MDCAT (ETEA entry test, Paper MDCAT-1) — 2017 · Solved Past Paper

Body: Educational Testing and Evaluation Agency (ETEA) · **Post:** MDCAT (ETEA entry test, Paper MDCAT-1) · **Year:** 2017 · **Questions:** 200 in the original paper — **199 solved and verified**, 1 excluded as defective (Q64) · **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 2017 sitting.

Source note: Question stems and options: ETEA MDCAT 2017, Paper MDCAT-1 (educationinkarachi.net/wp-content/uploads/2026/09/ETEA-MDCAT-2017.pdf, 32 pp.; Q1-200 contiguous, 4 options each; complete answer-key table at the end, Q1-200, with the key note that where two letters are shown both options are correct). Exam held Sunday 23 July 2017 (news report of the test held on Sunday, 33,053 candidates, KMU + ETEA jointly; result report confirms 23 July 2017). Printed key letter counts A37 / B53 / C55 / D51 (single-letter entries) plus 4 dual-letter entries (Q80 B/C, Q84 A/B, Q107 A/C, Q138 B/D). Subjects Biology/Chemistry/Physics/English interleaved across Q1-Q200 (no subject sections in the printed paper). 4 PICK-ONE (Q80, Q84, Q107, Q138) and 1 DEFECTIVE-excluded (Q64). 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 The compound that cannot undergo addition

The compound that cannot undergo addition reaction is:

- A. Cyclopropane

zene

- C. Butyne
- D. None of the above ✓ **Correct answer**

A. wrong: cyclopropane does undergo addition — its strained ring opens on addition (for example with HBr).

B. wrong: benzene does undergo addition under forcing conditions (for example catalytic hydrogenation to cyclohexane).

C. wrong: butyne, an alkyne, readily undergoes addition across the triple bond.

D. correct: all three compounds can undergo addition reactions, so none of them is a compound that cannot undergo addition.

Question 2 Benzene gives more stable product when

Benzene gives more stable product when undergo:

- A. Nucleophilic addition reaction
- B. Oxidation reaction
- C. Electrophilic substitution reaction ✓ **Correct answer**
- D. Electrophilic addition reaction

A. wrong: benzene does not undergo nucleophilic addition; its π system is electron-rich.

B. wrong: oxidation of benzene destroys the ring and gives no more stable product.

C. correct: benzene undergoes electrophilic aromatic substitution, which preserves the aromatic sextet and gives the most stable product.

D. wrong: electrophilic addition to benzene would destroy aromaticity and give a less stable product.

3 For callus formation auxin and cytokinin

For callus formation, auxin and cytokinin are required in which ratio?

- A. Balanced ✓ **Correct answer**
- B. Only cytokinin required
- C. Low auxin, very high cytokinin
- D. Only auxin

A. correct: callus formation in tissue culture needs a balanced ratio of auxin to cytokinin.

B. wrong: cytokinin alone does not produce a callus; auxin is also needed.

C. wrong: a high cytokinin-to-auxin ratio promotes shoot formation, not callus.

D. wrong: auxin alone does not produce a callus; cytokinin is also needed.

Question 4 For which purpose are myeloma cells

For which purpose are myeloma cells (cancerous B-lymphocytes) used in the production of monoclonal antibodies?

- A. Increased rate of cell division ✓ **Correct answer**
- B. Immunization with antigen
- C. To avoid contamination
- D. As nutrient in media

A. correct: myeloma cells are used in hybridoma technology because they divide indefinitely, giving the hybridoma an unlimited rate of cell division.

B. wrong: immunisation is done on the animal, not with myeloma cells.

C. wrong: myeloma cells do not prevent contamination.

D. wrong: myeloma cells are not a nutrient.

5 DNA polymerase adds nucleotides to the

DNA polymerase adds nucleotides to the 3’ end of the primer so the direction of replication will be?

- A. 5’ to 3’ ✓ **Correct answer**
- B. 3’ to 5’
- C. 3’ end of the primer to 3’ end of template strand
- D. 3’ end of the template strand to the 3’ end of the primer

A. correct: DNA polymerase adds nucleotides to the 3′ end of the primer, so the new strand grows in the 5′ to 3′ direction.

