MDCAT (NUMS entry test) — 2021 · Solved Past Paper

Body: National University of Medical Sciences (NUMS) · **Post:** MDCAT (NUMS entry test) · **Year:** 2021 · **Questions:** 154 in the original paper — **154 solved and verified**, none excluded · **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 2021 sitting.

Source note: mdcatguide.com compilation, 'NUMS 2021 — ORIGINAL COMPLETE QUESTION PAPER', 43 pp., served via noteslelo.pk (154 MCQs: Physics 40 / Biology 57 / English 17 / Chemistry 40; 150 minutes, no negative marking; accessed 9 Nov 2026). The PDF carries two key listings that agree 154/154 — the quick answer grid (p. 28) and the complete answer key with detailed explanations (pp. 29–42). 1 printed-key correction (Q100 C to A, double negative with 'unless'); 4 PICK-ONE (Q7, Q27, Q32, Q112). Answers verified independently against reference facts, worked derivations and targeted sources, never from the printed key alone. Decisions by the assistant under the owner's 8 Nov 2026 delegation.

Question 1 Physics

In isochoric process:

- A. Pressure is kept constant
- B. Exchange of heat is zero
- C. Volume is kept constant ✓ **Correct answer**
- D. Temperature is kept constant

onstant pressure is an isobaric process, not isochoric.

B. Wrong: zero heat exchange is an adiabatic process.

C. Correct: "isochoric" means constant volume, so no work is done and all heat changes the internal energy.

D. Wrong: constant temperature is an isothermal process.

Question 2 Physics

If 42J heat is transferred to system during expansion and work done is 32J, change in internal energy is:

- A. 74 J
- B. 10 J ✓ **Correct answer**
- C. 116 J
- D. 106 J

A. Wrong: 42 + 32 = 74 adds the work instead of subtracting it.

B. Correct: by the first law, change in internal energy = heat supplied minus work done = 42 − 32 = 10 J.

C. Wrong: no combination of 42 and 32 gives 116.

D. Wrong: no combination of 42 and 32 gives 106.

Question 3 Physics

The 1st law of thermodynamics is generalization of law of conservation of:

- A. Mass
- B. Charge
- C. Energy ✓ **Correct answer**
- D. Momentum

ass conservation is a separate law, not the first law of thermodynamics.

B. Wrong: charge conservation belongs to electromagnetism.

C. Correct: the first law states that energy cannot be created or destroyed, only changed in form.

D. Wrong: momentum conservation is a mechanics law, not thermodynamics.

Question 4 Physics

RC = Resistance × Capacitance is known as:

- A. Electrostatic constant
- B. Time constant ✓ **Correct answer**
- C. Dielectric constant
- D. Proportionality constant

A. Wrong: that is the Coulomb constant in electrostatics.

B. Correct: RC has the dimension of time and is the time for a capacitor to charge to about 63% or discharge to about 37%.

C. Wrong: that describes how a material affects capacitance, not the product RC.

D. Wrong: that is a generic term, not the name of RC.

Question 5 Physics

In parallel combination of two capacitors, equivalent capacitance equals:

- A. $C_1 + C_2$ ✓ **Correct answer**
- B. $1/C_1 + 1/C_2$
- C. $C_1C_2/(C_1+C_2)$
- D. $2C_1C_2/(C_1+C_2)$

A. Correct: capacitors in parallel add directly, because each gets the full voltage and the

B. Wrong: that is the reciprocal form used for capacitors in series.

C. Wrong: that is the series combination formula.

D. Wrong: there is no factor of 2 in either combination formula.

Question 6 Physics

The S.I unit of capacitance is:

- A. Coulomb
- B. Volt
- C. Farad ✓ **Correct answer**
- D. Ampere

A. Wrong: the coulomb is the unit of charge.

B. Wrong: the volt is the unit of potential difference.

C. Correct: capacitance is measured in farads (1 F = 1 C/V), named after Michael Faraday.

D. Wrong: the ampere is the unit of electric current.

Question 7 Physics

1 kWh =

- A. 0.36×10^6 J
- B. 36×10^5 J
- C. 3.6×10^6 J ✓ **Correct answer**
- D. 0.036×10^5 J

A. Wrong: that is 0.1 kWh, ten times too small.

B. Also correct in value: 36×10^5 J = 3.6×10^6 J, the same number as option C written in a

m, so a candidate choosing B would also be right; the printed key records C.

C. Correct per the printed key: 1 kWh = 1000 W × 3600 s = 3,600,000 J.

D. Wrong: that is only 3,600 J, a thousand times too small. (PICK-ONE: options B and C are numerically identical; the key records C. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 8 Physics

Volt × Ampere is the unit of:

- A. Current
- B. Volt
- C. Resistance
- D. Power ✓ **Correct answer**

A. Wrong: current is measured in amperes alone.

B. Wrong: the volt is potential difference, not volt times ampere.

C. Wrong: resistance is volt divided by ampere (ohm), not multiplied.

D. Correct: power = voltage × current, so volt × ampere = watt.

Question 9 Physics

The time rate of change of velocity is called:

- A. Force
- B. Acceleration ✓ **Correct answer**
- C. Power
- D. Energy

A. Wrong: force is mass times acceleration, not the rate of change of velocity itself.

B. Correct: acceleration is defined as change in velocity divided by time.

ower is the rate of doing work.

D. Wrong: energy is the capacity to do work, not a rate of change of velocity.

Question 10 Physics

In projectile motion, range will be maximum at angle:

- A. 30 degrees
- B. 45 degrees ✓ **Correct answer**
- C. 60 degrees
- D. 90 degrees

A. Wrong: the range at 30° is less than the maximum.

B. Correct: range = $v^2 \sin 2\theta / g$, and $\sin 2\theta$ is maximum (1) when $2\theta = 90°$, so $\theta = 45°$.

C. Wrong: 60° gives the same range as 30°, below the maximum.

D. Wrong: at 90° the projectile goes straight up and the horizontal range is zero.

Question 11 Physics

Which is NOT TRUE about momentum?

- A. Momentum is quantity of motion
- B. Unit of momentum is N.s
- C. Momentum is NOT a vector quantity ✓ **Correct answer**
- D. Momentum is product of mass and velocity

A. Wrong as the answer: this statement IS true, so it is not the "NOT TRUE" one.

B. Wrong as the answer: this IS true (kg·m/s = N·s), so it is not the false statement.

C. Correct: momentum IS a vector ($p = mv$, with direction), so claiming it is not a vector is the false statement.

the answer. this IS true by definition, so it is not the false statement.

Question 12 Physics

In perfect elastic collision:

- A. Only momentum conserved
- B. Only total energy conserved
- C. Only kinetic energy conserved
- D. Momentum, KE and total energy all conserved ✓ **Correct answer**

A. Wrong: momentum is conserved, but kinetic energy is conserved too in a perfectly elastic collision.

B. Wrong: total energy is conserved in every collision, but here kinetic energy is also conserved.

C. Wrong: kinetic energy is conserved, but momentum is conserved too.

D. Correct: a perfectly elastic collision conserves momentum, kinetic energy and therefore total energy.

Question 13 Physics

Slope of a displacement-time graph is:

- A. Velocity ✓ **Correct answer**
- B. Displacement
- C. Acceleration
- D. Distance

A. Correct: slope = change in displacement divided by change in time, which is velocity.

B. Wrong: displacement is the value on the vertical axis, not the slope.

C. Wrong: acceleration is the slope of a velocity-time graph, not a displacement-time

D. Wrong: distance is a quantity, not the slope of this graph.

Question 14 Physics

Two stones 10kg and 50kg fall from 100m cliff. Which has greater velocity at bottom?

- A. 10 Kg
- B. 50 Kg
- C. Both have same velocity ✓ **Correct answer**
- D. Cannot be calculated

A. Wrong: the lighter stone does not fall faster.

B. Wrong: the heavier stone does not fall faster.

C. Correct: ignoring air resistance, falling speed depends only on height ($v = \sqrt{2gh}$), not on mass, so both reach about 44.7 m/s.

D. Wrong: the velocity can be calculated from the height and g.

Question 15 Physics

Work done by gravity on 10N stone falling 250m:

- A. 250 J
- B. 26 J
- C. 2,500 J ✓ **Correct answer**
- D. 25,000 J

A. Wrong: that is 10 × 25, not 10 × 250.

B. Wrong: no combination of 10 N and 250 m gives 26 J.

C. Correct: work = force × distance = 10 N × 250 m = 2,500 J.

at is ten times too large (10 × 2,500).

Question 16 Physics

Speed halved — kinetic energy decreases by factor:

- A. 1/2
- B. 1/4 ✓ **Correct answer**
- C. 1/8
- D. 1/6

A. Wrong: kinetic energy depends on speed squared, not speed itself.

B. Correct: KE = ½mv², so halving v gives ½m(v/2)² = KE/4.

C. Wrong: that would be the factor if speed were halved three times over.

D. Wrong: no power law gives a factor of 1/6 here.

Question 17 Physics

Earth contracts to half size — gravitational PE becomes:

- A. Double ✓ **Correct answer**
- B. One-half
- C. Same
- D. Four times

A. Correct: gravitational potential energy U = −GMm/r, so halving r (with mass unchanged) doubles the magnitude of U.

B. Wrong: that is the factor if r doubled, not halved.

C. Wrong: U depends on r, so it changes when r changes.

D. Wrong: U varies as 1/r, not 1/r².

18 Physics

Product of force and velocity is:

- A. Kinetic Energy
- B. Potential Energy
- C. Power ✓ **Correct answer**
- D. Work done

A. Wrong: kinetic energy is ½mv², not force times velocity.

B. Wrong: potential energy depends on position, not on force times velocity.

C. Correct: power = force × velocity (P = F·v).

D. Wrong: work is force times distance, not force times velocity.

Question 19 Physics

One degree is equal to:

- A. 0.1 radian
- B. 0.15 radian
- C. 0.0175 radian ✓ **Correct answer**
- D. 0.275 radian

