C. For n = 4 the energy increases s < p < d < f, not s < f < p < d.

D. For n = 4 the energy increases s < p < d < f, not f < s < d < p.

Question 58 Chemistry

Which graph represents Boyle's law?

- A. Graph: V vs P, straight line through the origin
- B. Graph: P vs 1/V, straight line through the origin ✓ **Correct answer**
- C. Graph: PV=k vs P, straight line through the origin
- D. Graph: 1/V vs P, decaying curve

A. A straight line of V against P means V ∝ P, which is not Boyle's law.

B. Boyle's law is PV = constant, i.e. P ∝ 1/V, so a plot of P against 1/V is a straight line through the origin.

C. PV is constant at constant temperature, so a plot of PV against P is a horizontal line, not a line through the origin.

D. For Boyle's law 1/V is directly proportional to P, so the plot is a straight line, not a curve.

59 Chemistry

Which one of the following hydrogen bonds is stronger than others?

- A. N^δ−—H^δ+ ··· N^δ−—H^δ+
- B. F^δ−—H^δ+ ··· F^δ−—H^δ+ ✓ **Correct answer**
- C. O^δ−—H^δ+ ··· O^δ−—H^δ+
- D. N^δ−—H^δ+ ··· O^δ−—H^δ+

A. Nitrogen is less electronegative than fluorine, so the N—H···N bond is weaker than the F—H···F bond.

B. Fluorine is the most electronegative element, so the F—H···F hydrogen bond is the strongest.

C. Oxygen is less electronegative than fluorine, so the O—H···O bond is weaker than the F—H···F bond.

D. A mixed N—H···O bond is weaker than the F—H···F bond.

Question 60 Chemistry

The half-life of N_2O_5 at 0 °C is 24 minutes. How long will it take for sample of N_2O_5 to decay to 25% of its original concentration?

- A. 24 minutes
- B. 72 minutes
- C. 120 minutes
- D. 48 minutes ✓ **Correct answer**

A. One half-life leaves 50%, not 25%.

B. Three half-lives leave 12.5%, not 25%.

C. Five half-lives leave about 3%, not 25%.

D. 25% is $(1/2)^2$ of the original, so two half-lives: $2 \times 24 = 48$ minutes.

61 Chemistry

When the change in concentration is 6×10^{-4} mol dm^{-3} and time for that change is 10 seconds, the rate of reaction will be

- A. 6×10^{-3} mol dm^{-3} sec^{-1}
- B. 6×10^{-4} mol dm^{-3} sec^{-1}
- C. 6×10^{-2} mol dm^{-3} sec^{-1}
- D. 6×10^{-5} mol dm^{-3} sec^{-1} ✓ **Correct answer**

A. Rate = Δconc/Δt = $6 \times 10^{-4}/10 = 6 \times 10^{-5}$, not 6×10^{-3}.

B. Rate = $6 \times 10^{-4}/10 = 6 \times 10^{-5}$, not 6×10^{-4} (and the paper prints "se^{-1}" for "sec^{-1}").

C. Rate = $6 \times 10^{-4}/10 = 6 \times 10^{-5}$, not 6×10^{-2}.

D. Rate of reaction = change in concentration/time = 6×10^{-4} mol $dm^{-3}/10$ s = 6×10^{-5} mol dm^{-3} sec^{-1}.

Note: Filed option B read "6×10^{-4} mol dm^{-3} se^{-1}" (misprint in the source reproduction); corrected to "6×10^{-4} mol dm^{-3} sec^{-1}" as documented in the reviewed file.

Question 62 Chemistry

Which one of the following will have the smallest radius?

- A. Al^{+3}
- B. Si^{+4} ✓ **Correct answer**
- C. Mg^{+2}
- D. Na^{+1}

A. Al^{3+} has 13 protons pulling 10 electrons; Si^{4+} has 14 protons pulling the same 10 electrons, so Si^{4+} is smaller.

B. All four ions are isoelectronic (10 electrons); Si^{4+} has the highest nuclear charge (14 protons), so it pulls the electron cloud in most and has the smallest radius.

2 protons pulling 10 electrons, fewer than Si^{4+} (14), so it is larger.

D. Na^+ has 11 protons pulling 10 electrons, the fewest of the four, so it is the largest.

Question 63 Chemistry

Keeping in view the size of atoms, which order is correct?

- A. N > C
- B. P > Si
- C. Ar > Cl
- D. Li > Be ✓ **Correct answer**

A. Atomic size decreases across a period, so N (right of C) is smaller than C, not larger.

B. Atomic size decreases across a period, so P (right of Si) is smaller than Si, not larger.

C. Atomic size decreases across a period, so Ar (right of Cl) is smaller than Cl, not larger.

D. Atomic size decreases across a period, so Li (left of Be) is larger than Be.

Question 64 Chemistry

On the basis of oxidizing power of halogens, which reaction is possible?

- A. $I_2 + 2Cl^- \longrightarrow Cl_2 + 2I^-$
- B. $Br_2 + 2I^- \longrightarrow I_2 + 2Br^-$ ✓ **Correct answer**
- C. $Cl_2 + 2F^- \longrightarrow F_2 + 2Cl^-$
- D. $I_2 + 2Br^- \longrightarrow Br_2 + 2I^-$

A. I_2 is a weaker oxidising agent than Cl_2, so it cannot displace Cl^-.

B. The oxidising power order is $F_2 > Cl_2 > Br_2 > I_2$, so the stronger Br_2 displaces I^- from its salt.

C. Cl_2 is a weaker oxidising agent than F_2, so it cannot displace F^-.

ker oxidising agent than Br_2, so it cannot displace Br^-.

Question 65 Chemistry

Which one of the following gases is used as mixture for breathing by sea divers?

- A. Oxygen and Nitrogen
- B. Nitrogen and Helium
- C. Helium and Oxygen ✓ **Correct answer**
- D. Helium and Hydrogen

A. Ordinary air (oxygen + nitrogen) causes nitrogen narcosis at depth; divers use helium + oxygen instead.

B. A breathing mixture needs oxygen; nitrogen + helium has none.

C. Sea divers breathe heliox (helium + oxygen), which avoids nitrogen narcosis and oxygen toxicity at depth. (The Learnospot twin is a different question about antiseptics, so it is not a cross-check here.)

D. A breathing mixture needs oxygen; helium + hydrogen has none.

Question 66 Chemistry

$[Ti(H_2O)_6]^{+3}$ transmits

- A. Yellow and Red light
- B. Yellow and Blue light
- C. Red and white light
- D. Red and blue light ✓ **Correct answer**

A. $[Ti(H_2O)_6]^{3+}$ absorbs yellow-green light and transmits red and blue light, not yellow and red.

B. $[Ti(H_2O)_6]^{3+}$ absorbs yellow-green light, so it does not transmit yellow.

transmits red and blue light, not white light.

D. $[Ti(H_2O)_6]^{3+}$ absorbs light in the yellow-green region (~500 nm) and transmits red and blue light, which is why the complex appears purple.

Question 67 Chemistry

Electronic configuration of Gold [Au79] is

- A. [Xe] $4f^{14}$, $5d^{10}$, $6s^1$ ✓ **Correct answer**
- B. [Xe] $4f^{10}$, $5d^{10}$, $6s^2$
- C. [Xe] $4f^{14}$, $5d^9$, $6s^2$
- D. [Xe] $4f^{14}$, $5d^{10}$, $6s^2$

A. Gold has the anomalous configuration [Xe] $4f^{14}$ $5d^{10}$ $6s^1$ (a full 5d subshell with one 6s electron).

B. Gold has 14 f-electrons and one 6s electron, not $4f^{10}$ $6s^2$.

C. Gold has $5d^{10}$ $6s^1$, not $5d^9$ $6s^2$.

D. Gold has $6s^1$, not $6s^2$ (79 = 54 + 14 + 10 + 1).

Question 68 Chemistry

About 80% of ammonia is used for the production of

- A. Explosives
- B. Fertilizers ✓ **Correct answer**
- C. Nylon
- D. Polymers

A. Only a small share of ammonia goes to explosives.

B. About 80% of ammonia is used to make nitrogenous fertilizers (urea, ammonium nitrate, ammonium sulphate).

all share of ammonia goes to nylon production.

D. Only a small share of ammonia goes to polymers.

Question 69 Chemistry

Urea is the most widely used nitrogen fertilizer in Pakistan. Its composition is

- A. NH_2CO
- B. $N_2H_5CO_2$
- C. $N_2H_4CO_2$
- D. N_2H_4CO ✓ **Correct answer**

A. NH_2CO has only one nitrogen; urea is $CO(NH_2)_2$.

B. $N_2H_5CO_2$ is not the composition of urea.

C. $N_2H_4CO_2$ has two oxygens; urea has one.

D. Urea is $CO(NH_2)_2$, i.e. $CH_4N_2O = N_2H_4CO$.

Question 70 Chemistry

During the manufacture of nitric acid, nitric oxide is oxidized to nitrogen dioxide. This reaction is given as: $2NO(g) + O_2(g) \rightleftharpoons 2NO_2(g)$ $\Delta H = -114$ kJ/mol According to Le Chatelier's Principle

- A. Reaction must not be temperature dependent
- B. Reaction must be carried out at room temperature
- C. Reaction must be carried out at low temperature ✓ **Correct answer**
- D. Reaction must be carried out at high temperature

A. The reaction is exothermic, so its equilibrium is temperature dependent.

B. Low temperature (not specifically room temperature) favours the exothermic forward reaction.

ion is exothermic ($\Delta H = -114$ kJ/mol), so by Le Chatelier's principle low temperature shifts the equilibrium toward NO_2.

D. High temperature would shift the exothermic equilibrium backward, toward NO.

Question 71 Chemistry

What is the percentage of nitrogen in NH_3NO_3?

- A. 65%
- B. 35% ✓ **Correct answer**
- C. 20%
- D. 58%

A. The nitrogen content is 28/80 × 100 = 35%, not 65%.

B. Ammonium nitrate NH_4NO_3 (printed as NH_3NO_3) has molar mass 80 and contains 28 parts nitrogen: 28/80 × 100 = 35%.

C. The nitrogen content is 35%, not 20%.

D. The nitrogen content is 35%, not 58%.

Question 72 Chemistry

The structural formula of 2,3,4 trimethylpentane is:

- A. $H_3C-CH(CH_3)-CH(CH_3)-CH(CH_3)-CH_3$ ✓ **Correct answer**
- B. $H_3C-C(CH_3)_2-CH_2-CH(CH_3)-CH_3$
- C. $H_3C-CH_2-C(CH_3)_2-CH(CH_3)-CH_3$
- D. $H_3C-CH_2-CH(CH_3)-C(CH_3)_2-CH_3$

A. A five-carbon chain with methyl groups on carbons 2, 3 and 4: 2,3,4-trimethylpentane.

B. That is 2,2,4-trimethylpentane.

C. That is 3,3,4-trimethylpentane.

,4-trimethylpentane.

Question 73 Chemistry

Which one of the following is a powerful electrophile used to attack on the electrons of benzene ring?