B. wrong: the template is read 3′ to 5′, but the new strand is synthesised 5′ to 3′.

C. wrong: this mixes the two strands.

D. wrong: this is not the direction of synthesis.

Question 6 The range of projectile is the

The range of projectile is the same for two angles which are mutually:

- A. Perpendicular
- B. Supplementary
- C. Complementary ✓ **Correct answer**
- D. 270°

A. wrong: perpendicular angles (90° apart) do not give the same range.

B. wrong: supplementary angles (summing to 180°) do not give the same range.

C. correct: the range $R = u^2\sin 2\theta/g$ is the same for θ and $90° - \theta$, i.e. for complementary angles.

D. wrong: 270° is not a complementary angle to a projection angle.

7 A wave of amplitude 20 mm

A wave of amplitude 20 mm has intensity Ix. Another wave of the same frequency but of amplitude 5 mm has intensity Iy. What is Ix/Iy?

- A. 2
- B. 4
- C. 16 ✓ **Correct answer**
- D. 256

A. wrong: intensity is proportional to the square of the amplitude, not the amplitude itself.

B. wrong: 4 is the amplitude ratio, not the intensity ratio.

C. correct: intensity $I \propto A^2$, so $Ix/Iy = (20/5)^2 = 16$.

D. wrong: 256 would be the fourth power of the amplitude ratio.

Question 8 The resistance of a device is

The resistance of a device is designed to change with temperature. What is the device?

- A. A light dependent resistor
- B. A potential divider
- C. A semiconductor diode
- D. A thermistor ✓ **Correct answer**

A. wrong: an LDR changes resistance with light, not with temperature.

B. wrong: a potential divider is a circuit, not a temperature-sensitive device.

C. wrong: a diode's resistance is not designed to change with temperature.

D. correct: a thermistor is a resistor whose resistance is designed to change with temperature.

9 I enjoy tennis

I enjoy ____ tennis.

- A. to play
- B. plays
- C. playing ✓ **Correct answer**
- D. to playing

A. wrong: enjoy is followed by a gerund, not an infinitive.

B. wrong: plays is a finite verb form and cannot follow enjoy.

C. correct: enjoy takes a gerund, so "I enjoy playing tennis" is correct.

D. wrong: enjoy does not take "to + gerund".

Question 10 Catalytic converter reduces the emission of

Catalytic converter reduces the emission of:

- A. Unburnt hydrocarbons
- B. CO
- C. NO
- D. All of the above ✓ **Correct answer**

A. wrong on its own: a catalytic converter does reduce unburnt hydrocarbons, but it also reduces CO and NO.

B. wrong on its own: the converter also reduces hydrocarbons and NO.

C. wrong on its own: the converter also reduces hydrocarbons and CO.

D. correct: a three-way catalytic converter reduces unburnt hydrocarbons, carbon monoxide and nitrogen oxides.

11 What is the name of the

What is the name of the carboxylic acid given below? HOOC(CH2)3COOH

- A. Propanedioic acid
- B. Pentanedioic acid ✓ **Correct answer**
- C. Pentane dicarboxylic acid
- D. Propane dicarboxylic acid

A. wrong: propanedioic acid is HOOC–CH2–COOH (3 carbons).

B. correct: HOOC–(CH2)3–COOH has 5 carbons in total, so it is pentanedioic acid (glutaric acid).

C. wrong: this is not the systematic name.

D. wrong: the parent chain has 5 carbons, not 3.

Question 12 OH-alcoholic CH3CH22Br Product The nature of

OH-(alcoholic) + CH3(CH2)2Br → Product The nature of OH- in the above reaction is:

- A. Nucleophile ✓ **Correct answer**
- B. Lewis base
- C. Ligand
- D. All of the above

A. correct: the hydroxide ion attacks the carbon of the alkyl bromide as a nucleophile in this substitution reaction.

B. wrong as the answer here: OH^- is a Lewis base, but in this reaction its role is that of a nucleophile.

C. wrong: OH^- is not acting as a ligand here.

D. wrong: in this reaction OH^- acts as a nucleophile, not as a ligand.

13 When the sperm count is high

When the sperm count is high, inhibin hormone release increases which:

- A. Inhibits anterior pituitary release of follicle stimulating hormone ✓ **Correct answer**
- B. Increases anterior pituitary release of follicle stimulating hormone
- C. Inhibits release of luteinizing hormone
- D. Increases release of luteinizing hormone

A. correct: inhibin, released by the Sertoli cells when the sperm count is high, feeds back to inhibit FSH release from the anterior pituitary.