A. Wrong: 0.1 rad is about 5.7°, not 1°.

B. Wrong: 0.15 rad is about 8.6°, not 1°.

C. Correct: 1° = π/180 ≈ 0.01745 rad.

D. Wrong: 0.275 rad is about 15.8°, not 1°.

Question 20 Physics

Object on circular path r=1m covers 2m arc. Angular displacement:

rad

- B. 2 rad ✓ **Correct answer**
- C. 3 rad
- D. 2/3 rad

A. Wrong: that is r/s, the reciprocal of the correct ratio.

B. Correct: angular displacement θ = arc length / radius = 2/1 = 2 rad.

C. Wrong: no combination of 1 m and 2 m gives 3 rad.

D. Wrong: no combination of doubling v and r gives 8 times.

Question 21 Physics

Speed and radius both doubled — centripetal force becomes:

- A. Same
- B. Double ✓ **Correct answer**
- C. 4 times
- D. 8 times

A. Wrong: the force changes because both v and r change.

B. Correct: $F_c = mv^2/r$, so with v doubled and r doubled, Fc becomes $m(2v)^2/(2r) = 2mv^2/r$, twice the original.

C. Wrong: that would be the result if only the speed doubled with radius unchanged.

D. Wrong: no combination of doubling v and r gives 8 times.

Question 22 Physics

Relation between angular and linear velocity:

- A. a = rω
- B. v = rω ✓ **Correct answer**

- C. v/r^2
- D. $v = \omega/r$

A. Wrong: $a = r\omega$ is not the velocity relation (centripetal acceleration is $a = r\omega^2$).

B. Correct: linear velocity equals radius times angular velocity.

C. Wrong: the correct rearrangement is $\omega = v/r$, not v/r^2.

D. Wrong: velocity is radius times angular velocity, not divided by radius.

Question 23 Physics

100 waves per second, wavelength 1cm — wave speed:

- A. 1 ms^{-1} ✓ **Correct answer**
- B. 2 ms^{-1}
- C. 3 ms^{-1}
- D. 4 ms^{-1}

A. Correct: $v = f\lambda = 100 \times 0.01$ m = 1 m/s.

B. Wrong: that would need a frequency of 200 Hz or a wavelength of 2 cm.

C. Wrong: no combination of 100 Hz and 1 cm gives 3 m/s.

D. Wrong: no combination of 100 Hz and 1 cm gives 4 m/s.

Question 24 Physics

To make spring oscillation frequency 4 times, reduce mass to:

- A. One fourth
- B. Quadruple mass
- C. One sixteenth ✓ **Correct answer**
- D. Double mass

ducing mass to a quarter only doubles the frequency (f varies as 1/√m).

B. Wrong: increasing the mass lowers the frequency.

C. Correct: frequency varies as 1/√m, so for f to become 4f, mass must become m/16.

D. Wrong: doubling the mass lowers the frequency.

Question 25 Physics

Number of wavelengths per unit time is:

- A. Speed
- B. Velocity
- C. Displacement
- D. Frequency ✓ **Correct answer**

A. Wrong: speed is distance per unit time, not waves per unit time.

B. Wrong: velocity is speed with direction, not a count of waves.

C. Wrong: displacement is a distance, not a rate of waves.

D. Correct: frequency is the number of complete waves passing a point per second.

Question 26 Physics

Speed of sound 332 ms^{-1} at 0°C. Value at 10°C:

- A. 332 ms^{-1}
- B. 338.1 ms^{-1} ✓ **Correct answer**
- C. 332.61 ms^{-1}
- D. 334.1 ms^{-1}

A. Wrong: that is the speed at 0°C, before the temperature rise.

B. Correct: speed rises about 0.61 m/s per °C, so 332 + 0.61 × 10 = 338.1 m/s.

at adds only 0.61 once, as if the rise were 1°C.

D. Wrong: that is less than the correct rise of 6.1 m/s.

Question 27 Physics

Cp - Cv = R shows that:

- A. Cv < Cp
- B. Cp = Cv
- C. Cp > Cv ✓ **Correct answer**
- D. Cp = constant

A. Also true: this states exactly the same fact as option C (Cv smaller than Cp is the same as Cp greater than Cv), so a candidate choosing A would also be right; the printed key records C.

B. Wrong: that would make Cp − Cv = 0, not R.

C. Correct per the printed key: Cp − Cv = R and R is positive, so Cp must be greater than Cv.

D. Wrong: the equation says nothing about Cp being constant. (PICK-ONE: options A and C are the same statement; the key records C. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 28 Physics

Thermodynamic process with constant volume:

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

A. Wrong: isothermal means constant temperature.

Isobaric means constant pressure.

C. Correct: isochoric means constant volume, with no work done.

D. Wrong: adiabatic means no heat exchange.

Question 29 Physics

2μF and 6μF capacitors in parallel — equivalent capacitance:

- A. 8μF ✓ **Correct answer**
- B. 3/2μF
- C. 4μF
- D. 13/2μF

A. Correct: capacitors in parallel add, so 2 + 6 = 8 μF.

B. Wrong: that is the series result for 2 μF and 6 μF in a different combination (1/C = 1/2 + 1/6 gives 3/2 μF for series).

C. Wrong: that is the average of 2 and 6, not the parallel sum.

D. Wrong: no combination of 2 and 6 in parallel gives 6.5 μF.

Question 30 Physics

Capacitance of a capacitor does NOT depend upon:

- A. Temperature ✓ **Correct answer**
- B. Separation between plates
- C. Medium
- D. Area of plates

A. Correct: capacitance C = εA/d depends on the medium, the plate area and the separation, not directly on temperature.

B. Wrong as the answer: capacitance DOES depend on the separation (C varies as 1/d).

the answer: capacitance DOES depend on the medium between the plates (through ε).

D. Wrong as the answer: capacitance DOES depend on the plate area (C varies as A).

Question 31 Physics

Power transfer will be maximum when:

- A. R > r
- B. R < r
- C. R = r ✓ **Correct answer**
- D. R = 1/r

A. Wrong: when the load resistance exceeds the internal resistance, less than the maximum power is transferred.

B. Wrong: when the load resistance is smaller than the internal resistance, less than the maximum power is transferred.

C. Correct: the maximum power transfer theorem says maximum power is delivered when the load resistance equals the internal resistance.

D. Wrong: that is not a condition of the maximum power transfer theorem.

Question 32 Physics

Wire radius halved — resistance becomes:

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

A. Also defensible: resistance R = ρL/A, and halving the radius quarters the area, so with the length unchanged the resistance becomes 4R.

e resistance must change when the radius changes.

C. Wrong: no standard assumption gives 6R.

D. Correct per the printed key: if the wire is redrawn keeping its volume constant, the length quadruples as well as the area quartering, giving 4 × 4 = 16R. (PICK-ONE: the stem does not state that the wire is stretched or redrawn, so A is correct for unchanged length and D is correct for volume-conserved redrawing; the printed key records D, the FSc textbook convention. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 33 Physics

Charged particle enters magnetic field parallel — it will:

- A. Deflect towards North
- B. Deflect towards South
- C. Move straight ✓ **Correct answer**
- D. Move in circular path

A. Wrong: the magnetic force is zero here, so there is no deflection in any direction.

B. Wrong: the magnetic force is zero here, so there is no deflection in any direction.

C. Correct: magnetic force F = qv × B is zero when the velocity is parallel to the field (sin 0° = 0), so the particle continues straight.

D. Wrong: a circular path needs a force perpendicular to the velocity, which happens only when the particle enters perpendicular to the field.

Question 34 Physics

Magnetic flux is maximum when angle between field and area vector is:

- A. 0° ✓ **Correct answer**
- B. 90°
- C. 180°

A. Correct: flux $\Phi = BA\cos\theta$, and $\cos\theta$ is maximum (1) at $\theta = 0°$, when the field is parallel to the area vector.

B. Wrong: $\cos 90° = 0$, so the flux is zero, the minimum.

C. Wrong: $\cos 180° = -1$, so the flux has its maximum magnitude but negative sign; the maximum (positive) flux is at 0°.

D. Wrong: $\cos 45°$ is about 0.707, less than the maximum of 1.

Question 35 Physics

Pakistan domestic electricity supply has frequency:

- A. 70 Hz
- B. 50 Hz ✓ **Correct answer**
- C. 100 Hz
- D. 30 Hz

A. Wrong: no domestic supply in Pakistan runs at 70 Hz.

B. Correct: Pakistan's mains electricity is 50 Hz AC, like most of Asia and Europe.

C. Wrong: 100 Hz is double the mains frequency.

D. Wrong: no domestic supply in Pakistan runs at 30 Hz.

Question 36 Physics

Device that increases or decreases EMF is called:

- A. AC generator
- B. Motor
- C. Transformer ✓ **Correct answer**
- D. DC generator

generator produces EMF from mechanical energy; it does not step an existing EMF up or down.

B. Wrong: a motor converts electrical energy into mechanical energy.

C. Correct: a transformer steps AC voltage up or down by mutual induction.

D. Wrong: a DC generator produces direct current; it does not step EMF up or down.

Question 37 Physics

Induced current opposes the cause that produces it. This is:

- A. Ampere's Law
- B. Faraday's Law
- C. Lenz's Law ✓ **Correct answer**
- D. Joule's Law

A. Wrong: Ampere's law relates magnetic field to current, not to opposition of change.

B. Wrong: Faraday's law gives the size of the induced EMF, not the direction rule of opposition.

C. Correct: Lenz's law states that the induced current flows so as to oppose the change that produced it.

D. Wrong: Joule's law is about heating by current, not about induced current direction.

Question 38 Physics

The half-life of a radioactive substance is 20 minutes. After 1 hour, fraction remaining is:

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

at is the fraction after one half-life (20 minutes), not after an hour.

B. Wrong: that is the fraction after two half-lives (40 minutes).

C. Correct: 1 hour is 3 half-lives, so the remaining fraction is $(1/2)^3 = 1/8$.

D. Wrong: that is the fraction after four half-lives (80 minutes).

Question 39 Physics

Which of following has maximum penetrating power?

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

A. Wrong: alpha particles are heavy and slow, stopped by paper.

B. Wrong: beta particles penetrate further than alpha but are stopped by a few millimetres of metal.

C. Correct: gamma rays are high-energy electromagnetic radiation with the greatest penetrating power, passing through several centimetres of lead.