- A. $FeCl_2$
- B. $FeCl_4^-$
- C. Cl^+ ✓ **Correct answer**
- D. Cl_2

A. $FeCl_2$ is not the electrophile in benzene chlorination.

B. $FeCl_4^-$ is the anion formed with the catalyst, not the electrophile.

C. The chloronium ion Cl^+ is the powerful electrophile that attacks the π-electrons of the benzene ring.

D. Molecular chlorine is not itself the electrophile; it is polarised by the catalyst to give Cl^+.

Question 74 Chemistry

Order of reactivity of alkenes with hydrogen halide is:

- A. HBr > HI > HCl
- B. HI > HBr > HF
- C. HF > HI > HCl
- D. HI > HBr > HCl ✓ **Correct answer**

A. HI is more reactive than HBr (the H—I bond is weakest), so the order is HI > HBr > HCl.

B. HF is the least reactive (the H—F bond is strongest), so it is not second; the order among the three listed is HI > HBr > HCl.

C. HF is the least reactive hydrogen halide, not the most.

follows the ease of breaking the H—X bond: H—I < H—Br < H—Cl, so HI > HBr > HCl (and HF is least reactive).

Question 75 Chemistry

The given three hydrocarbons are [Benzene, Naphthalene, Anthracene]

- A. Alicyclic hydrocarbons
- B. Aromatic hydrocarbons ✓ **Correct answer**
- C. Acyclic Hydrocarbons
- D. Heterocyclic hydrocarbons

A. Benzene, naphthalene and anthracene are aromatic, not alicyclic.

B. Benzene, naphthalene and anthracene are fused-ring aromatic hydrocarbons.

C. Benzene, naphthalene and anthracene are cyclic aromatic hydrocarbons, not acyclic ones (the paper prints "Acydic" for "Acyclic").

D. Benzene, naphthalene and anthracene contain only carbon in their rings, so they are not heterocyclic.

Note: Filed option C read "Acydic Hydrocarbons" (misprint in the source reproduction); corrected to "Acyclic Hydrocarbons" as documented in the reviewed file.

Question 76 Chemistry

The IUPAC name of the given compound is [$H_3C-CH(CH_3)-CH_2-Cl$]

- A. 1-Chloro-2-methylpropane ✓ **Correct answer**
- B. 1-Chloro-2-methylbutane
- C. Isobutyl chloride
- D. 2-Methyl-3-chloropropane

A. The compound $(CH_3)_2CH-CH_2Cl$ has a three-carbon chain with Cl on carbon 1 and a methyl on carbon 2: 1-chloro-2-methylpropane.

st chain has three carbons, not four.

C. That is the common name, not the IUPAC name.

D. The substituents are numbered to give the lowest locants: 1-chloro-2-methyl, not 2-methyl-3-chloro.

Question 77 Chemistry

Which one of the following was used as one of the earliest antiseptic and disinfectant?

- A. Phenol ✓ **Correct answer**
- B. Ether
- C. Ethanol
- D. Methanol

A. Phenol (carbolic acid) was used by Lister as one of the earliest antiseptics and disinfectants.

B. Ether is an anaesthetic/solvent, not an early antiseptic.

C. Ethanol is an antiseptic, but phenol was the earliest one used.

D. Methanol is not used as an antiseptic/disinfectant.

Question 78 Chemistry

Which one of the following is NOT able to denature the ethanol?

- A. Methanol
- B. Lactic acid ✓ **Correct answer**
- C. Pyridine
- D. Acetone

A. Methanol is a standard denaturant for ethanol (methylated spirit).

B. Lactic acid is not used to denature ethanol.

is a standard denaturant for ethanol.

D. Acetone is used as a denaturant for ethanol.

Question 79 Chemistry

In the below reaction, the configuration of product is [$HO^- + CH_3Br \rightarrow$ (transition state $HO\cdots C\cdots Br) \rightarrow HO-CH_3 + Br^-$]

- A. 100% same of the configuration of reactant
- B. 50% retained
- C. 50% inverted
- D. 100% opposite from configuration of reactant ✓ **Correct answer**

A. The reaction shown is SN2 (backside attack), which inverts the configuration; it does not retain it.

B. SN2 gives complete inversion, not a 50% mixture (that would be SN1 racemisation).

C. SN2 gives complete (100%) inversion, not 50%.

D. In the SN2 mechanism the nucleophile attacks from the back side, so the configuration is completely (100%) inverted — Walden inversion.

Question 80 Chemistry

How will you distinguish between methanol and ethanol?

- A. By Lucas test
- B. By silver mirror test
- C. By oxidation
- D. By Iodoform test ✓ **Correct answer**

A. The Lucas test distinguishes primary, secondary and tertiary alcohols, not methanol from ethanol (both are primary).

ethanol nor ethanol gives a silver mirror (that test is for aldehydes).

C. Both methanol and ethanol are oxidised, so oxidation does not distinguish them.

D. Ethanol ($CH_3CH(OH)-$) gives a positive iodoform test (yellow CHI_3 precipitate); methanol does not.

Question 81 Chemistry

To produce absolute alcohol (100%) from rectified spirit (95.6% alcohol), the remaining 4.4% water must be removed by a drying agent such as

- A. Calcium oxide ✓ **Correct answer**
- B. Calcium chloride
- C. Calcium carbonate
- D. Carbon monoxide

A. Quicklime (CaO) reacts with water to form $Ca(OH)_2$, so it removes the last traces of water to give absolute alcohol.

B. Calcium chloride does not remove water from rectified spirit to give absolute alcohol.

C. Calcium carbonate does not react with water to dry alcohol.

D. Carbon monoxide is a gas, not a drying agent for alcohol.

Question 82 Chemistry

Which one of the following is also called silver mirror test?

- A. Fehling's solution test
- B. Iodoform test
- C. Tollen's reagent ✓ **Correct answer**
- D. Benedict's solution tests

A. Fehling's test gives a red precipitate, not a silver mirror.

orm test gives a yellow precipitate of CHI_3, not a silver mirror.

C. Tollen's reagent (ammoniacal silver nitrate) is the silver mirror test: aldehydes reduce it to metallic silver.

D. Benedict's test gives a red precipitate, not a silver mirror.

Question 83 Chemistry

When acetaldehyde reacts with 2,4-dinitrophenylhydrazine (2,4-DNPH), which one of the following products is formed?

- A. $CH_3-CH=N-NH-C_6H_4-NO_2$ (4-nitrophenylhydrazone)
- B. $CH_3-CH=N-NH-C_6H_3(NO_2)_2$ (3,4-dinitrophenylhydrazone)
- C. $(CH_3)_2C=N-NH-C_6H_3(NO_2)_2$ (acetone 2,4-dinitrophenylhydrazone)
- D. $CH_3-CH=N-NH-C_6H_3(NO_2)_2$ (2,4-dinitrophenylhydrazone) ✓ **Correct answer**

A. That has only one nitro group (para); 2,4-DNPH gives a dinitro product.

B. The nitro groups are in the 3,4-positions, not the 2,4-positions of 2,4-DNPH.

C. That is the derivative of acetone (two CH_3 on the C=N carbon), not of acetaldehyde.

D. Acetaldehyde (CH_3CHO) condenses with 2,4-dinitrophenylhydrazine to give its 2,4-dinitrophenylhydrazone, $CH_3-CH=N-NH-C_6H_3(NO_2)_2$.

Question 84 Chemistry

Both aldehydes and ketones are planer to the neighborhoods of carbonyl (C=O) group. Which one of the following bonds is distorted towards the oxygen atoms?

- A. π-bond of C and O ✓ **Correct answer**
- B. Sigma bond of C and H
- C. Sigma bond of C and O
- D. Sigma bond of C and C

nd of the carbonyl group is polarised/distorted toward the more electronegative oxygen atom.

B. The C—H sigma bond is not the bond distorted toward oxygen.

C. The sigma bond is less polarisable; it is the π-bond that is distorted toward oxygen.

D. The C—C sigma bond is not the bond distorted toward oxygen.

Question 85 Chemistry

In $^{4}CH_3-^{3}CH(CH_3)-^{2}CH(CH_3)-^{1}COOH$ which one is α-carbon atom?

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

A. Carbon 1 is the carboxyl carbon (COOH) itself, not the α-carbon.

B. Carbon 3 is the β-carbon, not the α-carbon. The Learnospot quiz keys B, which is wrong.

C. The α-carbon is the carbon adjacent to the carboxyl carbon (C-1), i.e. carbon 2.

D. Carbon 4 is the γ-carbon, not the α-carbon.

Question 86 Chemistry

The specific substances (metabolite) that fits on the enzyme surface and is converted to products is called

- A. Co-factor
- B. Prosthetic group
- C. Isoenzyme
- D. Substrate ✓ **Correct answer**

A. A co-factor is a non-protein helper of an enzyme, not the substance converted to

B. A prosthetic group is a co-factor tightly bound to the enzyme, not the substance converted to product.

C. An isoenzyme is a variant form of an enzyme, not its substrate.

D. The substance that fits on the enzyme surface (active site) and is converted to products is the substrate.

Question 87 Chemistry

Polyamide is formed due to the condensation od hexane-dioic acid with

- A. Hexane-1,5-diamine
- B. Hexane-1,6-diamine ✓ **Correct answer**
- C. Hexane-1,4-diamine
- D. Hexane-2,5-diamine

A. Nylon-6,6 is made from hexane-1,6-dioic acid and hexane-1,6-diamine, not the 1,5-diamine.

B. Hexane-1,6-dioic acid (adipic acid) condenses with hexane-1,6-diamine to give nylon-6,6 (a polyamide).

C. Nylon-6,6 uses the 1,6-diamine, not the 1,4-diamine.

D. Nylon-6,6 uses the 1,6-diamine, not the 2,5-diamine.

Question 88 Chemistry

Haemoglobin is a

- A. Genetic protein
- B. Building protein
- C. Transport protein ✓ **Correct answer**

A. Haemoglobin is not a genetic protein (it does not carry genetic information).

B. Haemoglobin is not a building (structural) protein.

C. Haemoglobin transports oxygen (and carbon dioxide) in the blood.

D. Haemoglobin is not a structural protein; it is a transport protein.

Question 89 Chemistry

Which one of the following polymer is polystyrene?

- A. —[CH_2−$CH(C_6H_5)$]$_n$— ✓ **Correct answer**
- B. —[CH_2−CH_2]$_n$—
- C. —[CF_2−CF_2]$_n$—
- D. —[CH_2−$CH(CH_3)$]$_n$—

A. Polystyrene is the polymer of styrene (phenylethene), with repeat unit —[CH_2−$CH(C_6H_5)$]$_n$—.

B. That is polyethylene, not polystyrene.

C. That is polytetrafluoroethylene (Teflon), not polystyrene.

D. That is polypropylene, not polystyrene.

Question 90 Chemistry

Out of these which nitrogen base is NOT present in DNA?

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

s present in DNA.

B. Guanine is present in DNA.

C. Uracil is present in RNA, not in DNA (DNA has thymine instead).

D. Thymine is present in DNA.

Question 91 Chemistry

Which one of the following is an example of co-polymer?

- A. Polyamide ✓ **Correct answer**
- B. Polystyrene
- C. Polyvinyl acetate
- D. Polyvinyl chloride

A. A polyamide such as nylon-6,6 is a co-polymer, made from two different monomers (a diamine and a dicarboxylic acid).

B. Polystyrene is a homopolymer of styrene.

C. Polyvinyl acetate is a homopolymer of vinyl acetate.

D. Polyvinyl chloride is a homopolymer of vinyl chloride.

Question 92 Chemistry

The biggest source of acid rain is the oxide of

- A. N
- B. S ✓ **Correct answer**
- C. O
- D. C

A. Nitrogen oxides contribute to acid rain, but sulphur oxides are the biggest source.

ioxide (SO_2) from burning fossil fuels is the biggest source of acid rain.