B. wrong: inhibin inhibits, not increases, FSH release.

C. wrong: inhibin acts on FSH, not on LH.

D. wrong: inhibin does not increase LH release.

Question 14 Implantation of embryo takes place in

Implantation of embryo takes place in which week of pregnancy?

- A. 1st
- B. 2nd
- C. 3rd
- D. 4th ✓ **Correct answer**

A. wrong: implantation does not occur in the first week of pregnancy.

B. wrong: implantation occurs later than the second week of pregnancy.

C. wrong: implantation occurs in the fourth week of pregnancy (gestational age).

D. correct: the embryo implants in the uterine wall during the fourth week of pregnancy, about 6–10 days after fertilisation.

15 ZZZW type of sex determination pattern

ZZ–ZW type of sex determination pattern is present in which of the following organisms?

- A. Humans
- B. Butterflies ✓ **Correct answer**
- C. Grasshopper
- D. Drosophila

A. wrong: humans have the XX–XY system.

B. correct: butterflies (and birds) have the ZZ–ZW system, in which the female is the heterogametic sex.

C. wrong: grasshoppers have the XX–XO system.

D. wrong: Drosophila has the XX–XY system.

Question 16 When will 1 C of charge

When will 1 C of charge pass a point in an electrical circuit?

- A. When 1 A moves through a voltage of 1 V
- B. When a power of 1 W is used for 1 s
- C. When the current is 5 mA for 200 s ✓ **Correct answer**
- D. When the current is 10 A for 10 s

A. wrong: 1 A for 1 s, not a voltage of 1 V, passes 1 C.

B. wrong: 1 W for 1 s is 1 J of energy, not 1 C of charge.

C. correct: $Q = It = 0.005\ A \times 200\ s = 1\ C$.

D. wrong: 10 A for 10 s passes 100 C.

17 A cell of internal resistance 20

A cell of internal resistance 2.0 Ω and electromotive force (e.m.f) 1.5 V is connected to a resistor of resistance 3.0 Ω. What is the potential difference across the 3.0 Ω resistor?

- A. 5 V
- B. 1.2 V
- C. 0.9 V ✓ **Correct answer**
- D. 0.6 V

A. wrong: 5 V is more than the e.m.f. of the cell.

B. wrong: this does not follow from the circuit values.

C. correct: the current is I = 1.5/(2.0 + 3.0) = 0.3 A, so the p.d. across the 3.0 Ω resistor is 0.3 × 3.0 = 0.9 V.

D. wrong: 0.6 V is the p.d. across the internal resistance, not across the 3.0 Ω resistor.

Question 18 In a stationary wave the distance

In a stationary wave the distance between consecutive antinodes is 25 cm. If the wave velocity is 300 m s-1 then the frequency of the wave will be:

- A. 150 Hz
- B. 300 Hz
- C. 600 Hz ✓ **Correct answer**
- D. 750 Hz

A. wrong: this uses the wrong wavelength.

B. wrong: this takes λ = 1 m.

C. correct: the distance between consecutive antinodes is λ/2 = 25 cm, so λ = 50 cm = 0.5 m, and f = v/λ = 300/0.5 = 600 Hz.

D. wrong: this does not follow from the given values.

19 The path paved so we were

The path ____ paved, so we were able to walk through the path.

- A. had been ✓ **Correct answer**
- B. was
- C. has been
- D. being

A. correct: the past perfect "had been paved" fits the sequence — the paving happened before they walked through.

B. wrong: "was paved" does not show the paving was completed before the walk.

C. wrong: the present perfect does not fit a past narrative.

D. wrong: "being paved" is ungrammatical here.

Question 20 Choose the correct sentence

Choose the correct sentence.

- A. Naila was exhausted that she lain down for a nap
- B. Naila was so exhausted that she laid down for a nap
- C. Naila was so exhausted that she was lying down for a nap ✓ **Correct answer**
- D. Naila was so exhausted that she will lay down for a nap

A. wrong: "lain" is the wrong verb form and "so" is missing.

B. wrong: "laid" is the past of lay (to put something down), not of lie down.

C. correct: "was lying" is the correct past continuous of lie down, and the "so ... that" construction is complete.

D. wrong: "will lay" is the wrong tense and the wrong verb.

21 The bond energy of H2 molecule

The bond energy of H2 molecule (H2 → 2H) is:

- A. 436 kJ/mol ✓ **Correct answer**
- B. 40.7 kJ/mol
- C. 272 kJ/mol
- D. 436 ÷ Avogadro’s number kJ/mol

A. correct: the H–H bond dissociation energy is 436 kJ/mol.

B. wrong: 40.7 kJ/mol is not the H–H bond energy.

C. wrong: 272 kJ/mol is not the H–H bond energy.

D. wrong: 436 kJ/mol is already the energy per mole of bonds; dividing by Avogadro's number would give the energy per single bond.