D. Wrong: X-rays penetrate well, but gamma rays penetrate further than X-rays.

Question 40 Physics

The escape velocity from earth's surface is approximately:

- A. 7.9 km/s
- B. 11.2 km/s ✓ **Correct answer**
- C. 3.0 km/s
- D. 9.8 km/s

A. Wrong: 7.9 km/s is the orbital velocity of a low Earth satellite, not the escape velocity.

escape velocity = $\sqrt{(2gR)} \approx 11.2$ km/s.

C. Wrong: far too slow to escape Earth's gravity.

D. Wrong: 9.8 is the value of g in m/s^2, not the escape velocity.

Question 41 Biology

If fertilization occurs, young embryo is implanted into:

- A. Epimetrium
- B. Perimetrium
- C. Myometrium
- D. Endometrium ✓ **Correct answer**

A. Wrong: there is no such layer of the uterus; the outer layer is the perimetrium.

B. Wrong: the perimetrium is the outer covering of the uterus, not the implantation site.

C. Wrong: the myometrium is the middle muscular layer that contracts in labour; implantation does not occur there.

D. Correct: the embryo implants into the endometrium, the inner lining of the uterus.

Question 42 Biology

Sperms are produced in:

- A. Vas deferens
- B. Collecting duct
- C. Epididymis
- D. Seminiferous tubules ✓ **Correct answer**

A. Wrong: the vas deferens carries sperms away from the testis; it does not produce them.

B. Wrong: collecting ducts are in the kidney, not the testis.

e epididymis stores and matures sperms; production happens in the seminiferous tubules.

D. Correct: spermatogenesis takes place in the seminiferous tubules of the testes.

Question 43 Biology

Gonadotropins are released by which gland?

- A. Ovaries
- B. Hypothalamus
- C. Pituitary ✓ **Correct answer**
- D. Testes

A. Wrong: ovaries are the target of gonadotropins, not their source.

B. Wrong: the hypothalamus releases GnRH, which stimulates the pituitary, but GnRH itself is not a gonadotropin.

C. Correct: the anterior pituitary releases the gonadotropins FSH and LH.

D. Wrong: testes are the target of gonadotropins, not their source.

Question 44 Biology

Found at ends of long bones, nose, larynx and trachea:

- A. Elastic cartilage
- B. Fibrous cartilage
- C. Perichondrium
- D. Hyaline cartilage ✓ **Correct answer**

A. Wrong: elastic cartilage is found in the ear and epiglottis, not at the ends of long bones.

B. Wrong: fibrous cartilage is found in intervertebral discs and the pubic symphysis.

C. Wrong: the perichondrium is the membrane covering cartilage, not a type of cartilage.

yaline cartilage covers the ends of long bones and forms the cartilage of the nose, larynx and trachea.

Question 45 Biology

Muscle with spontaneous contraction, many nuclei and no control over contraction:

- A. Smooth muscle
- B. Cardiac muscle ✓ **Correct answer**
- C. Skeletal muscle
- D. Visceral muscle

A. Wrong: smooth muscle is involuntary but its cells are uninucleate, not multinucleate.

B. Correct: cardiac muscle contracts spontaneously (myogenic), its cells are multinucleate, and it is not under voluntary control.

C. Wrong: skeletal muscle is under voluntary control.

D. Wrong: visceral muscle is smooth muscle of the organs, uninucleate, not the multinucleate spontaneously contracting type described.

Question 46 Biology

Ball and Socket joint is present at:

- A. Shoulder ✓ **Correct answer**
- B. Wrist
- C. Elbow
- D. Knee

A. Correct: the shoulder is a ball-and-socket joint, allowing movement in many directions.

B. Wrong: the wrist is a condyloid (ellipsoid) joint, not ball-and-socket.

C. Wrong: the elbow is a hinge joint.

e knee is a hinge joint.

Question 47 Biology

Na^+ ions are nearly _____ times greater outside cell than inside:

- A. 10 ✓ **Correct answer**
- B. 30
- C. 2
- D. 3

A. Correct: extracellular sodium is about 145 mmol/L and intracellular sodium about 12 mmol/L, a ratio of roughly 12, so "nearly 10 times" is the best option.

B. Wrong: the ratio is far below 30.

C. Wrong: the ratio is much larger than 2.

D. Wrong: the ratio is much larger than 3.

Question 48 Biology

Which hormone induces labour pains?

- A. Estrogen
- B. Oxytocin ✓ **Correct answer**
- C. Progesterone
- D. LH

A. Wrong: estrogen prepares the uterus for labour but does not cause the contractions.

B. Correct: oxytocin stimulates strong uterine contractions and induces labour pains.

C. Wrong: progesterone maintains pregnancy and suppresses contractions.

D. Wrong: LH acts on the gonads; it does not induce labour.

49 Biology

Hormone secreted due to decreased water content of blood:

- A. ADH ✓ **Correct answer**
- B. Oxytocin
- C. Glucagon
- D. Thyroxin

A. Correct: when blood water falls, ADH (antidiuretic hormone, vasopressin) is released to conserve water by the kidneys.

B. Wrong: oxytocin acts on the uterus and mammary glands, not on water balance.

C. Wrong: glucagon raises blood glucose, it is not triggered by low blood water.

D. Wrong: thyroxin regulates metabolic rate, not water balance.

Question 50 Biology

Place of production of neurotransmitters:

- A. Postsynaptic neuron
- B. Presynaptic neuron ✓ **Correct answer**
- C. Synaptic cleft
- D. Dendrite

A. Wrong: the postsynaptic neuron receives the transmitter; it does not produce it.

B. Correct: neurotransmitters are synthesised in the presynaptic neuron and stored in its synaptic vesicles.

C. Wrong: the synaptic cleft is the gap the transmitter crosses, not where it is made.

D. Wrong: dendrites receive signals; transmitter production happens in the presynaptic cell body and terminals.

51 Biology

Endorphins are produced in:

- A. Brain ✓ **Correct answer**
- B. Adrenal gland
- C. Stomach
- D. Thymus

A. Correct: endorphins are natural pain-relieving peptides produced in the brain (and pituitary).

B. Wrong: the adrenal gland produces adrenaline, cortisol and aldosterone, not endorphins.

C. Wrong: the stomach produces gastrin and digestive enzymes, not endorphins.

D. Wrong: the thymus matures T-lymphocytes; it does not produce endorphins.

Question 52 Biology

Hormone responsible for sperm production and male secondary sexual characteristics:

- A. Estrogen
- B. Progesterone
- C. Testosterone ✓ **Correct answer**
- D. Thyroxin

A. Wrong: estrogen is the main female sex hormone.

B. Wrong: progesterone is a female hormone that maintains pregnancy.

C. Correct: testosterone drives sperm production and the development of male secondary sexual characteristics.

D. Wrong: thyroxin regulates metabolic rate, not male sexual development.

53 Biology

Leydig cells are responsible for:

- A. Testosterone production ✓ **Correct answer**
- B. FSH production
- C. Sperm production
- D. Testosterone inhibition

A. Correct: Leydig (interstitial) cells of the testes secrete testosterone.

B. Wrong: FSH is produced by the anterior pituitary, not by Leydig cells.

C. Wrong: sperms are produced by germ cells in the seminiferous tubules, not by Leydig cells.

D. Wrong: Leydig cells make testosterone; they do not inhibit it.

Question 54 Biology

Estrogen secretion during oogenesis is stimulated by:

- A. LH
- B. Inhibin
- C. FSH ✓ **Correct answer**
- D. Testosterone

A. Wrong: LH triggers ovulation and the formation of the corpus luteum; it does not stimulate estrogen secretion from the follicle.

B. Wrong: inhibin suppresses FSH secretion; it does not stimulate estrogen.

C. Correct: follicle-stimulating hormone stimulates the ovarian follicle to grow and secrete estrogen.

D. Wrong: testosterone is a male hormone and does not stimulate estrogen secretion in oogenesis.

55 Biology

Pituitary hormones regulating menstrual cycle:

- A. FSH and estrogen
- B. LH and estrogen
- C. FSH and LH ✓ **Correct answer**
- D. Estrogen and progesterone

A. Wrong: estrogen is an ovarian hormone, not a pituitary hormone.

B. Wrong: estrogen is made by the ovaries, not the pituitary.

C. Correct: both FSH and LH are gonadotropins released by the anterior pituitary that regulate the menstrual cycle.

D. Wrong: both are ovarian hormones, not pituitary hormones.

Question 56 Biology

Trait transmitted from affected father to only his son:

- A. Autosomal
- B. X-linked
- C. Y-linked ✓ **Correct answer**
- D. X-Y linked

A. Wrong: autosomal traits pass to sons and daughters alike.

B. Wrong: a father gives his X chromosome to his daughters, not to his sons.

C. Correct: only the Y chromosome passes from father to son, so a Y-linked trait goes to all sons and no daughters.

D. Wrong: there is no such standard mode of inheritance as "X-Y linked".

57 Biology

When both alleles of a gene pair are same, organism is:

- A. Heterozygous
- B. Genotype
- C. Homozygous ✓ **Correct answer**
- D. Phenotype

A. Wrong: heterozygous means the two alleles are different.

B. Wrong: genotype is the genetic make-up in general, not the name for identical alleles.

C. Correct: identical alleles at a gene locus make the organism homozygous.

D. Wrong: phenotype is the observable character, not the allelic condition.

Question 58 Biology

Similar in function but different in structure — organs called:

- A. Analogous organs ✓ **Correct answer**
- B. Homologous organs
- C. Convergent organs
- D. Divergent organs

A. Correct: analogous organs perform the same function but have different structures and origins (e.g. wings of insects and birds).

B. Wrong: homologous organs have the same basic structure and origin but may perform different functions.

C. Wrong: convergence is the evolutionary process, not the name for such organs.

D. Wrong: divergence describes organs becoming different, not organs that are similar in function.

59 Biology

NOT a mode of action of an antibody:

- A. Neutralizing antigen
- B. Precipitating antigen
- C. Secretion of cytokines ✓ **Correct answer**
- D. Enhancing phagocytosis

A. Wrong as the answer: neutralising antigens IS a mode of action of antibodies.

B. Wrong as the answer: precipitating antigens IS a mode of action of antibodies.

C. Correct: cytokines are secreted by immune cells, not by antibodies; antibodies do not secrete cytokines.

D. Wrong as the answer: enhancing phagocytosis (opsonisation) IS a mode of action of antibodies.

Question 60 Biology

Pepsinogen is converted into active pepsin by:

- A. Proteolytic enzyme
- B. Dissolving in mucus
- C. Hormonal action
- D. Hydrochloric acid ✓ **Correct answer**

A. Wrong: pepsin itself is proteolytic, but the activation of pepsinogen is done by acid, not by another proteolytic enzyme.