C. Oxygen is not a source of acid rain.

D. Carbon dioxide forms weak carbonic acid, but it is not the biggest source of acid rain.

Question 93 Chemistry

Burning of which one of the following waste is considered as useful industrial fuel or to produce electricity

- A. Metals
- B. Grass
- C. Paper
- D. Plastic ✓ **Correct answer**

A. Metals do not burn, so they cannot be used as fuel.

B. Grass is not used as an industrial fuel.

C. Paper can be burned, but the textbook answer for a useful industrial fuel from waste is plastic.

D. Waste plastic is burned as an industrial fuel and to generate electricity.

Question 94 Chemistry

Which of the following is the correct dot and cross diagram of bonding between two chlorine atoms?

- A. Diagram: two chlorine atoms combine to give a single :Cl: unit with no shared pair shown between two chlorine atoms
- B. Diagram: two chlorine atoms with an electron-transfer arrow, giving two separate chloride ions
- C. Diagram: two chlorine atoms combine to give :Cl:Cl: with one shared pair of electrons between them and three lone pairs on each chlorine ✓ **Correct answer**

gram: two chlorine atoms combine to give two separate :Cl: units with no bond between them

A. The product is not a Cl−Cl molecule with a shared pair.

B. Chlorine atoms share electrons (covalent bonding), they do not transfer electrons to form ions.

C. Each chlorine atom has seven valence electrons; they share one pair to form a single covalent bond, leaving three lone pairs on each atom.

D. The product shows no bond between the two chlorine atoms.

Question 95 Chemistry

The equation that represents standard enthalpy of atomization of hydrogen is:

- A. $\frac{1}{2}H_2O(l) \longrightarrow H_2(g) + \frac{1}{2}O(g)$ +218 kJ mol^{-1}
- B. $\frac{1}{2}H_2O(l) \longrightarrow H_2(g) + \frac{1}{2}O(g)$ −218 kJ mol^{-1}
- C. $\frac{1}{2}H_2(g) \longrightarrow H(g)$ +218 kJ mol^{-1} ✓ **Correct answer**
- D. $\frac{1}{2}H_2(g) \longrightarrow H(g)$ −218 kJ mol^{-1}

A. That is not the atomization of hydrogen (it starts from water, not H_2).

B. That is not the atomization of hydrogen (it starts from water, not H_2).

C. The standard enthalpy of atomization is the energy needed to form one mole of gaseous atoms from the element in its standard state: $\frac{1}{2}H_2(g) \rightarrow H(g)$, ΔH = +218 kJ/mol (endothermic).

D. Atomization requires energy input (breaking the H−H bond), so ΔH is positive (+218), not negative.

Question 96 Chemistry

Standard enthalpy of combustion of graphite at 25 °C is −393.51 kJ mol^{-1} and that of

−393.41 kJ mol⁻¹. The enthalpy change for graphite is:

- A. − 1.91
- B. +2.1
- C. −2.1
- D. +1.91 ✓ **Correct answer**

A. For graphite → diamond, ΔH = ΔH_comb(graphite) − ΔH_comb(diamond) = −393.51 − (−395.41) = +1.91 kJ/mol, not −1.91. The Learnospot quiz keys A, which is the reverse change (diamond → graphite).

B. The difference is 395.41 − 393.51 = 1.90 ≈ 1.91, not 2.1.

C. The enthalpy change for graphite → diamond is +1.91 kJ/mol, not −2.1.

D. By Hess's law, ΔH(graphite → diamond) = ΔH_comb(graphite) − ΔH_comb(diamond) = −393.51 + 395.41 = +1.91 kJ/mol (graphite is the more stable form).

Question 97 Chemistry

10.0 grams of glucose are dissolved in water to make 100 cm³ of its solution, its molarity is:

- A. 0.55 ✓ **Correct answer**
- B. 0.1
- C. 10
- D. 1

A. Moles of glucose = 10/180 = 0.0556 mol; volume = 0.1 dm³; molarity = 0.0556/0.1 = 0.55 mol/dm³.

B. The molarity is 0.55 mol/dm³, not 0.1.

C. The molarity is 0.55 mol/dm³, not 10.

D. The molarity is 0.55 mol/dm³, not 1.

98 Chemistry

Given solution contains 16.0 g of CH_3OH, 92.0 g of C_2H_5OH and 36 g of water. Which statement about mole fraction of the components is true?

- A. Mole fraction of CH_3OH is highest among all components
- B. Mole fraction of C_2H_5OH and H_2O is the same ✓ **Correct answer**
- C. Mole fraction of CH_3OH and C_2H_5OH is same
- D. Mole fraction of H_2O is the lowest among all

A. CH_3OH has 0.5 mol, the fewest of the three, so its mole fraction is the lowest, not the highest.

B. Moles: CH_3OH = 16/32 = 0.5, C_2H_5OH = 92/46 = 2, H_2O = 36/18 = 2; C_2H_5OH and H_2O both have 2 mol, so their mole fractions are equal (2/4.5 each).

C. CH_3OH has 0.5 mol and C_2H_5OH has 2 mol, so their mole fractions differ.

D. H_2O has 2 mol (mole fraction 0.44); CH_3OH has the lowest mole fraction (0.11).

Question 99 Chemistry

Study the following facts [$Zn \longrightarrow Zn^{+2} + 2e^-$, $E° = +0.76$ V; $Cu \longrightarrow Cu^{+2} + 2e^-$, $E° = -0.34$ V]

- A. $Cu + Zn^{+2} \longrightarrow Cu^{+2} + Zn$
- B. $Cu^{+2} + Zn^{+2} \longrightarrow Cu + Zn$
- C. $Cu^{+2} + Zn \longrightarrow Cu + Zn^{+2}$ ✓ **Correct answer**
- D. $Cu^{+2} + Zn^{+2} \longrightarrow Cu + Zn^{+2}$

A. Copper cannot displace zinc (zinc is the stronger reducing agent).

B. Zn^{2+} cannot be reduced by Cu^{2+}; the reaction as written does not occur.

C. Zinc has the higher oxidation potential (+0.76 V vs −0.34 V for copper), so zinc is oxidised and Cu^{2+} is reduced: the spontaneous reaction is $Cu^{2+} + Zn \rightarrow Cu + Zn^{2+}$. (No Learnospot twin for this question; verified from the official key and the electrode

D. Zn^{2+} cannot be reduced by Cu^{2+}; the reaction as written does not occur.

Question 100 Chemistry

Keeping in mind the electrode potential, which one of the following reactions is feasible?

- A. $Zn^{+2} + Cu \longrightarrow Cu^{+2} + Zn$
- B. $Zn + MgSO_4 \longrightarrow ZnSO_4 + Mg$
- C. $Fe + CuSO_4 \longrightarrow FeSO_4 + Cu$ ✓ **Correct answer**
- D. $Cd + MgSO_4 \longrightarrow CdSO_4 + Mg$

A. Copper is below zinc in the reactivity series, so it cannot displace zinc.

B. Magnesium is above zinc in the reactivity series, so zinc cannot displace magnesium.

C. Iron is above copper in the reactivity series, so iron displaces copper from copper sulphate. (No Learnospot twin for this question; verified from the official key and the reactivity series.)

D. Magnesium is above cadmium in the reactivity series, so cadmium cannot displace magnesium.

Question 101 Chemistry

What is the correct relation between pH and pK?

- A. pH = pKa + log[Acid/Base]
- B. pH = pKa − log[Acid/Base] ✓ **Correct answer**
- C. pH = pKa − log[Base/Acid]
- D. pH = pKa + log[Base/Acid]

A. The Henderson–Hasselbalch equation is pH = pKa + log[Base/Acid], not + log[Acid/Base].

g[Acid/Base] = +log[Base/Acid], this is the Henderson–Hasselbalch equation pH = pKa + log[Base/Acid]. Note: option D is the same equation written in the other form.

C. That equals pKa + log[Acid/Base], the inverse of the correct relation.

D. That is the same equation as B (pH = pKa − log[Acid/Base]); B is the form the official key and the Learnospot quiz both give.

Question 102 Chemistry

Which one of the following is the correct presentation for Ksp? [AgCl ⟶ Ag^{+} + Cl^{-}]

- A. Ksp = [AgCl]/([Ag^{+1}][Cl^{-1}])
- B. Ksp = [Ag^{+1}][Cl^{-1}] ✓ **Correct answer**
- C. Ksp = ([Ag^{+1}][Cl^{-1}])/[AgCl]
- D. Ksp = [AgCl]

A. Ksp is the product of the ion concentrations, not the ratio with the solid in the numerator.

B. For the sparingly soluble salt AgCl, Ksp = [Ag^{+}][Cl^{-}] (the solid's activity is 1, so [AgCl] does not appear).

C. The solid AgCl does not appear in the solubility product expression.

D. Ksp is the product of the ion concentrations, not the concentration of the solid.

Question 103 English

In spite of all the torture, the police has failed to _____ any confession from the thief.

- A. Convince
- B. Elicit ✓ **Correct answer**
- C. Refuse
- D. Agree

a confession" is wrong; you elicit (draw out) a confession.

B. To elicit a confession is to draw it out (of the thief).

C. The police failed to obtain a confession; "refuse" does not fit.

D. "Agree a confession" is wrong.

Question 104 English

It is the duty of a teacher to _____ moral values in his students besides teaching.

- A. Tell
- B. Record
- C. Inculcate ✓ **Correct answer**
- D. Suggest

A. Values are inculcated (instilled), not merely told.

B. Values are inculcated, not recorded.

C. To inculcate moral values is to instil them in the students.

D. Values are inculcated, not merely suggested.

Question 105 English

Many of the houses in Murree have basic _____.

- A. Amenities ✓ **Correct answer**
- B. Accuracy
- C. Affinity
- D. Array

A. Houses have basic amenities (facilities such as water, electricity).

B. Houses do not have "basic accuracy".

o not have "basic affinity".

D. Houses do not have "basic array".

Question 106 English

Youngsters who indulge in love affairs are usually _____ in worldly manners.

- A. Adjoined
- B. Addled ✓ **Correct answer**
- C. Adjured
- D. Adhesive

A. "Adjoined" means joined to something; it does not fit.

B. Addled means confused or muddled; youngsters who indulge in love affairs are usually addled (confused) in worldly manners.

C. "Adjured" means earnestly urged; it does not fit.

D. "Adhesive" means sticky; it does not fit.

Question 107 English

SPOT THE ERROR: He picked up one or two magazines and after a hurried glance on the contents carefully replaced them. [The underlined segments are: A "picked up", B "a hurried", C "on", D "replaced".]

- A. picked up
- B. a hurried
- C. on ✓ **Correct answer**
- D. replaced

A. 'picked up' is correct.

B. 'a hurried' is correct.

error. It should be "at a hurried glance at the contents").

D. 'replaced' is correct.

Question 108 English

SPOT THE ERROR: His guests found it fun to watch him to make tea – mixing careful spoonful from different caddies. [The underlined segments are: A "it fun", B "to watch", C "to make", D "careful spoonful".]

- A. it fun
- B. to watch
- C. to make ✓ **Correct answer**
- D. careful spoonful

A. 'found it fun' is correct. The Learnospot quiz keys A, which is wrong.

B. 'to watch' is correct.

C. 'to make' is the error: after "watch him" the bare infinitive is used ("watch him make tea" or "watch him making tea").