Question 22 Considering the molecular orbital theory MOT

Considering the molecular orbital theory (MOT), choose the correct relative energies order.

- A. σ1s < σ*1s < σ2s < σ*2s < σ2px < π2py = π2pz ✓ **Correct answer**
- B. σ1s < σ*1s < σ2s < σ*2s < π2py = π2pz < σ2px
- C. σ1s < σ*1s < σ2s < σ*2s < π2px = π2py < σ2pz
- D. σ1s < σ*1s < σ2s < σ*2s < π2py < π2pz < π2px

A. correct: this is the molecular orbital energy order taught for O2/F2 (and the standard order in the textbook), with σ2p below the degenerate π2p pair.

B. wrong: this is the order for B2/C2/N2, not the order used here.

C. wrong: the degenerate pair is π2py = π2pz, and σ2px lies below them.

D. wrong: π2py and π2pz are degenerate (equal in energy), not different.

23 The oxidation of pent-2-one 2-pentanone with

The oxidation of pent-2-one (2-pentanone) with nascent oxygen gives:

- A. Propanal
- B. Propanoic acid
- C. Ethanoic acid ✓ **Correct answer**
- D. Pentanoic acid

A. wrong: oxidation of the ketone gives acids, not an aldehyde.

B. wrong as the answer here: Popoff's rule gives ethanoic acid as the acid that retains the carbonyl carbon with the smaller group.

C. correct: by Popoff's rule, pentan-2-one oxidises so that the carbonyl carbon stays with the smaller (methyl) group, giving ethanoic acid.

D. wrong: the ketone is cleaved on oxidation, so no pentanoic acid is formed.

Question 24 If medulla oblongata of a persons

If medulla oblongata of a person’s brain is damaged which of the following process will be disturbed?

- A. Thinking
- B. Sleep
- C. Thirst
- D. Swallowing ✓ **Correct answer**

A. wrong: thinking is a function of the cerebrum, not the medulla.

B. wrong: sleep is regulated mainly by the hypothalamus and pons.

C. wrong: thirst is regulated by the hypothalamus.

D. correct: the medulla oblongata controls involuntary actions including swallowing, breathing and heartbeat.

25 Otitis media is an inflammation of

Otitis media is an inflammation of which part of the body?

- A. Brain
- B. Middle ear ✓ **Correct answer**
- C. Lungs
- D. Urinary tract

A. wrong: inflammation of the brain is encephalitis.

B. correct: otitis media is inflammation of the middle ear.

C. wrong: inflammation of the lungs is pneumonia.

D. wrong: inflammation of the urinary tract is a urinary tract infection.

Question 26 In which of the following disorders

In which of the following disorders the structure and function of normal spinal cord is damaged?

- A. Arthritis
- B. Sciatica
- C. Spondylosis ✓ **Correct answer**
- D. Disc slip

A. wrong: arthritis is inflammation of the joints, not damage to the spinal cord.

B. wrong: sciatica is pain along the sciatic nerve, not damage to the spinal cord itself.

C. correct: spondylosis is degeneration of the spine that damages the structure and function of the spinal cord.

D. wrong: a slipped disc compresses a nerve root, but the disorder named for spinal cord damage here is spondylosis.

27 A stationary nucleus has nucleon number

A stationary nucleus has nucleon number A. The nucleus decays by emitting a proton with speed “v” to form a new nucleus with speed u. The new nucleus and the proton move away from one another in opposite directions. Which equation gives “v” in terms of A and u?

- A. v = (A/4 – 1)u
- B. v = (A – 1)u ✓ **Correct answer**
- C. v = Au
- D. v = (A + 1)u

A. wrong: this does not follow from conservation of momentum.

B. correct: by conservation of momentum, 1 × v = (A − 1) × u, since the new nucleus has nucleon number A − 1 and the proton has nucleon number 1.

C. wrong: this ignores the proton lost from the nucleus.

D. wrong: this adds the proton instead of subtracting it.

Question 28 A person travelling on a motorway

A person, travelling on a motorway a total distance of 200 km, travels the first 90 km at an average speed of 80 km/hr. Which average speed must be obtained for the rest of the journey if the person is to reach the destination in a total time of 2 hours 0 minutes?