B. Wrong: mucus protects the stomach wall; it does not activate pepsinogen.

C. Wrong: no hormone converts pepsinogen to pepsin.

D. Correct: HCl in gastric juice activates pepsinogen by removing a peptide fragment, forming active pepsin.

61 Biology

Which human body function is NOT controlled through negative feedback?

- A. Body temperature
- B. Glucagon production
- C. Labor contraction ✓ **Correct answer**
- D. Parathyroid activity

A. Wrong as the answer: body temperature IS controlled by negative feedback.

B. Wrong as the answer: glucagon release is controlled by negative feedback from blood glucose.

C. Correct: labour contractions are a positive feedback loop (oxytocin increases contractions, which increase oxytocin), not negative feedback.

D. Wrong as the answer: parathyroid hormone release is controlled by negative feedback from blood calcium.

Question 62 Biology

Grey matter of spinal cord does NOT contain:

- A. Cell bodies of sensory neurons
- B. Cell bodies of interneurons
- C. Axons of interneurons ✓ **Correct answer**
- D. Cell bodies of motor neurons

A. Wrong as the answer: grey matter DOES contain the cell bodies of sensory neurons.

B. Wrong as the answer: grey matter DOES contain the cell bodies of interneurons.

C. Correct: in the FSc account, grey matter is made of cell bodies and dendrites, while axons (the conducting fibres) belong to white matter.

D. Wrong as the answer: grey matter DOES contain the cell bodies of motor neurons.

63 Biology

Maximum temperature in enzyme action — enzymes:

- A. Start to denature ✓ **Correct answer**
- B. Start to re-nature
- C. Work best
- D. Are reactivated

A. Correct: above the optimum temperature the enzyme's shape is lost (denaturation) and activity falls.

B. Wrong: denatured enzymes do not generally re-nature on heating further.

C. Wrong: enzymes work best AT the optimum temperature, not at the maximum temperature.

D. Wrong: heating past the optimum inactivates enzymes; it does not reactivate them.

Question 64 Biology

Feedback inhibition — enzyme inhibited by:

- A. Product being produced ✓ **Correct answer**
- B. Normal regulatory mechanism
- C. Unaffected by product
- D. Inhibited irreversibly

A. Correct: in feedback inhibition the end product of a pathway inhibits an earlier enzyme in that pathway.

B. Wrong: that is vague; the specific inhibitor in feedback inhibition is the product itself.

C. Wrong: the enzyme IS affected by the product — that is the whole point of feedback inhibition.

D. Wrong: feedback inhibition is reversible, not irreversible.

65 Biology

Chemical that regulates enzymatic activity:

- A. Activator
- B. Inhibitor ✓ **Correct answer**
- C. Substrate
- D. Coenzyme

A. Wrong as the answer in the FSc sense: an activator increases activity, but the textbook regulator of enzyme activity is the inhibitor (feedback inhibition); the printed key records inhibitor.

B. Correct: inhibitors regulate enzyme activity by reducing it, the classic regulatory mechanism taught in the syllabus.

C. Wrong: the substrate is what the enzyme acts on, not a regulator of the enzyme.

D. Wrong: a coenzyme assists the enzyme but is not itself the regulator of its activity.

Question 66 Biology

Above optimum temperature, enzymatic activity decreases due to:

- A. Saturation
- B. Inhibition
- C. Denaturation ✓ **Correct answer**
- D. Composition

A. Wrong: saturation is about substrate concentration, not temperature.

B. Wrong: no inhibitor is involved in the temperature effect.

C. Correct: heat above the optimum breaks the bonds holding the enzyme's shape, denaturing it and destroying activity.

D. Wrong: the enzyme's composition does not change with temperature; its shape does.

67 Biology

NOT part of Darwin's theory of natural selection:

- A. Organisms produce more offspring than environment supports
- B. Variation arises by gene mutation ✓ **Correct answer**
- C. Only best adapted survive
- D. Individuals compete for resources

A. Wrong as the answer: overproduction IS part of Darwin's theory.

B. Correct: Darwin did not know about genes or mutations; mutation as the source of variation belongs to the modern synthesis, not to Darwin's original theory.

C. Wrong as the answer: survival of the fittest IS part of Darwin's theory.

D. Wrong as the answer: struggle for existence IS part of Darwin's theory.

Question 68 Biology

Kiwi evolution, horse food, duck webbed feet — explained by:

- A. Lamarck ✓ **Correct answer**
- B. Darwin
- C. Weismann
- D. De Vries

A. Correct: these are the classic use-and-disuse examples — the kiwi's wings reduced through disuse, the horse's grinding teeth and the duck's webbed feet developed through use — which Lamarck's theory of acquired characters explains.

B. Wrong: Darwin explained such features by natural selection, not by use and disuse.

C. Wrong: Weismann refuted Lamarck by showing acquired characters are not inherited.

D. Wrong: De Vries proposed mutation theory, not use and disuse.

69 Biology

NOT TRUE about interferons:

- A. Belong to cytokines
- B. Activate natural killer cells
- C. Activate immune cells
- D. Secrete interleukin ✓ **Correct answer**

A. Wrong as the answer: interferons DO belong to the cytokine family.

B. Wrong as the answer: interferons DO activate natural killer cells.

C. Wrong as the answer: interferons DO activate immune cells.

D. Correct: interleukins are a different group of cytokines secreted by immune cells; interferons do not secrete interleukin.

Question 70 Biology

Intrinsic factor from parietal cells helps in:

- A. Vitamin B12 absorption ✓ **Correct answer**
- B. Protein digestion
- C. Carbohydrate breakdown
- D. Bowel movement

A. Correct: intrinsic factor binds vitamin B12 so it can be absorbed in the ileum; without it, B12 deficiency (pernicious anaemia) results.

B. Wrong: protein digestion is done by pepsin and proteases, not by intrinsic factor.

C. Wrong: carbohydrates are broken down by amylase and other enzymes, not by intrinsic factor.

D. Wrong: bowel movement is controlled by muscle action, not by intrinsic factor.

71 Biology

Major gastric juice production triggered by:

- A. Taste sensation
- B. Smell of food
- C. Protein food in stomach ✓ **Correct answer**
- D. Sight of food

A. Wrong: taste triggers the smaller cephalic phase of secretion, not the major production.

B. Wrong: smell triggers the smaller cephalic phase, not the major production.

C. Correct: food (especially protein) in the stomach triggers the gastric phase — gastrin release — which produces the largest volume of gastric juice.

D. Wrong: sight triggers the smaller cephalic phase, not the major production.

Question 72 Biology

NOT a metabolic role of liver:

- A. Glycogenolysis
- B. Gluconeogenesis
- C. Deamination
- D. Immunoglobulin synthesis ✓ **Correct answer**

A. Wrong as the answer: glycogenolysis (breaking down glycogen to glucose) IS a liver function.

B. Wrong as the answer: gluconeogenesis (making glucose from non-carbohydrate sources) IS a liver function.

C. Wrong as the answer: deamination of amino acids IS a liver function.

D. Correct: immunoglobulins (antibodies) are made by plasma cells, not by the liver.

73 Biology

Enzyme NOT produced by pancreas:

- A. Lipase
- B. Trypsin
- C. Pepsin ✓ **Correct answer**
- D. Amylase

A. Wrong as the answer: pancreatic lipase IS produced by the pancreas.

B. Wrong as the answer: trypsin IS produced by the pancreas (as trypsinogen).

C. Correct: pepsin is produced in the stomach (as pepsinogen), not by the pancreas.

D. Wrong as the answer: pancreatic amylase IS produced by the pancreas.

Question 74 Biology

Heart chamber from where aorta originates:

- A. Left ventricle ✓ **Correct answer**
- B. Right ventricle
- C. Left atrium
- D. Right atrium

A. Correct: the aorta, the body's main artery, leaves the heart from the left ventricle.

B. Wrong: the pulmonary artery leaves from the right ventricle.

C. Wrong: the left atrium receives blood from the pulmonary veins; no artery leaves from it.

D. Wrong: the right atrium receives blood from the vena cava; no artery leaves from it.

75 Biology

Lymphatic system does NOT include:

- A. Lymphoid masses
- B. Lymph vessels
- C. Spleen
- D. Lungs ✓ **Correct answer**

A. Wrong as the answer: lymphoid masses (like tonsils) ARE part of the lymphatic system.

B. Wrong as the answer: lymph vessels ARE part of the lymphatic system.

C. Wrong as the answer: the spleen IS a lymphoid organ of the lymphatic system.

D. Correct: the lungs belong to the respiratory system, not the lymphatic system.

Question 76 Biology

Protein in walls of alveoli:

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

A. Correct: collagen fibres in the alveolar walls give the lungs their elastic structure.

B. Wrong: haemoglobin is the oxygen-carrying protein inside red blood cells, not a wall protein.

C. Wrong: myoglobin stores oxygen in muscle cells, not in alveolar walls.

D. Wrong: myosin is a contractile protein of muscle, not of alveolar walls.

77 Biology

Natural bacterial flora beneficial because they:

- A. Interfere with pathogenic colonization ✓ **Correct answer**
- B. Develop resistance against antigens
- C. Resist physical agents
- D. Produce antibiotics

A. Correct: normal flora compete with pathogens for space and nutrients, preventing them from colonising the body.

B. Wrong: flora do not develop resistance against antigens; that is an immune function.

C. Wrong: resisting physical agents is not how normal flora protect the host.

D. Wrong: normal flora generally do not produce antibiotics; their benefit is competitive exclusion.

Question 78 Biology

Bacteria resistance against heat provided by:

- A. Granules
- B. Cysts
- C. Spores ✓ **Correct answer**
- D. Plasmids

A. Wrong: granules store food material; they do not protect against heat.

B. Wrong: bacterial cysts are a resting form but the classic heat-resistant structure is the endospore.

C. Correct: endospores are highly resistant to heat, drying and chemicals, letting bacteria survive harsh conditions.

D. Wrong: plasmids carry extra genes (like antibiotic resistance); they do not protect

Question 79 Biology

Cells most important for immunity:

- A. Monocytes
- B. Neutrophils
- C. Lymphocytes ✓ **Correct answer**
- D. Thrombocytes

A. Wrong: monocytes are phagocytes and are important, but lymphocytes drive specific immunity.

B. Wrong: neutrophils are first-line phagocytes, but lymphocytes are the cells of specific immunity.

C. Correct: lymphocytes (B and T cells) produce antibodies and cell-mediated immunity — the specific immune response.

D. Wrong: thrombocytes (platelets) are for blood clotting, not immunity.

Question 80 Biology

Digestion of which food starts from oral cavity?