D. 'careful spoonful' is acceptable here.

Question 109 English

SPOT THE ERROR: You have put your life in his hands many a times. [The underlined segments are: A "put your life", B "in his hands", C "many a", D "times".]

- A. put your life
- B. in his hands
- C. many a ✓ **Correct answer**
- D. times

A. 'put your life' is correct.

ds" is correct.

C. 'many a' is the error: "many a" must be followed by a singular noun ("many a time"), not the plural "times".

D. 'times' is the plural that "many a" wrongly takes; the error lies in the "many a" segment.

Question 110 English

SPOT THE ERROR: Chips, thinking it over a good many time, always added to himself that Kathie would have approved and also have been amused. [The underlined segments are: A "a good many time", B "added to himself", C "would have approved", D "have been amused".]

- A. a good many time ✓ **Correct answer**
- B. added to himself
- C. would have approved
- D. have been amused

A. 'a good many time' is the error: "many" takes a plural noun ("a good many times").

B. 'added to himself' is correct.

C. 'would have approved' is correct.

D. 'have been amused' is correct.

Question 111 English

SPOT THE ERROR: But the men ate their supper in good appetites. [The underlined segments are: A "men", B "ate", C "their", D "in".]

- A. men
- B. ate
- C. their
- D. in ✓ **Correct answer**

B. 'ate' is correct.

C. 'their' is correct.

D. 'in' is the error: the idiom is "with good appetite" (and "appetite" singular), not "in good appetites". (The Learnospot twin is a different Chemistry question, so it is not a cross-check here.)

Question 112 English

SPOT THE ERROR: A common sense of failure is a mistaken ambition of the boys on the part of his parents. [The underlined segments are: A "of" (in "sense of failure"), B "of" (in "ambition of the boys"), C "on" (in "on the part"), D "of" (in "part of his parents").]

- A. of (in "sense of failure")
- B. of (in "ambition of the boys")
- C. on (in "on the part")
- D. of (in "part of his parents") ✓ **Correct answer**

A. 'sense of failure' is correct.

B. 'ambition of the boys' is correct.

C. 'on the part of' is the correct idiom; the Learnospot quiz keys this segment, which is wrong.

D. The official key gives D: the phrase "on the part of his parents" wrongly attributes the boys' ambition to the parents (and "his" does not agree with "the boys").

Question 113 English

Choose the CORRECT sentence:

- A. Tourism is burgeoned over the last fifteen years.

rism will burgeoned over the last fifteen years.

- C. Tourism have burgeoned over the last fifteen years.
- D. Tourism has burgeoned over the last fifteen years. ✓ **Correct answer**

A. 'is burgeoned' is wrong (the present perfect "has burgeoned" is needed).

B. 'will burgeoned' is wrong (the future does not go with "over the last fifteen years").

C. 'have' does not agree with the singular "Tourism".

D. Correct: present perfect "has burgeoned" with singular subject "Tourism". (The Learnospot twin is a different Chemistry question, so it is not a cross-check here.)

Question 114 English

Choose the CORRECT sentence:

- A. His remains were interred in the new cemetery. ✓ **Correct answer**
- B. His remains were entered in the new cemetery.
- C. His remains was interred in the new cemetery.
- D. His remains was entered in the new cemetery.

A. Correct: "remains" is plural ("were") and "interred" means buried.

B. 'entered' is the wrong word (it should be 'interred').

C. 'was' does not agree with the plural "remains".

D. Both 'was' and 'entered' are wrong.

Question 115 English

Choose the CORRECT sentence:

- A. They had died in the same day.
- B. They had died over the same day.
- C. They had died on the same day. ✓ **Correct answer**

y had died of the same day.

A. The correct preposition is 'on' the same day, not 'in'.

B. The correct preposition is 'on', not 'over'.

C. Correct: "died on the same day".

D. The correct preposition is 'on', not 'of'.

Question 116 English

Choose the CORRECT sentence:

- A. She had turned on the supper steaks when the telephone rang.
- B. She had turned over the supper steaks when the telephone rang. ✓ **Correct answer**
- C. She had turned into the supper steaks when the telephone rang.
- D. She had turned in the supper steaks when the telephone rang.

A. 'turned on' means switched on; you do not turn on steaks. The Learnospot quiz keys A, which is wrong.

B. Correct: "turn over" is the phrasal verb for flipping food.

C. 'turned into' means became; it does not fit.

D. 'turned in' means handed in or went to bed; it does not fit.

Question 117 English

Choose the CORRECT sentence:

- A. Empty of concord is the soul of wit. ✓ **Correct answer**
- B. Empty of concord is the role of wit.
- C. Empty of concord is the sole of wit.
- D. Empty of concord is the howl of wit.

the soul of wit" (echoing "brevity is the soul of wit").

B. 'role' is not the word in the phrase.

C. 'sole' (the underside of a foot) is not the word; it is 'soul'.

D. 'howl' is not the word in the phrase.

Question 118 English

Choose the CORRECT sentence:

- A. The cheery trees stand over the woodland ride.
- B. The cheery trees stand about the woodland ride. ✓ **Correct answer**
- C. The cheery trees stand beside the woodland ride.
- D. The cheery trees stand on the woodland ride.

A. 'stand over' does not fit (trees do not stand over a ride).

B. Correct: "stand about" means stand here and there around the woodland ride. (Option C "beside" is also idiomatic, but the official key gives B.)

C. 'beside' is idiomatic, but the official key gives B ("about").

D. Trees do not stand on a ride (a path); the Learnospot quiz keys D, which is wrong.

Question 119 English

Choose the CORRECT sentence:

- A. He made me to write the sum on the slip and to sign my name in a book.
- B. He made me write the sum on/at the slip and to sign my name in a book.
- C. He made me to write the sum on the slip and sign my name in a book. ✓ **Correct answer**
- D. He made me to write the sum in a slip and to sign my name in a book.

A. 'to sign' breaks the parallel bare infinitives.

not a correct preposition, and 'to sign' breaks the parallelism.

C. The intended correct sentence: correct preposition "on the slip" and parallel "sign". Note: strictly it should be "made me write" (bare infinitive), but both the official key and the Learnospot quiz give C.

D. 'in a slip' is the wrong preposition (it should be 'on the slip').

Question 120 English

Choose the CORRECT sentence:

- A. I am looking forward to secure excellent marks in MCAT.
- B. I am looking forward to securing excellent marks in MCAT. ✓ **Correct answer**
- C. I am looking forward securing excellent marks in MCAT.
- D. I am looking forward secure excellent marks in MCAT.

A. 'looking forward to' takes a gerund ('securing'), not the base verb 'secure'.

B. Correct: "look forward to" + gerund.

C. The 'to' is missing.

D. Both 'to' and the gerund are missing.

Question 121 English

Choose the CORRECT sentence:

- A. The study of population growth indicates one of the greatest paradox of our time.
- B. The study of population growth indicate one of the greatest paradox of our time.
- C. The study of population growth indicates one of the greatest paradoxes of our time. ✓ **Correct answer**
- D. The study of population growth indicates one of the greatest paradox in our time.

of the greatest" the noun must be plural ("paradoxes").

B. 'indicate' does not agree with the singular subject "study", and "paradox" should be plural.

C. Correct: singular verb "indicates" and plural "paradoxes" after "one of the".

D. "paradox" should be plural ("paradoxes") and "of our time" is the idiom, not "in our time".

Question 122 English

Choose the CORRECT sentence:

- A. In North Africa, he barely escaped assassination at the hand of the governor of the province.
- B. In North Africa, he barely escaped from assassination at the hands of the governor of the province. ✓ **Correct answer**
- C. In North Africa, he barely escaped from assassination at the hand of the governor of the province.
- D. In North Africa, he barely escaped assassination at the hands of the governor of the province.

A. The idiom for an agent is "at the hands of" (plural), not "at the hand of".

B. Correct: "escaped from" + "at the hands of".

C. 'at the hand of' should be 'at the hands of'.

D. 'at the hands of' is right, but the official key and the Learnospot quiz both give B ("escaped from assassination").

Question 123 English

EMPATHY

- B. Animosity
- C. Friendship
- D. Sympathy ✓ **Correct answer**

A. Empathy is the ability to understand another's feelings, so "understanding" is a close meaning; the Learnospot quiz keys A, but the official key gives D.

B. Animosity means hostility, the opposite of empathy.

C. Friendship is a relationship, not the meaning of empathy.

D. Empathy is the sharing of another's feelings, nearest in meaning to sympathy (the official key's answer).

Question 124 English

FELICITY

- A. Boredom
- B. Business
- C. Happiness ✓ **Correct answer**
- D. Relaxation

A. Boredom is the opposite of felicity.

B. Business is unrelated to felicity.

C. Felicity means great happiness.

D. Relaxation is not the meaning of felicity.

Question 125 English

UNCANNY

- A. Exact

- C. Good
- D. Strange ✓ **Correct answer**

A. Uncanny does not mean exact.

B. Uncanny does not mean opposite.

C. Uncanny does not mean good.

D. Uncanny means strange or mysterious. (No Learnospot twin for this question; verified from the official key and the dictionary meaning.)

Question 126 English

VIRULENT

- A. Progressive
- B. Harmful ✓ **Correct answer**
- C. Healthy
- D. Positive

A. Virulent does not mean progressive.

B. Virulent means extremely harmful or poisonous.

C. Healthy is the opposite of virulent.

D. Virulent does not mean positive. (No Learnospot twin for this question; verified from the official key and the dictionary meaning.)

Question 127 English

RAPT

- A. Trumpet
- B. Bewitched ✓ **Correct answer**

- D. Rash

A. Trumpet is unrelated to rapt.

B. Rapt means fascinated or enchanted, nearest in meaning to bewitched.

C. Rapid is a different word (fast); it is not the meaning of rapt.

D. Rash is unrelated to rapt. (No Learnospot twin for this question; verified from the official key and the dictionary meaning.)

Question 128 English

PEDAGOGY

- A. The study of pediatrics
- B. The study of teaching methods ✓ **Correct answer**
- C. The study of cultural heritage
- D. The study of pectoral muscle

A. Pediatrics is the study of children's diseases, not pedagogy.

B. Pedagogy is the method and practice of teaching.

C. That is not pedagogy.

D. That is anatomy, not pedagogy. (No Learnospot twin for this question; verified from the official key and the dictionary meaning.)

Question 129 English

INDICTMENT

- A. Humiliation
- B. Offended
- C. Accusation ✓ **Correct answer**

A. Humiliation is not the meaning of indictment.

B. Offended is not the meaning of indictment.

C. An indictment is a formal charge or accusation.

D. Invisible is unrelated to indictment. (No Learnospot twin for this question; verified from the official key and the dictionary meaning.)

Question 130 English

MITIGATION

- A. Alleviation ✓ **Correct answer**
- B. Classification
- C. Formidable
- D. Poisonous

A. Mitigation means lessening or alleviation (of severity).

B. Classification is unrelated to mitigation.

C. Formidable is unrelated to mitigation.

D. Poisonous is unrelated to mitigation. (The Learnospot twin is a different Physics question, so it is not a cross-check here.)

Question 131 English

CONCERTED

- A. Strenuous ✓ **Correct answer**
- B. Furious
- C. Curious
- D. Precious

ed effort is a strenuous, determined joint effort.

B. Furious means angry; it is not the meaning of concerted.

C. Curious is unrelated to concerted.

D. Precious is unrelated to concerted. (The Learnospot twin is a different Biology question, so it is not a cross-check here.)