- A. 110 km/hr
- B. 120 km/hr
- C. 122 km/hr
- D. 126 km/hr ✓ **Correct answer**

A. wrong: the remaining 110 km must be covered in less than one hour.

B. wrong: this is too slow for the time left.

s is slightly too slow.

D. correct: the first 90 km take 90/80 = 1.125 h, leaving 0.875 h for the remaining 110 km, so the speed needed is 110/0.875 ≈ 126 km/h.

Question 29 An object of mass m travelling

An object of mass “m” travelling with speed “v” has a head-on collision with another object of mass “m” travelling with speed “v” in the opposite direction, the objects stick together after the collision. What is the total loss of kinetic energy in the collision?

- A. 0
- B. ½ mv2
- C. mv2 ✓ **Correct answer**
- D. 2mv2

A. wrong: kinetic energy is lost in a perfectly inelastic collision.

B. wrong: the initial kinetic energy is mv^2, and all of it is lost.

C. correct: the initial kinetic energy is $\frac{1}{2}mv^2 + \frac{1}{2}mv^2 = mv^2$, and after the objects stick together the total momentum is zero, so the final kinetic energy is zero — the loss is mv^2.

D. wrong: $2mv^2$ is twice the initial kinetic energy.

Question 30 He asked me what my name

He asked me what my name was and what I did. [Direct form of the sentence is:]

- A. He said to me, “What was my name and what did I do?”
- B. He said to me, “What is your name and what do you do?” ✓ **Correct answer**
- C. He said to me, “What my name was and what I did?”
- D. He said to me, “What his name was and what did he do?”

A. wrong: the direct form must use the second person (your) and the present tense.

the direct form, "my name was" becomes "your name is" and "what I did" becomes "what you do".

C. wrong: this keeps the indirect word order and tense.

D. wrong: the pronouns and tense are wrong for the direct form.

Question 31 Four beakers containing ethanol ethanal propanone

Four beakers containing ethanol, ethanal, propanone and phenol separately. Aqueous bromine was added to each beaker. A white ppt was produced in one beaker. This beaker contains:

- A. Ethanol
- B. Phenol ✓ **Correct answer**
- C. Ethanal
- D. Propanone

A. wrong: aqueous bromine gives no white precipitate with ethanol.

B. correct: bromine water reacts with phenol to give a white precipitate of 2,4,6-tribromophenol.

C. wrong: ethanal gives no white precipitate with bromine water.

D. wrong: propanone gives no white precipitate with bromine water.

Question 32 To differentiate between the white ppt

To differentiate between the white ppt of AgCl and off-white ppt of AgBr we use:

- A. Dil. solution of NaOH
- B. Dil. solution of Pb(NO3)2
- C. Dil. solution of NH3 ✓ **Correct answer**
- D. Dil. solution of FeCl3

dium hydroxide does not distinguish the two precipitates.

B. wrong: lead nitrate does not distinguish AgCl from AgBr.

C. correct: AgCl dissolves in dilute ammonia (forming the soluble diammine silver complex) while AgBr does not, so dilute ammonia distinguishes them.

D. wrong: ferric chloride does not distinguish the two precipitates.

Question 33 CH3CH2NH2 C2H5COC2H5 Product

CH3CH2NH2 + C2H5–CO–C2H5 → Product:

- A. Schiff's base ✓ **Correct answer**
- B. Diazonium salt
- C. Amide
- D. Imine + Amide

A. correct: a primary amine condenses with a ketone to give a Schiff's base (an imine).

B. wrong: diazonium salts form from aromatic amines with nitrous acid, not from this reaction.

C. wrong: no amide is formed from an amine and a ketone.

D. wrong: only the imine (Schiff's base) is formed, not an amide.

Question 34 If the primer annealing temperature is

If the primer annealing temperature is increased to 94°C. What will happen?

- A. Annealing
- B. Extension
- C. No annealing ✓ **Correct answer**
- D. Primer-dimer formation

A. wrong: 94°C is the denaturation temperature, not the annealing temperature.

tension occurs at about 72 °C.

C. correct: at 94°C the primer cannot anneal to the template — the DNA is denatured at that temperature, so no annealing takes place.