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

A. Wrong: protein digestion starts in the stomach with pepsin.

B. Wrong: fat digestion starts in the small intestine with bile and lipase.

C. Correct: salivary amylase in the mouth begins breaking down starch into maltose.

tamins are not digested, they are absorbed as they are.

Question 81 Biology

Vaccination is example of:

- A. Natural passive immunity
- B. Natural active immunity
- C. Acquired/Artificial active immunity ✓ **Correct answer**
- D. Acquired/Artificial passive immunity

A. Wrong: natural passive immunity is antibodies passed from mother to baby, not vaccination.

B. Wrong: natural active immunity follows a natural infection, not a vaccine.

C. Correct: a vaccine artificially introduces an antigen so the body actively makes its own antibodies and memory cells.

D. Wrong: artificial passive immunity is injected ready-made antibodies (antiserum), not a vaccine.

Question 82 Biology

Pubic symphysis and intervertebral disc are examples of:

- A. Fibrous joints
- B. Synovial joints
- C. Cartilaginous joints ✓ **Correct answer**
- D. Gliding joints

A. Wrong: fibrous joints are held by fibrous tissue (e.g. skull sutures), not by cartilage discs.

B. Wrong: synovial joints are freely movable with a fluid-filled cavity (e.g. shoulder).

e public symphysis and intervertebral discs are joined by cartilage and allow slight movement.

D. Wrong: gliding joints are a type of synovial joint (e.g. between wrist bones), not cartilaginous.

Question 83 Biology

Cartilage harder to heal than bone because it:

- A. Lacks vascular supply ✓ **Correct answer**
- B. Lacks mineral deposits
- C. Has fewer cells
- D. Lacks protein

A. Correct: cartilage has no blood vessels, so nutrients and repair cells reach it slowly and it heals poorly.

B. Wrong: lack of minerals makes cartilage flexible, not slow to heal.

C. Wrong: cell number is not the reason cartilage heals slowly.

D. Wrong: cartilage is rich in protein (collagen); it does not lack protein.

Question 84 Biology

Feature absent from cardiac muscles:

- A. Intercalated disc
- B. Multinucleate cells ✓ **Correct answer**
- C. Light and dark bands
- D. Contractile sarcomeres

A. Wrong as the answer: intercalated discs ARE present in cardiac muscle (they join the cells).

Cardiac muscle cells are uninucleate (one nucleus each); multinucleate cells are a feature of skeletal muscle.

C. Wrong as the answer: light and dark bands (striations) ARE present in cardiac muscle.

D. Wrong as the answer: sarcomeres ARE the contractile units of cardiac muscle.

Question 85 Biology

Sarcoplasmic reticulum mainly responsible for:

- A. Calcium storage ✓ **Correct answer**
- B. Protein synthesis
- C. Lipid metabolism
- D. Storing cell wastes

A. Correct: the sarcoplasmic reticulum stores Ca^{2+} and releases it to trigger muscle contraction.

B. Wrong: protein synthesis is the job of ribosomes and the rough endoplasmic reticulum.

C. Wrong: lipid metabolism is mainly a function of the smooth endoplasmic reticulum.

D. Wrong: wastes are stored in vacuoles, not in the sarcoplasmic reticulum.

Question 86 Biology

Junction between two neurons:

- A. Impulse
- B. Synapse ✓ **Correct answer**
- C. Axon
- D. Cleft

A. Wrong: an impulse is the signal that travels along a neuron, not the junction.

B. Correct: a synapse is the junction where one neuron passes a signal to the next.

axon is the fibre that carries the impulse away from the cell body.

D. Wrong: the synaptic cleft is only the gap within a synapse, not the junction as a whole.

Question 87 Biology

Chemically a steroid hormone:

- A. ADH
- B. Thyroxin
- C. Cortisone ✓ **Correct answer**
- D. Insulin

A. Wrong: ADH (vasopressin) is a peptide hormone, not a steroid.

B. Wrong: thyroxin is an amino-acid derivative (iodinated tyrosine), not a steroid.

C. Correct: cortisone is a glucocorticoid, a steroid hormone made from cholesterol.

D. Wrong: insulin is a peptide (protein) hormone, not a steroid.

Question 88 Biology

Parathyroid underactivity causes drop in blood:

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

A. Wrong: parathyroid hormone does not primarily control blood magnesium.

B. Wrong: blood sodium is controlled mainly by aldosterone, not by the parathyroid.

C. Wrong: blood potassium is controlled mainly by aldosterone and insulin, not by the parathyroid.

parathyroid hormone raises blood calcium; underactivity causes hypocalcaemia — a drop in blood Ca^{2+}.

Question 89 Biology

Protein establishing matrix of bone and cartilage:

- A. Elastin
- B. Keratin
- C. Collagen ✓ **Correct answer**
- D. Histone

A. Wrong: elastin gives stretch to tissues like skin and blood vessels, not the bone/cartilage matrix.

B. Wrong: keratin is the protein of hair, nails and skin, not of bone or cartilage matrix.

C. Correct: collagen fibres form the organic matrix of bone and cartilage, giving them strength and structure.

D. Wrong: histones are proteins that package DNA in the nucleus, not matrix proteins.

Question 90 Biology

Non-competitive inhibitors react at:

- A. Allosteric site ✓ **Correct answer**
- B. Active site
- C. Passive site
- D. Regulatory site

A. Correct: a non-competitive inhibitor binds to a site other than the active site — the allosteric site — changing the enzyme's shape.

B. Wrong: binding at the active site is competitive inhibition, not non-competitive.

ere is no standard "passive site" in enzyme theory.

D. Wrong: "regulatory site" is not the standard term for where non-competitive inhibitors bind; the standard term is allosteric site.

Question 91 Biology

Most enzymes work best at temperature:

- A. 30°C
- B. 40°C ✓ **Correct answer**
- C. 50°C
- D. 20°C

A. Wrong: 30°C is below the optimum for human enzymes.

B. Correct: most human enzymes work best near body temperature (about 37°C), and 40°C is the closest option to that optimum.

C. Wrong: 50°C is above the optimum and would begin to denature most human enzymes.

D. Wrong: 20°C is well below the optimum, so enzyme activity would be low.

Question 92 Biology

Competitive inhibitors block substrate because they have:

- A. Similar shape to substrate ✓ **Correct answer**
- B. Different shape to substrate
- C. Higher molecular weight
- D. Stronger bonds

A. Correct: a competitive inhibitor resembles the substrate and competes with it for the active site.

B. Wrong: a differently shaped molecule could not fit the active site and compete.

olecular weight is not what lets an inhibitor compete for the active site.

D. Wrong: bond strength is not the basis of competitive inhibition.

Question 93 Biology

When light falls on P-700, it is:

- A. Induces photolysis
- B. Gains Hydrogen
- C. Accepts electrons
- D. Oxidised ✓ **Correct answer**

A. Wrong: photolysis (splitting of water) happens at photosystem II (P680), not at P700.

B. Wrong: P700 does not gain hydrogen when light falls on it.

C. Wrong: when excited, P700 loses an electron (it is oxidised); it accepts electrons later, from plastocyanin, after being oxidised.

D. Correct: light excites P700, which gives up an electron and becomes oxidised ($P700^{+}$).

Question 94 Biology

Products of light reaction used in dark reaction:

- A. ATP and $NADP^{+}$
- B. ADP and $NADP^{+}$
- C. ADP and NADPM
- D. ATP and NADPH ✓ **Correct answer**

A. Wrong: $NADP^{+}$ is the oxidised form; the dark reaction needs the reduced form, NADPH.

B. Wrong: ADP and $NADP^{+}$ are the spent forms returned to the light reaction, not the products used by the dark reaction.

C. Wrong: there is no such molecule as "NADPM".

…he light reactions produce ATP and NADPH, which the Calvin cycle (dark reaction) uses to fix carbon dioxide.

Question 95 Biology

End products of light reactions of photosynthesis:

- A. ATP and NADPH ✓ **Correct answer**
- B. ATP and glucose
- C. Glucose and NADP
- D. ATP and water

A. Correct: the light reactions produce ATP and NADPH (and oxygen as a by-product); these are the end products that feed the dark reaction.

B. Wrong: glucose is made in the dark reaction, not in the light reactions.

C. Wrong: neither glucose nor NADP is an end product of the light reactions.

D. Wrong: water is a raw material split in the light reactions, not an end product.

Question 96 Biology

Smallest known bacteria belong to genus:

- A. Mycoplasma ✓ **Correct answer**
- B. Streptococcus
- C. Escherichia
- D. Bacillus

A. Correct: Mycoplasma are the smallest free-living bacteria, lacking a cell wall.

B. Wrong: streptococci are ordinary-sized spherical bacteria, much larger than Mycoplasma.

C. Wrong: Escherichia (e.g. E. coli) are ordinary rod-shaped bacteria, larger than

D. Wrong: Bacillus are rod-shaped bacteria, larger than Mycoplasma.

Question 97 Biology

Tonoplast is membrane separating:

- A. Vacuole and Nucleoplasm
- B. Cytoplasm and Nucleoplasm
- C. Vacuole and Stroma
- D. Vacuole and Cytoplasm ✓ **Correct answer**

A. Wrong: the nucleoplasm is inside the nucleus, not next to the vacuole.

B. Wrong: the membrane between cytoplasm and nucleoplasm is the nuclear envelope, not the tonoplast.

C. Wrong: stroma is the fluid of the chloroplast, not what the tonoplast separates.

D. Correct: the tonoplast is the membrane surrounding the central vacuole, separating the vacuole from the cytoplasm.

Question 98 English

I _____ English for five years.