Question 132 English

ARCANE

- A. Mysterious ✓ **Correct answer**
- B. Furious
- C. Arid
- D. Clear

A. Arcane means mysterious or secret, understood by few.

B. Furious is unrelated to arcane.

C. Arid means dry; it is unrelated to arcane.

D. Clear is the opposite of arcane. (No Learnospot twin for this question; verified from the official key and the dictionary meaning.)

Question 133 Biology

In _____ response, β-cells produce plasma cells that synthesize antibodies and release in blood plasma and tissue fluid.

- A. Cell-Mediated
- B. Hormonal
- C. Humoral ✓ **Correct answer**
- D. Phototactic

mediated response uses T-cells, not antibody-producing plasma cells.

B. The hormonal response is not the antibody response.

C. In the humoral response, B-cells (β-cells) produce plasma cells that synthesize antibodies released into blood plasma and tissue fluid.

D. Phototactic means movement toward light; it is not an immune response.

Question 134 Biology

Passive immunity is used against:

- A. Malaria
- B. Typhoid
- C. Dengue
- D. Tetanus ✓ **Correct answer**

A. Passive immunity is not the standard protection against malaria.

B. Passive immunity is not the standard protection against typhoid.

C. Passive immunity is not the standard protection against dengue.

D. Passive immunity (antitetanus serum/antitoxin) is used against tetanus.

Question 135 Biology

B-lymphocytes are named due to their relationship with:

- A. Blood
- B. Bursa of Fabricius ✓ **Correct answer**
- C. Bone Marrow
- D. Bile Duct

A. B-lymphocytes are not named after blood.

named after the Bursa of Fabricius, the organ in birds where they mature.

C. In mammals B-cells mature in the bone marrow, but the "B" comes from the Bursa of Fabricius.

D. B-lymphocytes are not named after the bile duct.

Question 136 Biology

In light independent stage of photosynthesis, the CO_2 combines with _____ to form an unstable 6-carbon intermediate.

- A. Ribulose bisphosphate ✓ **Correct answer**
- B. Hexose sugar
- C. Glycerate-3-phosphate
- D. Glyceraldehyde-9-phosphate

A. In the Calvin cycle, CO_2 combines with ribulose bisphosphate (RuBP) to form an unstable 6-carbon intermediate.

B. CO_2 does not combine with a hexose sugar in the light-independent stage.

C. Glycerate-3-phosphate is the product after the 6-carbon intermediate splits, not what CO_2 combines with.

D. Glyceraldehyde-3-phosphate is a later product, not what CO_2 combines with.

Question 137 Biology

In glycolysis, glycerate-1,3-bisphosphate is converted into glycerate-3-phosphate by losing _____ phosphate molecules.

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

1,3-bisphosphate loses one phosphate (to ADP, forming ATP), not three.

B. It loses one phosphate, not two.

C. 1,3-bisphosphoglycerate loses one phosphate group to become 3-phosphoglycerate (substrate-level phosphorylation).

D. It loses one phosphate, not four.

Question 138 Biology

Malate is oxidized by _____ to oxaloacetate in Krebs's Cycle.

- A. ATP
- B. NADP
- C. NAD ✓ **Correct answer**
- D. FAD

A. Malate is oxidised by NAD, not ATP.

B. Malate is oxidised by NAD, not NADP.

C. In the Krebs cycle, malate dehydrogenase oxidises malate to oxaloacetate using NAD^+ (producing NADH).

D. FAD is used in the succinate-to-fumarate step, not the malate step.

Question 139 Biology

In electron transport chain, the electrons from NADH and $FADH_2$ are passed to;

- A. Cytochrome a
- B. Cytochrome a_3
- C. Co-enzyme c
- D. Co-enzyme Q ✓ **Correct answer**

A. Cytochrome a is a later carrier in the chain, not the first acceptor from NADH/$FADH_2$.

ne a_3 is the final carrier before oxygen, not the first acceptor; the Learnospot quiz keys B, which is wrong.

C. The carrier is co-enzyme Q (ubiquinone), not co-enzyme c.

D. Electrons from NADH (via Complex I) and from $FADH_2$ (via Complex II) are both passed first to co-enzyme Q (ubiquinone).

Question 140 Biology

Carriers of the respiratory chain are located on:

- A. Matrix of mitochondria
- B. Outer membrane of mitochondria
- C. Inner membrane of mitochondria ✓ **Correct answer**
- D. Cytoplasmic matrix

A. The carriers are in the inner membrane, not the matrix.

B. The carriers are in the inner membrane, not the outer membrane.

C. The electron-transport chain carriers are embedded in the inner mitochondrial membrane.

D. The carriers are in the inner mitochondrial membrane, not the cytoplasmic matrix.

Question 141 Biology

In cystic fibrosis, liposomes-microscopic vesicles are sued which are coated with:

- A. Healthy Gene ✓ **Correct answer**
- B. Chromosome
- C. Protein
- D. Carbohydrate

A. Liposomes (microscopic vesicles) carrying the healthy CFTR gene are used in gene

ystic fibrosis. (The stem prints "sued" for "used".)

B. Liposomes are not coated with a chromosome.

C. Liposomes are not coated with a protein.

D. Liposomes are not coated with a carbohydrate.

Question 142 Biology

The DNA formed by the reverse transcription is called:

- A. rDNA
- B. dDNA
- C. cDNA ✓ **Correct answer**
- D. DNA

A. rDNA is recombinant DNA, not the product of reverse transcription.

B. There is no such term as dDNA.

C. Reverse transcription of mRNA produces complementary DNA (cDNA).

D. The specific term for DNA made by reverse transcription is cDNA.

Question 143 Biology

Bacterial cells take up recombinant plasmids when they are treated with:

- A. $CaCl_2$ ✓ **Correct answer**
- B. NaCl
- C. KCl
- D. NaOH

A. Treatment with calcium chloride ($CaCl_2$) makes bacterial cells competent to take up recombinant plasmids.

hloride is not used to make cells competent.

C. Potassium chloride is not used to make cells competent.

D. Sodium hydroxide is not used to make cells competent.

Question 144 Biology

Which one of the following is made up of radioactively labelled nucleotides?

- A. Phage DNA
- B. Genomic Library
- C. Recombinant DNA
- D. Gene Probe ✓ **Correct answer**

A. Phage DNA is not made of radioactively labelled nucleotides.

B. A genomic library is a collection of DNA fragments, not a labelled probe.

C. Recombinant DNA is not made of radioactively labelled nucleotides.

D. A gene probe is a short single-stranded DNA/RNA made of radioactively labelled nucleotides, used to detect a specific gene.

Question 145 Biology

A technique in transgenic animals in which desired gene is inserted into the eggs of animal is called:

- A. Embryonic Stem Cell mediated Transfer
- B. Microinjection ✓ **Correct answer**
- C. Retro-virus mediated gene Transfer
- D. Virus vectors

A. This technique uses embryonic stem cells, not injection into eggs.

B. Microinjection inserts the desired gene directly into the eggs (the pronucleus) of the

C. This technique uses a retrovirus as a vector, not injection into eggs.

D. Virus vectors carry the gene, but the egg-insertion technique is microinjection.

Question 146 Biology

Ozone is a layer of atmosphere extending from _____ km above earth and absorbs ultraviolet radiations.

- A. 10-50 ✓ **Correct answer**
- B. 50-60
- C. 5-30
- D. 10-80

A. The ozone layer extends from about 10 to 50 km above the earth (in the stratosphere) and absorbs ultraviolet radiation.

B. The ozone layer is not in the 50–60 km range.

C. The ozone layer extends to about 50 km, not 30 km.

D. The ozone layer extends to about 50 km, not 80 km.

Question 147 Biology

Light rays from the sun are absorbed by CO_2 and re-radiate as _____ radiations.

- A. Ultraviolet
- B. Indigo
- C. Infra-Red ✓ **Correct answer**
- D. Green

A. CO_2 absorbs the sun's rays and re-radiates them as infra-red, not ultraviolet.

B. Indigo is a colour of visible light, not the re-radiated form.

bs solar radiation and re-radiates it as infra-red radiation (the greenhouse effect).

D. Green is a colour of visible light, not the re-radiated form.

Question 148 Biology

The gases which are produced by burning of fossils fuels and are responsible for acid rain are:

- A. CFCs
- B. CO_2 and CO
- C. HCl and Oxides of Nitrogen
- D. SO_2 and Oxides of Nitrogen ✓ **Correct answer**

A. CFCs deplete ozone; they are not the acid-rain gases from burning fossil fuels.

B. CO_2 and CO are not the main acid-rain gases.

C. The main acid-rain gases are SO_2 and oxides of nitrogen, not HCl.

D. Burning fossil fuels produces sulphur dioxide and oxides of nitrogen, which cause acid rain.

Question 149 Biology

During successions, the first organisms that develop on bare rock are:

- A. Lichens ✓ **Correct answer**
- B. Shrubs
- C. Moss
- D. Herbs

A. Lichens are the pioneer organisms that first colonise bare rock during primary succession.

pear much later in succession.

C. Moss appears after lichens in succession.

D. Herbs appear after lichens and mosses in succession.

Question 150 Biology

Trophic level of a herbivore in given food-web is:

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

A. Trophic level 1 is the producer (grass), not the herbivore.

B. Trophic level 3 is the secondary consumer (fox, owl, dog), not the herbivore.

C. Trophic level 4 is the tertiary consumer (dog), not the herbivore.

D. In the food web, grass (level 1) is eaten by the herbivores beetle, rat and rabbit, so the herbivore is at trophic level 2.

Question 151 Biology

During maternal mitosis, non-disjunction of autosomal chromosome pair results in the formation of an egg having 24 chromosomes in:

- A. Klinefelter's Syndrome
- B. Down's Syndrome ✓ **Correct answer**
- C. Turner's Syndrome
- D. Jacob's Syndrome

A. Klinefelter's syndrome is caused by non-disjunction of the sex chromosomes (XXY), not an autosomal pair.

nction of autosomal chromosome pair 21 gives an egg with 24 chromosomes, causing Down's syndrome (trisomy 21).

C. Turner's syndrome is caused by the loss of an X chromosome (44 + XO), not autosomal non-disjunction.

D. Jacob's syndrome (XYY) is caused by non-disjunction of the Y chromosome, not an autosomal pair.

Question 152 Biology

Typical symptoms like enlarged breasts and small testis in male are attributed to:

- A. Down's Syndrome
- B. Turner's Syndrome
- C. Klinefelter's Syndrome ✓ **Correct answer**
- D. Phenylketonuria

A. Down's syndrome does not cause enlarged breasts and small testes in males.

B. Turner's syndrome affects females (44 + XO).

C. Klinefelter's syndrome (44 + XXY) in males causes enlarged breasts (gynaecomastia) and small testes.

D. Phenylketonuria is a metabolic disorder, not the cause of these symptoms.

Question 153 Biology

Fluid mosaic model of plasma membrane states that protein molecules float in a fluid _____ layer.

- A. Galactose
- B. Phospholipids ✓ **Correct answer**
- C. Glucose
- D. Carbohydrate

olecules float in a fluid phospholipid layer, not a galactose layer.

B. In the fluid mosaic model, protein molecules float in a fluid phospholipid bilayer.

C. Protein molecules float in a fluid phospholipid layer, not a glucose layer.

D. Protein molecules float in a fluid phospholipid layer, not a carbohydrate layer.

Question 154 Biology

How many triplets of microtubules are present in centriole?