D. wrong: primer-dimers form at low annealing temperatures, not at 94°C.

Question 35 Choose acids that are showing leveling

Choose acids that are showing leveling effect. i) HClO4 ii) HI iii) HCl iv) HF

- A. i & iv
- B. i, iii, & iv
- C. iii & iv
- D. i, ii, & iii ✓ **Correct answer**

A. wrong: HF is a weak acid and is not levelled, so iv does not belong.

B. wrong: HF (iv) is not levelled.

C. wrong: HF (iv) is not levelled and HI (ii) is missing.

D. correct: HClO4, HI and HCl are all strong acids and are levelled by water to the same strength; HF is weak and is not levelled.

Question 36 The experiments by Hershey and Chase

The experiments by Hershey and Chase helped confirm that DNA was the hereditary material on the basis of the finding that:

- A. Radioactive phage were found in the pellet
- B. Radioactive cells were found in the supernatant
- C. Radioactive sulfur was found inside the cell
- D. Radioactive phosphorus was found in the cell ✓ **Correct answer**

A. wrong: the phage (protein coats) stayed in the supernatant.

e infected cells were in the pellet.

C. wrong: sulfur labels protein, which stayed outside the cell.

D. correct: 32P labels DNA, and the radioactive phosphorus was found inside the infected cells, confirming that DNA is the hereditary material.

Question 37 How many nucleotides are in 12

How many nucleotides are in 12 mRNA codons?

- A. 12
- B. 24
- C. 36 ✓ **Correct answer**
- D. 48

A. wrong: 12 is the number of codons, not of nucleotides.

B. wrong: 24 would be two nucleotides per codon.

C. correct: each codon has 3 nucleotides, so 12 codons have 12 × 3 = 36 nucleotides.

D. wrong: 48 would be four nucleotides per codon.

Question 38 Which of the following is the

Which of the following is the suitable vector to be incorporated with the large external DNA fragment?

- A. Small size vector ✓ **Correct answer**
- B. Large size vector
- C. Large size vector with no origin of replication
- D. Small size vector with no origin of replication

A. correct: the textbook lists small size as a property of a suitable vector (a small vector is easily manipulated and replicated).

large vector is harder to manipulate and is not the textbook's stated property.

C. wrong: a vector without an origin of replication cannot replicate.

D. wrong: a vector must have an origin of replication to replicate inside the host.

Question 39 A value for the acceleration of

A value for the acceleration of free fall on earth is given as (10 ± 2) m s-2. Which statement is correct?

- A. The value is accurate but not precise. ✓ **Correct answer**
- B. The value is both accurate and precise.
- C. The value is neither precise nor accurate.
- D. The value is precise but not accurate.

A. correct: 10 m/s^2 is close to the true value (9.81 m/s^2), so it is accurate, but the uncertainty of ±2 is large, so it is not precise.

B. wrong: the large uncertainty means it is not precise.

C. wrong: 10 is close to the true value, so it is accurate.

D. wrong: the value is accurate and the uncertainty is large, so it is not precise.

Question 40 Which experimental technique reduces the systematic

Which experimental technique reduces the systematic error of the quantity being investigated?

- A. Adjusting an ammeter to remove its zero error before measuring a current. ✓ **Correct answer**
- B. Measuring several inter-nodal distances on a standing wave to find the mean inter-nodal distance.
- C. Measuring the diameter of a wire repeatedly and calculating the average.
- D. Timing a large number of oscillations to find a period.

zero error is a systematic error, and removing it before measuring reduces the systematic error.

B. wrong: averaging repeated measurements reduces random error, not systematic error.

C. wrong: averaging reduces random error, not systematic error.

D. wrong: timing many oscillations reduces random error, not systematic error.

Question 41 A metal sphere of radius r

A metal sphere of radius r is dropped into a tank of water. As it sinks at speed v, it experiences a drag force F given by F = krv, where k is a constant. What are the SI base units of k?

- A. kg m2 s-1
- B. kg m2 s-2
- C. kg m-1 s-1 ✓ **Correct answer**
- D. kg m s-2

A. wrong: this has the wrong powers of m and s.

B. wrong: this is the unit of energy, not of k.

C. correct: from F = krv, k = F/(rv), so its units are N/(m·m/s) = (kg·m/s^2)/(m^2/s) = kg·m^{-1}·s^{-1}.

D. wrong: this is the unit of force, not of k.

Question 42 Choose the correct sentence

Choose the correct sentence.

- A. How long your wearing glasses?
- B. How long do you wear the glasses?
- C. How long you wear glasses?
- D. How long have you been wearing glasses? ✓ **Correct answer**

e word order and verb form are wrong.