- A. Study
- B. Am Studying
- C. Have been studying ✓ **Correct answer**
- D. Studies

A. Wrong: the simple present does not express an action continuing over five years up to now.

B. Wrong: the present continuous describes an action happening now, not one spread

C. Correct: the present perfect continuous expresses an action that started in the past and continues to the present ("for five years").

D. Wrong: "studies" is third-person singular and does not agree with "I".

Question 99 English

The soup _____ good.

- A. Taste
- B. Tastes ✓ **Correct answer**
- C. Is tasting
- D. Has taste

A. Wrong: "taste" does not agree with the singular subject "soup".

B. Correct: "tastes" is the correct present-tense form for the singular subject, and "taste" as a linking verb takes no continuous form here.

C. Wrong: "taste" is a state verb and is not used in the continuous form in this sense.

D. Wrong: unnatural and incorrect; the idiomatic form is "tastes good".

Question 100 English

Unless we _____ now, we cannot be on time.

- A. Start ✓ **Correct answer**
- B. Will start
- C. Do not start
- D. Are starting

A. Correct: "Unless we start now, we cannot be on time" — "unless" means "if not", so the verb after it must be affirmative.

nless" clauses do not take "will" in this conditional structure.

C. Wrong: the reproduction's printed key says C, but "unless we do not start" is a double negative ("if we do start"), which reverses the meaning; the key is wrong and is corrected here.

D. Wrong: the continuous form does not fit the conditional "unless" clause. (PRINTED-KEY ERROR CORRECTED: the reproduction's grid and detailed key both say C; corrected to A under the owner's 8 Nov 2026 delegation, because "unless" already carries the negative.)

Question 101 English

Daud is better than _____ of the college.

- A. All teachers
- B. Any teachers
- C. All other teachers ✓ **Correct answer**
- D. Any teacher

A. Wrong: saying Daud is better than "all teachers" would include Daud himself among the teachers, which is illogical.

B. Wrong: "any teachers" is ungrammatical after a comparative in this construction.

C. Correct: "other" excludes Daud himself, so he is compared with the rest of the teachers.

D. Wrong: "better than any teacher" would again include Daud himself in the comparison.

Question 102 English

Abide _____ the traffic laws for smooth and safe flow of traffic.

- A. On
- B. With
- C. By ✓ **Correct answer**
- D. To

bide on" is not an English collocation.

B. Wrong: "abide with" is not the correct preposition for obeying laws.

C. Correct: the fixed phrase is "abide by" (to obey or follow rules and laws).

D. Wrong: "abide to" is not an English collocation.

Question 103 English

He prefers death _____ dishonor.

- A. Over
- B. On
- C. Upon
- D. To ✓ **Correct answer**

A. Wrong: "prefer X over Y" is common in modern usage, but the standard examination form is "prefer X to Y".

B. Wrong: "prefer death on dishonor" is not an English collocation.

C. Wrong: "prefer death upon dishonor" is not an English collocation.

D. Correct: the standard construction is "prefer one thing to another".

Question 104 English

What does the word 'SURPLUS' mean?

- A. In excess ✓ **Correct answer**
- B. A mathematical term
- C. Within reach
- D. Salutation

A. Correct: surplus means an amount left over, more than what is needed — "in excess".

rplus is a general word for excess, not a mathematical term.

C. Wrong: that means accessible, not surplus.

D. Wrong: a salutation is a greeting, unrelated to surplus.

Question 105 English

What does the word 'SPILL' mean?

- A. Coil
- B. Deliver
- C. Spoil
- D. Spread ✓ **Correct answer**

A. Wrong: to coil is to wind into loops, unrelated to spilling.

B. Wrong: to deliver is to hand over, unrelated to spilling.

C. Wrong: to spoil is to ruin; a spill may spoil something, but that is not the meaning of "spill".

D. Correct: of the four options, "spread" is the closest synonym — a spill spreads out over a surface.

Question 106 English

What does the word 'CURIOUS' mean?

- A. Keen ✓ **Correct answer**
- B. Careful
- C. Quest
- D. Cruel

A. Correct: curious means eager to know or learn, and "keen" (eager, enthusiastic) is the closest synonym among the options.

reful means cautious, not curious.

C. Wrong: a quest is a search or journey, not a synonym for curious.

D. Wrong: cruel means deliberately unkind, the opposite of curious.

Question 107 English

Pick the sentence with correct punctuation:

- A. He had one motto "serving humanity."
- B. He, had one motto, serving humanity.
- C. He had one motto; serving humanity.
- D. He had one motto: serving humanity. ✓ **Correct answer**

A. Wrong: the quotation marks are misplaced and the sentence lacks the colon that introduces the explanation.

B. Wrong: the commas break the sentence incorrectly.

C. Wrong: a semicolon must join two independent clauses, but "serving humanity" is not one.

D. Correct: a colon introduces the explanation or example that follows.

Question 108 English

Pick the word with correct spelling:

- A. Collique
- B. Colleague ✓ **Correct answer**
- C. Collegue
- D. Co-leageu

A. Wrong: misspelled; the correct word is "colleague".

B. Correct: c-o-l-l-e-a-g-u-e, a person one works with.

misspelled (missing the "a" before "gue").

D. Wrong: misspelled and wrongly hyphenated.

Question 109 English

Pick the word with correct spelling:

- A. Acquaintance ✓ **Correct answer**
- B. Equatance
- C. Equantence
- D. Equentense

A. Correct: a-c-q-u-a-i-n-t-a-n-c-e, a person known slightly.

B. Wrong: misspelled; it is not a word.

C. Wrong: misspelled; it is not a word.

D. Wrong: misspelled; it is not a word.

Question 110 English

Pick the word with correct spelling:

- A. Prayority
- B. Priarity
- C. Prioarily
- D. Priority ✓ **Correct answer**

A. Wrong: misspelled ("pray" instead of "pri").

B. Wrong: misspelled (missing the "o").

C. Wrong: misspelled (extra "a").

D. Correct: p-r-i-o-r-i-t-y.

111 English

Pick the sentence with correct punctuation:

- A. "He did his best that was all anyone could do".
- B. He did his best, that was all anyone could do.
- C. He did his best: that was all anyone could do.
- D. He did his best; that was all anyone could do. ✓ **Correct answer**

A. Wrong: the quotation marks are misplaced and the two clauses run together without proper punctuation.

B. Wrong: a comma alone cannot join two independent clauses (comma splice).

C. Wrong: a colon is for introducing an explanation or list, not for joining two equal independent clauses here.

D. Correct: a semicolon correctly joins two closely related independent clauses.

Question 112 English

Pick the correct option:

- A. How has the chair leg broken?
- B. How has the leg of the chair broken? ✓ **Correct answer**
- C. How the leg of the chair has broken?
- D. How the chair's leg is broken?

A. Also grammatical: "chair leg" is a normal compound noun, so this question is correctly formed too; the printed key records B.

B. Correct per the printed key: the auxiliary "has" is correctly placed before the subject in this question.

C. Wrong: a direct question needs inversion ("How has..."), not statement word order.

D. Wrong: it lacks inversion and uses the wrong tense for asking how the break happened.

options A and B are both grammatical questions; the key records B. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 113 English

The teacher asked the students _____ they had completed their homework.

- A. that
- B. whether ✓ **Correct answer**
- C. if that
- D. whether or not that

A. Wrong: "asked the students that they had completed" is ungrammatical; "asked" needs an indirect question word.

B. Correct: indirect questions after "asked" use "whether" (or "if") to introduce the yes/no question.

C. Wrong: "if that" is not a correct combination here.

D. Wrong: "whether or not that" is ungrammatical in this reported question.

Question 114 English

Neither the students nor the teacher _____ present today.

- A. are
- B. were
- C. was ✓ **Correct answer**
- D. have been

A. Wrong: with "neither...nor" the verb agrees with the nearest subject ("teacher", singular), so a plural verb is wrong.

B. Wrong: "were" is plural and past; the sentence needs a singular present verb.

the nearest subject "teacher" is singular, and "today" calls for the present tense, so "was" (singular) is the intended form in this examination item.

D. Wrong: "have been" is plural and does not agree with the singular "teacher".

Question 115 Chemistry

Vapor pressure is independent of:

- A. Temperature
- B. Intermolecular forces
- C. Density of liquid
- D. Surface area of liquid ✓ **Correct answer**

A. Wrong as the answer: vapor pressure DOES depend on temperature (it rises as temperature rises).

B. Wrong as the answer: vapor pressure DOES depend on intermolecular forces (stronger forces mean lower vapor pressure).

C. Wrong as the answer: density is related to the nature of the liquid, which affects vapor pressure, and the key does not record it.

D. Correct: vapor pressure is an equilibrium property that does not depend on the surface area of the liquid.

Question 116 Chemistry

Boiling point of ether less than alcohols due to:

- A. Functional group
- B. Intermolecular forces ✓ **Correct answer**
- C. Nature of alkyl groups
- D. Isomerism

A. Wrong: the functional group alone does not explain the boiling point difference; it is the

B. Correct: ethers cannot form hydrogen bonds with themselves, so their intermolecular forces are weaker than those of alcohols and they boil at lower temperatures.

C. Wrong: the alkyl groups are similar in both cases; the difference is the hydrogen bonding.

D. Wrong: isomerism does not explain why ethers boil lower than alcohols.

Question 117 Chemistry

Ice cubes unite when pressed due to:

- A. Dipole-dipole
- B. Covalent attraction
- C. Van Der Waal's forces
- D. H-bonding ✓ **Correct answer**

A. Wrong: ordinary dipole forces do not explain regelation (melting under pressure and refreezing).

B. Wrong: no covalent bonds form between the ice cubes.

C. Wrong: van der Waals forces are too weak to account for the cubes uniting firmly.

D. Correct: pressure melts the ice at the contact points, and when the pressure is removed the water refreezes, with hydrogen bonds reforming between the cubes (regelation).

Question 118 Chemistry

NaCl crystal: each Na^+ surrounded by:

- A. 6 Cl^- and each Cl^- by 6 Na^+ ✓ **Correct answer**
- B. Face centred cubic only
- C. 3 Cl^- and 3 Na^+

A. Correct: in the NaCl lattice each Na^+ is octahedrally surrounded by 6 Cl^- ions, and each Cl^- by 6 Na^+ ions (coordination number 6).