- A. Ten
- B. Eight
- C. Nine ✓ **Correct answer**
- D. Seven

A. A centriole has nine triplets of microtubules, not ten.

B. A centriole has nine triplets of microtubules, not eight.

C. A centriole consists of nine triplets of microtubules arranged in a circle.

D. A centriole has nine triplets of microtubules, not seven.

Question 155 Biology

Turner's syndrome is characterized by having:

- A. Trisomy 21
- B. 44 + XXY
- C. Trisomy 18
- D. 44 + XO ✓ **Correct answer**

A. Trisomy 21 is Down's syndrome, not Turner's syndrome.

B. 44 + XXY is Klinefelter's syndrome, not Turner's syndrome.

B is Edwards syndrome, not Turner's syndrome.

D. Turner's syndrome is characterised by 44 + XO (a female with a single X chromosome).

Question 156 Biology

Which one of the following cell structures is involved in the synthesis of lipids?

- A. Endoplasmic Reticulum ✓ **Correct answer**
- B. Golgi Complex
- C. Centriole
- D. Mitochondria

A. Lipids are synthesised in the smooth endoplasmic reticulum (phospholipids and steroids).

B. The Golgi complex modifies, sorts and packages lipids and proteins, but it does not synthesise lipids; the official key (B) is wrong, and the Learnospot quiz keys A.

C. Centrioles are involved in cell division, not lipid synthesis.

D. Mitochondria produce ATP; they are not the site of lipid synthesis.

Question 157 Biology

Monosaccharides are major components of:

- A. DNA, ATP, Ribulose bisphosphate and Cysteine
- B. DNA, NAD and Insulin
- C. DNA, NADP, ATP and Ribulose bisphosphate ✓ **Correct answer**
- D. DNA, RNA and Myosin

A. DNA, ATP and ribulose bisphosphate contain monosaccharides, but cysteine is an amino acid, so this option is wrong.

B. DNA and NAD contain monosaccharides, but insulin is a protein, so this option is

C. DNA (deoxyribose), NADP (ribose), ATP (ribose) and ribulose bisphosphate (ribulose) all contain monosaccharides.

D. DNA and RNA contain monosaccharides, but myosin is a protein; the Learnospot quiz keys D, which is wrong.

Question 158 Biology

Blood group antigen contains:

- A. Glycoproteins ✓ **Correct answer**
- B. Phospholipids
- C. Glycolipids
- D. Sphingolipids

A. Blood group antigens are glycoproteins (and glycolipids) on the red blood cell surface; the textbook answer is glycoproteins.

B. Blood group antigens are not phospholipids.

C. Glycolipids also carry blood group antigens, but the textbook answer is glycoproteins.

D. Blood group antigens are not sphingolipids.

Question 159 Biology

Myosin is a _____ type of protein.

- A. Intermediate
- B. Simple
- C. Globular
- D. Fibrous ✓ **Correct answer**

A. Myosin is not an intermediate protein.

not classified as a simple protein.

C. Myosin has a globular head, but it is classified as a fibrous protein (its long rod-like tail); the Learnospot quiz keys C, which is wrong.

D. Myosin is a fibrous protein (the textbook's classic fibrous-protein example, along with collagen and keratin).

Question 160 Biology

Which one of the following is an example of unsaturated fatty acid?

- A. Butyric Acid
- B. Oleic Acid ✓ **Correct answer**
- C. Palmitic Acid
- D. Acetic Acid

A. Butyric acid is a saturated fatty acid.

B. Oleic acid (C18:1) is a monounsaturated fatty acid.

C. Palmitic acid is a saturated fatty acid.

D. Acetic acid is a short-chain saturated acid, not an unsaturated fatty acid.

Question 161 Biology

Number of base pairs in one turn of DNA is:

- A. 10 ✓ **Correct answer**
- B. 2
- C. 34
- D. 54

A. One turn of the DNA double helix contains 10 base pairs (3.4 nm).

B. One turn contains 10 base pairs, not 2.

number of angstroms (3.4 nm) in one turn, not the number of base pairs.

D. One turn contains 10 base pairs, not 54.

Question 162 Biology

The lymph vessel of villi is called:

- A. Epithelium
- B. Afferent lymph vessel
- C. Adrenals
- D. Lacteal ✓ **Correct answer**

A. The lymph vessel of the villi is the lacteal, not the epithelium.

B. The lymph vessel of the villi is the lacteal, not an afferent lymph vessel.

C. The lymph vessel of the villi is the lacteal, not the adrenals.

D. The lacteal is the lymph vessel in the centre of each intestinal villus.

Question 163 Biology

Right atrium is separated from right ventricle by:

- A. Bicuspid Valve
- B. Semilunar Valve
- C. Tricuspid Valve ✓ **Correct answer**
- D. Interatrial Septum

A. The bicuspid (mitral) valve separates the left atrium from the left ventricle.

B. The semilunar valves are at the exits of the ventricles, not between the right atrium and right ventricle.

C. The tricuspid valve separates the right atrium from the right ventricle.

...trial septum separates the two atria, not the right atrium from the right ventricle.

Question 164 Biology

The flaps of tricuspid valves are attached to muscular extensions of right ventricle known as:

- A. Smooth Muscles
- B. Papillary Muscles ✓ **Correct answer**
- C. Intercostal Muscles
- D. Skeletal Muscles

A. The valve flaps are attached to the papillary muscles, not smooth muscles.

B. The flaps (cusps) of the tricuspid valve are attached by chordae tendineae to the papillary muscles of the right ventricle.

C. Intercostal muscles are between the ribs, not in the ventricle.

D. The valve flaps are attached to the papillary muscles, not skeletal muscles.

Question 165 Biology

One complete heartbeat consists of one systole and one diastole and lasts for about:

- A. 0.8 sec ✓ **Correct answer**
- B. 0.2 sec
- C. 0.4 sec
- D. 0.5 sec

A. One cardiac cycle lasts about 0.8 seconds (60 ÷ 75 beats per minute).

B. One cardiac cycle lasts about 0.8 seconds, not 0.2 seconds.

C. One cardiac cycle lasts about 0.8 seconds, not 0.4 seconds.

ac cycle lasts about 0.8 seconds, not 0.5 seconds; the Learnospot quiz keys D, which is wrong.

Question 166 Biology

The heart beat cycle starts when electric impulses are generated from;

- A. AV Node
- B. SV Node
- C. SA Node ✓ **Correct answer**
- D. PQ Node

A. The heartbeat starts at the SA node; the AV node relays the impulse, it does not start it.

B. There is no SV node; the pacemaker is the SA node.

C. The heartbeat cycle starts when electric impulses are generated from the sinoatrial (SA) node, the heart's pacemaker.

D. There is no PQ node; the pacemaker is the SA node.

Question 167 Biology

About 70-85% CO_2 in blood is carried:

- A. As carboxylase myoglobin
- B. With proteins in plasma
- C. Freely as CO_2
- D. As bicarbonate ✓ **Correct answer**

A. Most CO_2 is carried as bicarbonate, not as carboxylase myoglobin.

B. Most CO_2 is carried as bicarbonate, not with plasma proteins.

C. Only about 5% of CO_2 is carried freely dissolved in plasma.

D. About 70–85% of CO_2 in blood is carried as bicarbonate ions (HCO_3^-).

168 Biology

Those nephrons which are present along the border of the cortex and medulla are called:

- A. Juxtamedullary nephrons ✓ **Correct answer**
- B. Cortical nephrons
- C. Internal nephrons
- D. Outer nephrons

A. Juxtamedullary nephrons are located along the border of the cortex and medulla (their loops of Henle extend deep into the medulla).

B. Cortical nephrons lie entirely in the cortex.

C. There is no such term as internal nephrons.

D. There is no such term as outer nephrons.

Question 169 Biology

When water is in short supply, increased water retention occurs through the:

- A. Cortical nephrons
- B. Proximal Convoluted Tubule
- C. Juxtamedullary nephrons ✓ **Correct answer**
- D. The tissue of cortex

A. Cortical nephrons do not concentrate urine; the juxtamedullary nephrons do.

B. The proximal tubule reabsorbs water constantly, but increased retention in water shortage is through the juxtamedullary nephrons.

C. When water is in short supply, increased water retention occurs through the juxtamedullary nephrons (their long loops of Henle build the medullary gradient for water reabsorption).

ention does not occur through the tissue of the cortex.

Question 170 Biology

In nephrons, counter-current multiplier occurs at:

- A. Loop of Henle ✓ **Correct answer**
- B. Collecting Duct
- C. Bowman's Capsule
- D. Glomerulus

A. The counter-current multiplier operates in the loop of Henle (the descending and ascending limbs).

B. The collecting duct is where water reabsorption is regulated, not where the counter-current multiplier occurs.

C. Filtration occurs in Bowman's capsule, not the counter-current multiplier.

D. Filtration occurs in the glomerulus, not the counter-current multiplier.

Question 171 Biology

Ascending loop of Henle does not allow outflow of:

- A. Na^+ ions
- B. K^+ ions
- C. Cl^- ions
- D. Water ✓ **Correct answer**

A. Na^+ ions are actively transported out of the ascending loop.

B. K^+ ions move out of the ascending loop.

C. Cl^- ions move out of the ascending loop.

D. The ascending loop of Henle is impermeable to water, so water cannot flow out of it.

172 Biology

A larger quantity of dilute urine is produced in diabetes insipidus. This disease is due to the deficiency of:

- A. Antidiuretic Hormone ✓ **Correct answer**
- B. Aldosterone
- C. Thyroxine
- D. Cortisol

A. Diabetes insipidus is caused by a deficiency of antidiuretic hormone (ADH/vasopressin), so the kidneys cannot reabsorb water and large quantities of dilute urine are produced.

B. Aldosterone regulates sodium reabsorption, not water reabsorption in diabetes insipidus.

C. Thyroxine deficiency does not cause diabetes insipidus.

D. Cortisol deficiency does not cause diabetes insipidus.

Question 173 Biology

Water and sodium ions are reabsorbed in:

- A. Urinary Bladder and Urethra
- B. Ureter
- C. Adrenal Cortex
- D. Proximal Convoluted Tubule & Collecting Duct ✓ **Correct answer**

A. Water and sodium are not reabsorbed in the bladder and urethra.

B. Water and sodium are not reabsorbed in the ureter.

C. The adrenal cortex secretes aldosterone; it is not where water and sodium are reabsorbed.

D. Water and sodium ions are reabsorbed in the proximal convoluted tubule and the

Question 174 Biology

Which disease is responsible for dementia (memory loss)?

- A. Parkinson's Disease
- B. Alzheimer's Disease ✓ **Correct answer**
- C. Epilepsy
- D. Grave's Disease

A. Parkinson's disease mainly causes movement problems (tremor, rigidity), not dementia.

B. Alzheimer's disease is the main cause of dementia (progressive memory loss).

C. Epilepsy causes seizures, not dementia.

D. Grave's disease (hyperthyroidism) does not cause dementia.

Question 175 Biology

Neurotransmitter secreted at synapse outside the central nervous system is:

- A. Dopamine
- B. Polypeptide
- C. Androgen
- D. Acetylcholine ✓ **Correct answer**

A. Dopamine is a neurotransmitter in the central nervous system, not the one secreted at synapses outside it.

B. A polypeptide is a chain of amino acids, not a neurotransmitter.

C. An androgen is a male sex hormone, not a neurotransmitter.

D. Acetylcholine is the neurotransmitter secreted at synapses outside the central nervous system (at neuromuscular junctions and in the autonomic nervous system).