B. wrong: this asks about a habit, not about the duration up to now.

C. wrong: the word order is wrong.

D. correct: the present perfect continuous is used for an action that started in the past and continues to the present.

Question 43 A Carnot engine working between 200

A Carnot engine working between 200 K and 400 K has a work output of 600 J per cycle. How much heat energy is supplied to the engine from the source in each cycle?

- A. 1400 J
- B. 1200 J ✓ **Correct answer**
- C. 1700 J
- D. 1300 J

A. wrong: this does not follow from the Carnot efficiency.

B. correct: the efficiency is $\eta = 1 - 200/400 = 0.5$, and $W = \eta \cdot Q_h$, so $Q_h = 600/0.5 = 1200$ J.

C. wrong: this does not follow from the efficiency.

D. wrong: this does not follow from the efficiency.

Question 44 What happens when charge is placed

What happens when charge is placed on a soap bubble?

- A. It collapses
- B. Its radius increases. ✓ **Correct answer**
- C. Its radius decreases.
- D. None of the above.

A. wrong: charging a soap bubble does not collapse it.

like charges spread over the surface repel each other, increasing the surface area and so the radius of the bubble.

C. wrong: repulsion between the charges increases, not decreases, the radius.

D. wrong: the radius does increase.

Question 45 Choose the antonym of the word

Choose the antonym of the word “ABROGATE”.

- A. Transgress
- B. Signify
- C. Alleviate
- D. Ratify ✓ **Correct answer**

A. wrong: transgress means to break a rule, not the opposite of abrogate.

B. wrong: signify means to mean or indicate.

C. wrong: alleviate means to relieve or lessen.

D. correct: abrogate means to repeal or abolish (a law), and ratify means to formally approve it — the opposite.

Question 46 Which ion is stable in aqueous

Which ion is stable in aqueous solution?

- A. Sc3+ ✓ **Correct answer**
- B. Li2+
- C. Ba3+
- D. Na-

A. correct: Sc^{3+} has the stable argon electron configuration and is stable in aqueous solution.

nium does not form a stable +2 ion.

C. wrong: barium does not form a stable +3 ion.

D. wrong: the sodium anion is not stable in aqueous solution.

Question 47 Colloidal particles can be separated by

Colloidal particles can be separated by using:

- A. Ordinary filter paper
- B. Coarse filter paper
- C. Fine filter paper
- D. Extremely fine filter paper ✓ **Correct answer**

A. wrong: colloidal particles pass through ordinary filter paper.

B. wrong: colloidal particles pass through coarse filter paper.

C. wrong: colloidal particles pass through fine filter paper.

D. correct: colloidal particles are separated by ultrafiltration, using extremely fine filter paper (or a semipermeable membrane).

Question 48 Consider the following reaction 2FeCl3aq 6KIaq

Consider the following reaction: 2FeCl3(aq) + 6KI(aq) → 2FeI2(aq) + 6KCl(aq) + I2(s) Rate = [FeCl3]1 [KI]2 Choose the correct molecularity and the order of reaction respectively.

- A. 2 and 2
- B. 6 and 2
- C. 8 and 3 ✓ **Correct answer**
- D. 8 and 2

A. wrong: neither the molecularity nor the order is 2.

B. wrong: the molecularity is 8 and the order is 3.

olecularity is the sum of the stoichiometric coefficients of the reactants, 2 + 6 = 8, and the order is the sum of the powers in the rate law, 1 + 2 = 3.

D. wrong: the order is 3, not 2.

Question 49 Which of the following nutrients is

Which of the following nutrients is incorrectly paired with its function in plant?

- A. Iron – cytochromes and chlorophyll
- B. Molybdenum – cell permeability ✓ **Correct answer**
- C. Cobalt – required by nitrogen fixers
- D. Calcium – formation of cell wall

A. wrong as the incorrect pairing: iron is correctly paired with cytochromes and chlorophyll synthesis.

B. correct as the incorrect pairing: molybdenum is needed for nitrate reductase and nitrogen fixation, not for cell permeability.

C. wrong as the incorrect pairing: cobalt is correctly required by nitrogen-fixing bacteria.

D. wrong as the incorrect pairing: calcium is correctly paired with cell-wall formation (calcium pectate).

Question 50 Which cells are responsible for movement

Which cells are responsible for movement of sugar as per mass flow hypothesis?