B. Wrong: that describes the lattice type, not the number of neighbours around each ion.

C. Wrong: the coordination number in NaCl is 6, not 3.

D. Wrong: that is a type of force, not a description of the crystal surroundings.

Question 119 Chemistry

Greater lattice energy shown by:

- A. NaCl
- B. NaBr
- C. NaI
- D. NaF ✓ **Correct answer**

A. Wrong: Cl^- is larger than F^-, so NaCl has lower lattice energy than NaF.

B. Wrong: Br^- is larger than F^-, so NaBr has lower lattice energy than NaF.

C. Wrong: I^- is the largest halide here, so NaI has the lowest lattice energy of the four.

D. Correct: F^- is the smallest halide ion, so the ions are closest together and the attraction is strongest, giving the highest lattice energy.

Question 120 Chemistry

Thermal conductivity of metals due to:

- A. Layered structure
- B. Freely moving electrons ✓ **Correct answer**
- C. Loosely held atoms
- D. Vibrational movement

layered structure does not explain thermal conductivity.

B. Correct: delocalised electrons in metals carry thermal energy rapidly through the lattice.

C. Wrong: atoms in a metal are held in a fixed lattice; it is the electrons, not the atoms, that move freely.

D. Wrong: lattice vibrations carry some heat, but the main mechanism in metals is the free electrons.

Question 121 Chemistry

200 atm pressure in Haber's process used for:

- A. Better yield ✓ **Correct answer**
- B. Lower yield
- C. Lower rate
- D. Cost decrease

A. Correct: $N_2 + 3H_2 \rightarrow 2NH_3$ goes from 4 moles of gas to 2, so high pressure shifts the equilibrium to the product side and gives a better yield.

B. Wrong: high pressure increases the yield, not lowers it.

C. Wrong: high pressure increases the rate of reaction, not lowers it.

D. Wrong: 200 atm equipment is expensive; the pressure is used for yield, not to cut costs.

Question 122 Chemistry

Equilibrium attained earlier by using:

- A. Temperature
- B. Pressure
- C. Concentration

alyst ✓ **Correct answer**

A. Wrong: temperature changes the equilibrium position and the rate, but the standard way to reach equilibrium sooner without changing the position is a catalyst.

B. Wrong: pressure changes the equilibrium position; it is not the agent that simply speeds up attainment.

C. Wrong: concentration changes the equilibrium position; it does not simply bring equilibrium earlier.

D. Correct: a catalyst lowers the activation energy and speeds up both forward and reverse reactions, so equilibrium is reached earlier (its position is unchanged).

Question 123 Chemistry

Temperature raised 10K — reaction rate increases to:

- A. Double ✓ **Correct answer**
- B. Three times
- C. Four times
- D. Five times

A. Correct: as a standard rule, the rate of most reactions roughly doubles for every 10°C (10 K) rise in temperature.

B. Wrong: the standard rule is doubling, not tripling.

C. Wrong: the rate would quadruple for a 20 K rise, not a 10 K rise.

D. Wrong: no standard rule gives a fivefold rise for 10 K.

Question 124 Chemistry

Minimum energy for effective collisions:

- A. Activation energy ✓ **Correct answer**

ice energy

- C. Bond energy
- D. Hydration energy

A. Correct: activation energy is the minimum energy colliding molecules must have for a reaction to occur.

B. Wrong: lattice energy is about forming an ionic solid from gaseous ions, not about collisions.

C. Wrong: bond energy is the energy of a single bond, not the threshold for effective collision.

D. Wrong: hydration energy is released when ions are surrounded by water, not a collision threshold.

Question 125 Chemistry

Which is NOT a state function?

- A. Pressure (P)
- B. Work (W) ✓ **Correct answer**
- C. Volume (V)
- D. Temperature (T)

A. Wrong as the answer: pressure IS a state function (it depends only on the state, not the path).

B. Correct: work is path-dependent — it depends on how the change was carried out — so it is not a state function.

C. Wrong as the answer: volume IS a state function.

D. Wrong as the answer: temperature IS a state function.

126 Chemistry

$Mg^{2+}(g) + O^{2-}(g) \rightarrow MgO(s)$ represents:

- A. Atomization
- B. Neutralization
- C. Lattice energy ✓ **Correct answer**
- D. Solution

A. Wrong: atomization is forming gaseous atoms from an element, not forming a solid from gaseous ions.

B. Wrong: neutralisation is an acid reacting with a base to form salt and water.

C. Correct: gaseous ions coming together to form a solid ionic lattice releases lattice energy.

D. Wrong: solution would involve a solvent, which is absent here.

Question 127 Chemistry

When nitric oxide reacts with ozone, order of reaction is:

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

A. Correct: rate = $k[NO][O_3]$, first order in each reactant, so the overall order is second.

B. Wrong: the reaction involves two reactants, each first order, giving order 2, not 3.

C. Wrong: the rate depends on two concentrations, so it cannot be first order overall.

D. Wrong: the rate does depend on the concentrations, so the order is not zero.

128 Chemistry

During electrolysis, reduction always occurs at:

- A. Anode
- B. Cathode ✓ **Correct answer**
- C. SHE
- D. Salt bridge

A. Wrong: oxidation occurs at the anode ("AN OX").

B. Correct: reduction always occurs at the cathode ("RED CAT").

C. Wrong: the standard hydrogen electrode is a reference electrode, not where reduction always occurs.

D. Wrong: the salt bridge completes the circuit; no reduction occurs there.

Question 129 Chemistry

Highest electronegativity of Fluorine due to:

- A. Complete outer shell
- B. Forms negative ion
- C. Diatomic molecule
- D. Smaller size and higher nuclear charge ✓ **Correct answer**

A. Wrong: fluorine does not have a complete outer shell (it has 7 valence electrons); that is not why it is the most electronegative.

B. Wrong: forming a negative ion is a consequence of its electronegativity, not its cause.

C. Wrong: being diatomic does not explain electronegativity.

D. Correct: fluorine is the smallest atom in its period with the highest effective nuclear charge, so it pulls shared electrons most strongly.

130 Chemistry

VSEPR theory explains:

- A. Bond Energy
- B. Bond Length
- C. Shapes and Bond Energy
- D. Shapes ✓ **Correct answer**

A. Wrong: VSEPR does not predict bond energies.

B. Wrong: VSEPR does not predict bond lengths.

C. Wrong: VSEPR predicts shapes only; it does not explain bond energy.

D. Correct: VSEPR theory predicts the shapes of molecules by minimising repulsions between electron pairs.

Question 131 Chemistry

sp^3 hybridization is shown by:

- A. BF_3
- B. C_2H_4
- C. $BeCl_2$
- D. CH_4 ✓ **Correct answer**

A. Wrong: BF_3 has sp^2 hybridisation (trigonal planar).

B. Wrong: ethene has sp^2 hybridised carbons (double bond).

C. Wrong: $BeCl_2$ has sp hybridisation (linear).

D. Correct: methane's carbon forms four single bonds, so it is sp^3 hybridised (tetrahedral, 109.5°).

132 Chemistry

Factor NOT affecting bond length:

- A. Multiple bonds
- B. Nature of hybridization
- C. Difference in electronegativity
- D. Ionization energies of bonded atoms ✓ **Correct answer**

A. Wrong as the answer: multiple bonds DO affect bond length (triple bonds are shorter than single bonds).

B. Wrong as the answer: hybridisation DOES affect bond length (more s-character means shorter bonds).

C. Wrong as the answer: electronegativity difference DOES affect bond length.

D. Correct: ionisation energy does not directly determine how long a bond is.

Question 133 Chemistry

Malleable and ductile substance:

- A. Sodium chloride
- B. Copper sulphate
- C. Mercury
- D. Aluminum ✓ **Correct answer**

A. Wrong: sodium chloride is an ionic solid and is brittle, not malleable or ductile.

B. Wrong: copper sulphate is an ionic compound and is brittle, not malleable or ductile.

C. Wrong: mercury is a liquid metal at room temperature, so malleability and ductility do not apply to it.

D. Correct: aluminium is a metal and metals are malleable (can be beaten into sheets) and ductile (can be drawn into wires).

134 Chemistry

Coordination number of Na in metallic BCC structure:

- A. 10
- B. 9
- C. 8 ✓ **Correct answer**
- D. 12

A. Wrong: no common metallic structure has coordination number 10 for sodium.

B. Wrong: the BCC coordination number is 8, not 9.

C. Correct: in a body-centred cubic metal each atom touches 8 nearest neighbours.

D. Wrong: 12 is the coordination number of close-packed structures (FCC/HCP), not BCC.

Question 135 Chemistry

Cracking method for better quality gasoline:

- A. Thermal
- B. Catalytic ✓ **Correct answer**
- C. Steam
- D. Radiations

A. Wrong: thermal cracking breaks large hydrocarbons with heat alone and gives lower-octane gasoline.

B. Correct: catalytic cracking (using a zeolite catalyst) produces higher-octane, better-quality gasoline.

C. Wrong: steam cracking is used to make alkenes, not to improve gasoline quality.

D. Wrong: radiation is not a cracking method for gasoline.

136 Chemistry

Homocyclic organic compounds divided into:

- A. Alicyclic and Aromatic ✓ **Correct answer**
- B. Open and branched chain
- C. Aromatic and non-aromatic
- D. Antiaromatic and antialicyclic

A. Correct: homocyclic compounds (rings of carbon only) are of two types — alicyclic (non-aromatic rings) and aromatic.

B. Wrong: open and branched chains describe acyclic compounds, not homocyclic ones.

C. Wrong: the standard pair in the syllabus is alicyclic and aromatic, not "aromatic and non-aromatic".

D. Wrong: "antialicyclic" is not a standard class of homocyclic compounds.

Question 137 Chemistry

Acetophenone formed from benzene by:

- A. Alkylation
- B. Acylation ✓ **Correct answer**
- C. Halogenation
- D. Nitration

A. Wrong: Friedel-Crafts alkylation adds an alkyl group (giving toluene), not an acyl group.

B. Correct: Friedel-Crafts acylation (benzene + CH_3COCl with $AlCl_3$) gives acetophenone, $C_6H_5COCH_3$.

C. Wrong: halogenation adds a halogen atom to the ring, not an acetyl group.

D. Wrong: nitration adds a nitro group (giving nitrobenzene), not an acetyl group.

138 Chemistry

Generic formula of cycloalkane is:

- A. CnH2n+2
- B. CnH2n ✓ **Correct answer**
- C. CnH2n-1
- D. C_nH_{2n-2}

A. Wrong: C_nH_{2n+2} is the formula of alkanes, not cycloalkanes.

B. Correct: a cycloalkane has one ring, which is one degree of unsaturation, so its formula is C_nH_{2n}.

C. Wrong: C_nH_{2n-1} is not the formula of any standard hydrocarbon class.

D. Wrong: C_nH_{2n-2} is the formula of alkynes (or compounds with two degrees of unsaturation), not cycloalkanes. (Option D is served in the reproduction as the garbled string "CnCH2n-2"; it is transcribed here as C_nH_{2n-2} and the garble is recorded in the verification summary.)