176 Biology

Conduction of action potentials from one mode of Ranvier to another in myelinated neurons is through:

- A. Hyperpolarization
- B. Resting Membrane Potential
- C. Depolarization
- D. Saltatory Conduction ✓ **Correct answer**

A. Hyperpolarization is a phase of the action potential, not the mode of conduction in myelinated neurons.

B. The resting membrane potential is the baseline potential, not the mode of conduction.

C. Depolarization is a phase of the action potential, not the mode of conduction.

D. In myelinated neurons, action potentials jump from one node of Ranvier to the next by saltatory conduction. (The stem prints "mode" for "node".)

Question 177 Biology

In the following diagram of action potential in a neuron, 'x' depicts:

- A. Depolarization ✓ **Correct answer**
- B. Polarization
- C. Repolarization
- D. Hyperpolarization

A. In the diagram, 'x' marks the rising phase of the action potential (membrane potential rising from about −70 mV toward 0 mV), which is depolarization.

B. Polarization is the resting state, not the rising phase marked 'x'.

C. Repolarization is the falling phase after the peak, not the rising phase marked 'x'.

D. Hyperpolarization is the dip below the resting potential after repolarization, not the

marked 'x'.

Question 178 Biology

In human testis, which structure is responsible for carrying sperm from inside the testis?

- A. Seminiferous tubules
- B. Urinogenital duct
- C. Seminal Vesicles
- D. Vasa efferentia ✓ **Correct answer**

A. The seminiferous tubules produce sperm, but they do not carry sperm out of the testis.

B. The urinogenital duct is not the structure that carries sperm from inside the testis.

C. The seminal vesicles secrete fluid into the semen; they do not carry sperm from the testis.

D. The vasa efferentia carry sperm from the seminiferous tubules inside the testis to the epididymis.

Question 179 Biology

In which part of female reproductive system fertilization takes place?

- A. Proximal part of oviduct ✓ **Correct answer**
- B. Uterus
- C. Placenta
- D. Vagina

A. Fertilization takes place in the proximal part (ampulla) of the oviduct (fallopian tube).

B. The uterus is where the embryo implants, not where fertilization occurs.

C. The placenta nourishes the foetus; fertilization does not occur in it.

D. The vagina receives sperm, but fertilization does not occur in it.

180 Biology

In females, FSH stimulates the ovary to produce:

- A. Progesterone
- B. Lactin
- C. Oestrogen ✓ **Correct answer**
- D. Oxytocin

A. FSH stimulates the ovary to produce oestrogen; progesterone is produced by the corpus luteum under LH.

B. There is no such hormone as lactin.

C. In females, FSH stimulates the ovarian follicles to produce oestrogen.

D. Oxytocin is produced by the pituitary, not by the ovary under FSH.

Question 181 Biology

Syphilis, sexually transmitted disease is caused by:

- A. HIV
- B. Treponema pallidum ✓ **Correct answer**
- C. Neisseria gonorhoeae
- D. Type '2' virus

A. HIV causes AIDS, not syphilis.

B. Syphilis is caused by the bacterium Treponema pallidum.

C. Neisseria gonorrhoeae causes gonorrhoea, not syphilis.

D. Syphilis is caused by a bacterium, not a virus.

182 Biology

In which phase of human female menstrual cycle, endometrium prepares for the implantation of embryo?

- A. Proliferative phase
- B. Menstrual phase
- C. Secretory phase ✓ **Correct answer**
- D. Ovulation phase

A. In the proliferative phase the endometrium rebuilds, but it prepares for implantation in the secretory phase.

B. In the menstrual phase the endometrium is shed.

C. In the secretory phase the endometrium thickens and becomes secretory, preparing for implantation of the embryo.

D. Ovulation is the release of the egg, not the phase in which the endometrium prepares for implantation.

Question 183 Biology

The total number of cervical and thoracic vertebrae in human vertebral column is:

- A. 7
- B. 19 ✓ **Correct answer**
- C. 14
- D. 33

A. 7 is the number of cervical vertebrae alone.

B. There are 7 cervical and 12 thoracic vertebrae, so the total is 19.

C. The total is 19 (7 cervical + 12 thoracic), not 14.

D. 33 is the total number of vertebrae in the whole column, not cervical + thoracic.

184 Biology

A sarcomere is the region of a myofibril between two successive:

- A. M-lines
- B. Z-lines ✓ **Correct answer**
- C. I-bands
- D. T-tubules

A. A sarcomere is bounded by Z-lines, not M-lines.

B. A sarcomere is the region of a myofibril between two successive Z-lines.

C. A sarcomere is bounded by Z-lines, not I-bands.

D. A sarcomere is bounded by Z-lines, not T-tubules.

Question 185 Biology

The sarcolemma of muscle fibre folds inwards and forms a system of tubes which runs through the sarcoplasm called:

- A. Myofilaments
- B. Sarcoplasmic reticulum
- C. Z-lines
- D. Transverse tubules ✓ **Correct answer**

A. Myofilaments are the actin and myosin filaments, not the tubes formed by the sarcolemma.

B. The sarcoplasmic reticulum is a separate membrane system that stores calcium, not the inward folds of the sarcolemma.

C. Z-lines are the boundaries of sarcomeres, not the tubes formed by the sarcolemma.

D. The sarcolemma folds inwards to form the transverse (T) tubules, which run through the sarcoplasm.

186 Biology

According to sliding filament theory, when muscle fibers are stimulated by nervous system, which of the following changes occurs?

- A. I-bands shorten ✓ **Correct answer**
- B. H-zone becomes more visible
- C. Z-lines move further apart
- D. A-bands shorten

A. When a muscle contracts, the actin filaments slide over the myosin filaments, so the I-bands shorten.

B. The H-zone becomes less visible (it narrows or disappears) during contraction.

C. The Z-lines move closer together during contraction.

D. The A-bands stay the same length during contraction.

Question 187 Biology

If lactic acid builds up in thigh muscles, it causes muscle tiredness and pain. This condition is called:

- A. Muscle Fatigue ✓ **Correct answer**
- B. Tetany
- C. Cramps
- D. Oxygen debt in muscles

A. A build-up of lactic acid causes muscle tiredness and pain, called muscle fatigue.

B. Tetany is sustained muscle contraction caused by low calcium, not lactic acid build-up.

C. Cramps are painful involuntary contractions, not the name for lactic-acid tiredness.

D. Oxygen debt is the extra oxygen needed after exercise to remove lactic acid, not the name of the tiredness itself.

188 Biology

Thyroxine deficiency in adults' results in a condition called:

- A. Cretinism
- B. Hypothyroidism
- C. Thyrotoximia
- D. Myxoedema ✓ **Correct answer**

A. Cretinism is thyroxine deficiency in children, not in adults.

B. Hypothyroidism is the general term for low thyroid function; the named condition in adults is myxoedema.

C. Thyrotoximia is excess thyroxine, the opposite of deficiency.

D. Thyroxine deficiency in adults results in myxoedema.

Question 189 Biology

α-cells of pancreas secrete a hormone known as:

- A. Glucagon ✓ **Correct answer**
- B. Insulin
- C. Gastrin
- D. Rennin

A. The alpha cells of the islets of Langerhans secrete glucagon.

B. Insulin is secreted by the beta cells of the pancreas, not the alpha cells.

C. Gastrin is secreted by the stomach, not the alpha cells of the pancreas.

D. Rennin is a stomach enzyme, not a pancreatic hormone.

190 Biology

X-linked recessive trait is:

- A. Hypophosphatemia
- B. Vitamin-D resistant rickets
- C. Haemophilia ✓ **Correct answer**
- D. Diabetes Mellitus

A. Hypophosphatemia is an X-linked dominant trait, not X-linked recessive.

B. Vitamin-D resistant rickets is an X-linked dominant trait, not X-linked recessive.

C. Haemophilia is the classic X-linked recessive trait.

D. Diabetes mellitus is not an X-linked recessive trait.

Question 191 Biology

Human skin colour is a good example of?

- A. Sex-linked inheritance
- B. Polygenic inheritance ✓ **Correct answer**
- C. x-linked inheritance
- D. y-linked inheritance

A. Skin colour is not sex-linked.

B. Human skin colour is controlled by several genes, a good example of polygenic inheritance.

C. Skin colour is not X-linked.

D. Skin colour is not Y-linked.

192 Biology

From evolutionary point of view, which respiratory protein is common in many organisms?

- A. Cytochrome a
- B. Cytochrome b
- C. Cytochrome c ✓ **Correct answer**
- D. Cytochrome d

A. Cytochrome c is the respiratory protein common to many organisms, not cytochrome a.

B. Cytochrome c is the respiratory protein common to many organisms, not cytochrome b.

C. Cytochrome c is a highly conserved respiratory protein found in many organisms, used as evidence for evolution.

D. Cytochrome c is the respiratory protein common to many organisms, not cytochrome d.

Question 193 Biology

Number of pairs of autosomes in humans in:

- A. 23
- B. 24
- C. 21
- D. 22 ✓ **Correct answer**

A. 23 is the total number of chromosome pairs (22 autosomes + 1 sex pair).

B. Humans have 22 pairs of autosomes, not 24.

C. Humans have 22 pairs of autosomes, not 21.

D. Humans have 22 pairs of autosomes (and one pair of sex chromosomes).

194 Biology

ABO blood system is an example of:

- A. Polygenes
- B. Multiple genes
- C. Multiple Alleles ✓ **Correct answer**
- D. Multiple Mutation

A. The ABO system is controlled by one gene with three alleles, not by polygenes.

B. The ABO system is controlled by a single gene (I), not multiple genes.

C. The ABO blood system is an example of multiple alleles (I^A, I^B and i at one locus).

D. The ABO system is an example of multiple alleles, not multiple mutation.

Question 195 Biology

Which molecular structure of enzyme is essential for activity of enzyme?

- A. Primary Structure
- B. Quaternary Structure
- C. Secondary Structure
- D. Tertiary Structure ✓ **Correct answer**

A. The primary structure (amino acid sequence) determines the shape, but the tertiary structure is what is essential for activity.

B. Not all enzymes have a quaternary structure; the tertiary structure is essential for activity.

C. The secondary structure (alpha helices, beta sheets) is not what is essential for activity.

D. The tertiary (three-dimensional) structure of an enzyme, which forms the active site, is essential for its activity.

196 Biology

Which one of the following edible products is widely pasteurized?

- A. Soft drinks
- B. Mango squash
- C. Milk ✓ **Correct answer**
- D. Orange Juice

A. Soft drinks are not widely pasteurized.

B. Mango squash is not widely pasteurized.

C. Milk is the edible product most widely pasteurized (to kill pathogens).

D. Orange juice is not widely pasteurized.

Question 197 Biology

Ribosomes are tiny organisms, which are involved in the synthesis of:

- A. Protein ✓ **Correct answer**
- B. RNA
- C. Nucleus
- D. Nuclosome

A. Ribosomes are the sites of protein synthesis.

B. Ribosomes do not synthesise RNA (RNA is made in the nucleus).

C. Ribosomes do not synthesise a nucleus.

D. Ribosomes do not synthesise a nucleosome.

Question 198 Biology

Which organelle is bounded by two membranes?