Question 139 Chemistry

Test that differentiates alcohol from phenol:

- A. Lucas test ✓ **Correct answer**
- B. Halogenation
- C. Nitration
- D. Iodoform test

A. Correct: Lucas reagent (concentrated HCl with $ZnCl_2$) reacts with alcohols to give turbidity but does not react with phenol, whose C–O bond has partial double-bond character, so it distinguishes the two.

B. Wrong: halogenation is a reaction type, not a test that distinguishes alcohol from phenol.

tration is a reaction type, not a test that distinguishes alcohol from phenol.

D. Wrong: the iodoform test identifies methyl ketones and ethanol ($CH_3CHOH–$ group), not alcohol versus phenol.

Question 140 Chemistry

Order of reactivity of alcohol when C-O bond breaks:

- A. Tertiary > secondary > Primary ✓ **Correct answer**
- B. Secondary > primary > tertiary
- C. Primary > secondary > tertiary
- D. Tertiary > primary > secondary

A. Correct: C–O bond cleavage gives a carbocation, and tertiary carbocations are the most stable, so tertiary alcohols react fastest.

B. Wrong: that order puts tertiary last, the opposite of the carbocation stability order.

C. Wrong: primary carbocations are the least stable, so primary alcohols react slowest.

D. Wrong: secondary carbocations are more stable than primary, so secondary must come before primary.

Question 141 Chemistry

$C_nH_{2n}O$ is general formula of:

- A. Ether
- B. Carboxylic acid
- C. Ketones ✓ **Correct answer**
- D. Carbolic acid

A. Wrong: ethers have the formula $C_nH_{2n+2}O$.

B. Wrong: carboxylic acids have the formula $C_nH_{2n}O_2$.

etones have the general formula $C_nH_{2n}O$ (aldehydes share this formula, but aldehyde is not among the options, so ketone is the uniquely correct choice here).

D. Wrong: carbolic acid is phenol (C_6H_5OH), not the class with formula $C_nH_{2n}O$.

Question 142 Chemistry

Catalytic reduction of aldehyde and ketone forms:

- A. Alcohol ✓ **Correct answer**
- B. Carboxylic acid
- C. Alkane
- D. Aldehyde

A. Correct: hydrogenation with a catalyst (H_2/Ni) reduces an aldehyde to a primary alcohol and a ketone to a secondary alcohol.

B. Wrong: reduction does not give a carboxylic acid; oxidation of an aldehyde does.

C. Wrong: catalytic hydrogenation of a carbonyl group stops at the alcohol, not the alkane.

D. Wrong: an aldehyde is a starting material here, and a ketone cannot be reduced to an aldehyde.

Question 143 Chemistry

Reacts with carboxylic acid to form ester:

- A. Aldehyde
- B. Alkyl Halide
- C. Ketones
- D. Alcohol ✓ **Correct answer**

A. Wrong: aldehydes do not react with carboxylic acids to form esters.

B. Wrong: alkyl halides do not form esters with carboxylic acids.

tones do not react with carboxylic acids to form esters.

D. Correct: Fischer esterification — RCOOH + R'OH → RCOOR' + H_2O — is the reaction of a carboxylic acid with an alcohol to form an ester.

Question 144 Chemistry

Hydrolysis of nitriles produces:

- A. Carboxylic acid ✓ **Correct answer**
- B. Aldehydes
- C. Ketones
- D. Esters

A. Correct: R–CN + $2H_2O$ → R–COOH + NH_3; complete hydrolysis of a nitrile gives a carboxylic acid.

B. Wrong: aldehydes are not the product of nitrile hydrolysis.

C. Wrong: ketones are not the product of nitrile hydrolysis.

D. Wrong: esters are not the product of nitrile hydrolysis.

Question 145 Chemistry

Mass of sulphur in 24.5g of H_2SO_4:

- A. 32 g
- B. 24 g
- C. 16 g
- D. 8 g ✓ **Correct answer**

A. Wrong: 32 g is the mass of one mole of sulphur atoms, not the sulphur in 24.5 g of acid.

B. Wrong: no calculation with 24.5 g of H_2SO_4 gives 24 g of sulphur.

C. Wrong: 16 g would be the sulphur in 49 g of H_2SO_4 (0.5 mol), not in 24.5 g.

4.5 g of H_2SO_4 is 24.5/98 = 0.25 mol, and 0.25 mol × 32 g/mol = 8 g of sulphur.

Question 146 Chemistry

Moles of NH_3 from 2.5 moles N_2 ($N_2+3H_2\rightarrow2NH_3$):

- A. 2.5 moles
- B. 2 moles
- C. 5 moles ✓ **Correct answer**
- D. 7.5 moles

A. Wrong: that is a 1:1 ratio, but the equation gives 2 moles of NH_3 per mole of N_2.

B. Wrong: that is the number of moles of NH_3 from 1 mole of N_2, not from 2.5 moles.

C. Correct: 1 mol N_2 → 2 mol NH_3, so 2.5 mol N_2 → 5 mol NH_3.

D. Wrong: 7.5 is 2.5 × 3, the moles of H_2 needed, not the moles of NH_3 produced.

Question 147 Chemistry

Quantum energy directly proportional to:

- A. Photon
- B. Wavelength
- C. Frequency ✓ **Correct answer**
- D. Velocity

A. Wrong: a photon is a particle of light, not a quantity that energy is proportional to.

B. Wrong: energy is inversely proportional to wavelength ($E = hc/\lambda$), not directly proportional.

C. Correct: by Planck's relation $E = hf$, energy is directly proportional to frequency.

D. Wrong: the velocity of light is constant; energy does not vary with it.

148 Chemistry

For l=2, total values of magnetic quantum number:

- A. 3
- B. 5 ✓ **Correct answer**
- C. 7
- D. 10

A. Wrong: 3 values belong to l = 1 (m = −1, 0, +1).

B. Correct: for l = 2, m runs from −2 to +2, giving −2, −1, 0, +1, +2 — five values.

C. Wrong: 7 values belong to l = 3 (the f orbitals).

D. Wrong: no value of l gives 10 magnetic quantum numbers in this set.

Question 149 Chemistry

Total directions of f-orbitals in space:

- A. 5
- B. 3
- C. 7 ✓ **Correct answer**
- D. 6

A. Wrong: 5 directions belong to the d orbitals (l = 2).

B. Wrong: 3 directions belong to the p orbitals (l = 1).

C. Correct: f orbitals have l = 3, so m = −3 to +3, giving 7 orientations in space.

D. Wrong: there are 7 f orbitals, not 6.

Question 150 Chemistry

NOT obtained from Schrödinger wave equation:

cipal QN

- B. Spin QN ✓ **Correct answer**
- C. Azimuthal QN
- D. Magnetic QN

A. Wrong as the answer: the principal quantum number (n) IS obtained from the Schrödinger equation.

B. Correct: the spin quantum number (ms = ±½) was introduced separately (Pauli) and is not a solution of the Schrödinger wave equation.

C. Wrong as the answer: the azimuthal quantum number (l) IS obtained from the Schrödinger equation.

D. Wrong as the answer: the magnetic quantum number (m) IS obtained from the Schrödinger equation.

Question 151 Chemistry

Degenerate orbitals explained by:

- A. Aufbau Principle
- B. n+l Rule
- C. Hund's Rule ✓ **Correct answer**
- D. Pauli Exclusion

A. Wrong: the Aufbau principle gives the order of filling orbitals, not the rule for degenerate orbitals.

B. Wrong: the n+l rule gives the order of orbital energies, not the filling of degenerate orbitals.

C. Correct: Hund's rule states that degenerate orbitals are filled singly with parallel spins before pairing begins.

e Pauli principle limits two electrons per orbital with opposite spins; it does not explain degenerate-orbital filling.

Question 152 Chemistry

Molecules in gases in constant movement — called:

- A. Kinetic theory of gases ✓ **Correct answer**
- B. Crystal field theory
- C. Molecular orbital theory
- D. Transition state theory

A. Correct: the kinetic molecular theory states that gas molecules are in constant random motion.

B. Wrong: crystal field theory is about metal complexes, not gas molecules.

C. Wrong: molecular orbital theory is about bonding in molecules, not gas motion.

D. Wrong: transition state theory is about reaction rates, not gas motion.

Question 153 Chemistry

SI unit of pressure:

- A. mm of Hg
- B. Pascal ✓ **Correct answer**
- C. Bar
- D. Torr

A. Wrong: millimetres of mercury is a pressure unit, but it is not the SI unit.

B. Correct: the pascal (Pa = 1 N/m^2) is the SI unit of pressure.

C. Wrong: the bar is a pressure unit, but it is not the SI unit.

D. Wrong: the torr is a pressure unit, but it is not the SI unit.

154 Chemistry

Both temperature and volume doubled — pressure:

- A. Cannot be predicted
- B. Reduced to ½
- C. Remains unchanged ✓ **Correct answer**
- D. Is doubled

A. Wrong: the ideal gas law predicts the result exactly.

B. Wrong: that would be the result if only the volume doubled with temperature unchanged.

C. Correct: PV/T is constant, so $P_2 = P_1 \times (V_1/V_2) \times (T_2/T_1) = P_1 \times (1/2) \times 2 = P_1$.

D. Wrong: that would be the result if only the temperature doubled with volume unchanged.

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