- B. Mitochondria ✓ **Correct answer**
- C. Lysosome
- D. Nucleolus

A. Ribosomes have no membrane at all.

B. Mitochondria are bounded by two membranes (an outer and an inner membrane).

C. Lysosomes are bounded by a single membrane.

D. The nucleolus has no membrane at all.

Question 199 Biology

At the beginning of nuclear division, the number of microtubule triplets in two pairs of centrioles that migrate to opposite poles are:

- A. 9
- B. 18
- C. 108
- D. 36 ✓ **Correct answer**

A. 9 is the number of triplets in one centriole, not in two pairs.

B. 18 is the number of triplets in one pair (2 centrioles × 9), not two pairs; the Learnospot quiz keys B, which is wrong.

C. 108 is far too many (it would be 12 centrioles × 9).

D. Two pairs of centrioles = 4 centrioles, each with 9 triplets, so 4 × 9 = 36 triplets.

Question 200 Biology

The disease in which an individual has extra sex chromosome (44 + XXY) is known as:

- A. Down's syndrome

ner's syndrome

- C. Klinefelter's syndrome ✓ **Correct answer**
- D. Jacob's syndrome

A. Down's syndrome is trisomy 21 (47, +21), not 44 + XXY.

B. Turner's syndrome is 44 + XO, not 44 + XXY.

C. Klinefelter's syndrome is 44 + XXY (an extra X chromosome in a male).

D. Jacob's syndrome is 44 + XYY, not 44 + XXY.

Question 201 Biology

Over-secretion of cortical hormone causes a disease called;

- A. Cushing's Disease ✓ **Correct answer**
- B. Diabetes Mellitus
- C. Hypoglycemia
- D. Addison's Disease

A. Over-secretion of adrenal cortical hormones (cortisol) causes Cushing's disease.

B. Diabetes mellitus is caused by insulin deficiency, not cortical hormone excess.

C. Hypoglycemia is low blood sugar, not caused by cortical hormone excess.

D. Addison's disease is caused by under-secretion (deficiency) of cortical hormones, not over-secretion.

Question 202 Biology

Ejection of milk from mammary glands is under the control of which one of the following hormones?

- A. Androgen
- B. Oxytocin ✓ **Correct answer**

- D. Estrogen

A. Androgens are male sex hormones; they do not control milk ejection.

B. Oxytocin causes the ejection (let-down) of milk from the mammary glands.

C. Progesterone prepares the mammary glands, but milk ejection is controlled by oxytocin.

D. Estrogen prepares the mammary glands, but milk ejection is controlled by oxytocin.

Question 203 Biology

Granulocytes are:

- A. Monocytes, Eosinophils, Basophils
- B. Basophils, Macrophages, Neurophils
- C. Neurophils, Eosinophils, Basophils ✓ **Correct answer**
- D. Monocytes, Macrophages, Basophils

A. Monocytes are agranulocytes, not granulocytes.

B. Macrophages are agranulocytes, not granulocytes.

C. The granulocytes are neutrophils, eosinophils and basophils. (The paper prints "Neurophils" for "Neutrophils".)

D. Monocytes and macrophages are agranulocytes, not granulocytes.

Question 204 Biology

Response of body against the transplanted organ is:

- A. Homeostatic Response
- B. Behavioral Response
- C. Primary Response

-mediated response ✓ **Correct answer**

A. Rejection of a transplanted organ is an immune response, not a homeostatic response.

B. Rejection of a transplanted organ is an immune response, not a behavioral response.

C. The primary response is the first antibody response to an antigen, not the rejection of a transplant.

D. The body rejects a transplanted organ by a cell-mediated (T-cell) immune response.

Question 205 Biology

Some enzymes require helper which is non-protein part for its efficient functioning that is called:

- A. Accelerator
- B. Cofactor ✓ **Correct answer**
- C. Prosthetic group
- D. Apoenzyme

A. There is no such term as accelerator for an enzyme helper.

B. A cofactor is the non-protein helper (an ion or organic molecule) that an enzyme needs for efficient functioning.

C. A prosthetic group is a cofactor permanently bound to the enzyme; the general term for the non-protein helper is cofactor.

D. The apoenzyme is the protein part of the enzyme alone, not the non-protein helper.

Question 206 Biology

Pepsin, protein digesting enzymes, sets best pH:

- A. 3.00
- B. 4.50

-) ✓ Correct answer
- D. 6.00

A. Pepsin works best at pH 2.00, not 3.00.

B. Pepsin works best at pH 2.00, not 4.50.

C. Pepsin, the protein-digesting enzyme of the stomach, works best at pH 2.00 (in the acidic stomach).

D. Pepsin works best at pH 2.00, not 6.00.

Question 207 Biology

Which one of the following is an example of competitive inhibitor?

- A. Glucose
- B. Fumerate
- C. Succinic Acid
- D. Melonate ✓ **Correct answer**

A. Glucose is a substrate, not a competitive inhibitor.

B. Fumarate is the product of succinate dehydrogenase, not a competitive inhibitor.

C. Succinic acid is the substrate of succinate dehydrogenase, not its inhibitor.

D. Malonate (printed "Melonate") is the classic competitive inhibitor of succinate dehydrogenase (it competes with succinate for the active site).

Question 208 Biology

HIV is classified as:

- A. Bacteriophage
- B. Oncovirus
- C. Retrovirus ✓ Correct answer

A. A bacteriophage infects bacteria; HIV infects human cells.

B. An oncovirus causes cancer; HIV is not classified as an oncovirus.

C. HIV is a retrovirus (it carries RNA and reverse transcriptase).

D. Icosahedral describes a capsid shape, not the classification of HIV.

Question 209 Biology

Cyanobacteria are:

- A. Photoautotrophic bacteria ✓ **Correct answer**
- B. Chemosynthetic bacteria
- C. Saprotrophic bacteria
- D. Parasitic bacteria

A. Cyanobacteria (blue-green algae) are photoautotrophic bacteria (they photosynthesise).

B. Cyanobacteria are not chemosynthetic.

C. Cyanobacteria are not saprotrophic.

D. Cyanobacteria are not parasitic.

Question 210 Biology

During favourable conditions, certain bacteria produces:

- A. Ribosomes
- B. Plasmids
- C. Mitochondria
- D. Spores ✓ **Correct answer**

A. Ribosomes are the protein-synthesis machinery present in all bacteria, not a product of

B. Plasmids are extra DNA present in bacteria, not a product of favourable conditions.

C. Bacteria have no mitochondria.

D. Certain bacteria produce resistant spores. Note: the stem prints "favourable", which is evidently a misprint for "unfavourable" — endospores are formed in unfavourable conditions (the Learnospot twin reads "During unfavourable conditions"), and both the official key and the quiz give D.

Question 211 Biology

In rhizopus, zygote forms temporary, dormant, thick-walled resistant structure called:

- A. Zygospore ✓ **Correct answer**
- B. Spore
- C. Sporangia
- D. Hydra

A. In Rhizopus, the zygote forms a temporary, dormant, thick-walled resistant structure called a zygospore.

B. The resistant structure formed by the zygote is specifically a zygospore, not a spore.

C. Sporangia are the sacs that produce spores, not the zygote's resistant structure.

D. Hydra is a different organism, not a structure in Rhizopus.

Question 212 Biology

_____ is a triploblastic organism.

- A. Jelly Fish
- B. Sea Anemone
- C. Tapeworm ✓ **Correct answer**

A. Jellyfish are cnidarians, which are diploblastic (two germ layers); the Learnospot quiz keys A, which is wrong.

B. Sea anemones are cnidarians, which are diploblastic.

C. The tapeworm is a platyhelminth, which is triploblastic (three germ layers: ectoderm, mesoderm, endoderm).

D. Corals are cnidarians, which are diploblastic.

Question 213 Biology

In arthropods, the body cavity is in the form of:

- A. Coelem
- B. Haemocoel ✓ **Correct answer**
- C. Psedocoelem
- D. Enteron

A. In arthropods the true coelom is reduced; the body cavity is a haemocoel.

B. In arthropods, the body cavity is a haemocoel (a cavity filled with blood/haemolymph).

C. A pseudocoelom is found in nematodes, not arthropods.

D. The enteron is the gut cavity, not the body cavity of arthropods.

Question 214 Biology

_____ is a good example of polymorphism.

- A. Hydra
- B. Starfish
- C. Obelia ✓ **Correct answer**
- D. Equplectella

of the classic example of polymorphism.

B. Starfish is not an example of polymorphism.

C. Obelia is the classic example of polymorphism (its colony has different forms: polyps and medusae).

D. Euplectella (a glass sponge) is not an example of polymorphism; the Learnospot quiz keys D, which is wrong.

Question 215 Biology

Name common gut roundworm parasites of humans and pigs.

- A. Aascaris lumberocoides ✓ **Correct answer**
- B. Lumbericus terresaris
- C. Pheretima posthuma
- D. Hirudo Medicinalis

A. Ascaris lumbricoides (printed "Aascaris lumberocoides") is the common gut roundworm parasite of humans and pigs.

B. Lumbricus terrestris is the earthworm, not a gut parasite.

C. Pheretima posthuma is an earthworm, not a gut parasite.

D. Hirudo medicinalis is the medicinal leech, not a gut roundworm.

Question 216 Biology

_____ is also called liver fluke.

- A. Dugesia
- B. Taenia
- C. Fasciola ✓ **Correct answer**
- D. Coral

; a free-living planarian, not the liver fluke.

B. Taenia is the tapeworm, not the liver fluke.

C. Fasciola hepatica is the liver fluke.

D. Coral is a cnidarian, not the liver fluke.

Question 217 Biology

Oxyntic cells in stomach produces:

- A. Pepsin
- B. Pepsinogen
- C. Gastrin
- D. HCl ✓ **Correct answer**

A. Pepsin is the active enzyme; oxyntic cells produce HCl, not pepsin.

B. Pepsinogen is produced by the chief cells, not the oxyntic cells.

C. Gastrin is produced by G-cells, not the oxyntic cells.

D. Oxyntic (parietal) cells in the stomach produce hydrochloric acid (HCl).

Question 218 Biology

The hormone which inhibits the secretion of pancreatic juice is:

- A. Secretin ✓ **Correct answer**
- B. Gastrin
- C. Thyroxine
- D. Parathormone

A. Secretin is the pancreatic-juice hormone (the official key and the Learnospot quiz both give A). Note: physiologically secretin stimulates the secretion of bicarbonate-rich pancreatic juice; the question's "inhibits" is an erroneous framing (secretin inhibits gastric,

ic, secretion), but A is the intended answer per both keys.

B. Gastrin stimulates gastric juice, not pancreatic juice inhibition.

C. Thyroxine is a thyroid hormone, unrelated to pancreatic juice.

D. Parathormone regulates calcium, unrelated to pancreatic juice.

Question 219 Biology

Trypsinogen is activated to trypsin by:

- A. HCl
- B. Enterokinase ✓ **Correct answer**
- C. Mucus
- D. Gastrin

A. HCl activates pepsinogen, not trypsinogen.

B. Enterokinase (enteropeptidase) activates trypsinogen to trypsin in the small intestine.

C. Mucus protects the gut lining; it does not activate trypsinogen.

D. Gastrin stimulates gastric secretion; it does not activate trypsinogen.

Question 220 Biology

The emulsification of fats is the role of:

- A. Saliva
- B. Pancreatic juice
- C. Gastrin
- D. Bile ✓ **Correct answer**

A. Saliva digests starch, not the emulsification of fats.

B. Pancreatic juice contains lipase, which digests fats after emulsification, but

n itself is the role of bile.

C. Gastrin is a hormone, not the agent of fat emulsification.

D. Bile emulsifies fats (breaks large fat globules into small droplets) in the small intestine.

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