- A. Tracheids, vessel elements
- B. Tracheids, companion cells
- C. Vessel elements, companion cells
- D. Companion cells, sieve tubes ✓ **Correct answer**

A. wrong: tracheids and vessel elements carry water, not sugar.

C. wrong: vessel elements carry water, not sugar.

D. correct: in the mass flow hypothesis, sugar moves through the sieve tubes, loaded and maintained by the companion cells.

Question 51 After buying green bananas or unripe

After buying green bananas or unripe avocados, they can be kept in a brown bag to ripen. The hormone released by the fruit and trapped in the bag is probably:

- A. Abscisic acid
- B. Cytokinin
- C. Ethylene ✓ **Correct answer**
- D. Gibberellic acid

A. wrong: abscisic acid promotes dormancy and leaf fall, not ripening.

B. wrong: cytokinin promotes cell division, not ripening.

C. correct: ethylene is the gaseous plant hormone that ripens fruit; trapping it in the bag speeds ripening.

D. wrong: gibberellic acid promotes stem elongation and seed germination, not ripening.

Question 52 For the location detection of a

For the location / detection of a gene in a DNA library which of the following is used?

- A. Primer
- B. Probe ✓ **Correct answer**
- C. Restriction enzyme
- D. Taq polymerase

A. wrong: a primer starts DNA synthesis; it is not used to locate a gene in a library.

labelled DNA probe hybridises with its complementary sequence and so locates the gene in a DNA library.

C. wrong: restriction enzymes cut DNA; they do not locate genes.

D. wrong: Taq polymerase copies DNA in PCR; it does not locate genes.

Question 53 Under UV illuminator DNA bands are

Under UV illuminator, DNA bands are seen in agarose gel due to which of the following?

- A. Agarose
- B. Charge in DNA
- C. Fluorescent dye ✓ **Correct answer**
- D. Radioactive dye

A. wrong: agarose is only the gel matrix.

B. wrong: the charge moves the DNA through the gel; it does not make the bands visible.

C. correct: the DNA is stained with a fluorescent dye (ethidium bromide), which glows under UV light so the bands are seen.

D. wrong: no radioactive dye is used to see DNA bands in agarose gel electrophoresis.

Question 54 When a car travelling with constant

When a car travelling with constant velocity passes a stationary observer, the observer hears a change in the frequency of sound emitted by the car. Which statement is correct?

- A. The change in frequency is greater as a car moves away than as it approaches.
- B. The greater the speed of the car, the greater the change in observed frequency. ✓ **Correct answer**
- C. The observed frequency is lower as the car moves toward the observer and higher as the car moves away from the observer.

volume of the sound heard by the observer does not change as the car approaches.

A. wrong: the magnitude of the Doppler shift is the same on approach and recession for the same speed.

B. correct: the Doppler shift is proportional to the speed of the source, so a faster car gives a greater change in observed frequency.

C. wrong: it is the reverse — higher on approach, lower on recession.

D. wrong: the volume (loudness) increases as the car approaches.

Question 55 A parachutist is falling at constant

A parachutist is falling at constant terminal velocity. Which statement is not correct?

- A. Gravitational potential energy is converted into kinetic energy of the air.
- B. Gravitational potential energy is converted into kinetic energy of the parachutist. ✓ **Correct answer**
- C. Gravitational potential energy is converted into thermal energy of the air.
- D. Gravitational potential energy is converted into thermal energy of the parachutist.

A. wrong as the incorrect statement: at terminal velocity the parachutist's kinetic energy is constant, and the lost potential energy does go into the kinetic and thermal energy of the air.

B. correct as the incorrect statement: the parachutist falls at constant terminal velocity, so his kinetic energy does not increase.

C. wrong as the incorrect statement: air resistance does convert potential energy into thermal energy of the air.

D. wrong as the incorrect statement: friction does warm the parachutist.

Question 56 The time period of the simple

The time period of the simple pendulum is 2 seconds. If its length is increased by 4 times, then its period becomes:

- A. 16 s
- B. 12 s
- C. 8 s
- D. 4 s ✓ **Correct answer**

A. wrong: the period is proportional to the square root of the length, not to the length.

B. wrong: this does not follow from the square-root relation.

C. wrong: this is four times the period, not twice it.

D. correct: $T = 2\pi\sqrt{(L/g)}$, so increasing L by 4 times multiplies T by $\sqrt{4} = 2$, giving $2 \times 2 = 4$ s.

Question 57 Choose the correct sentence

Choose the correct sentence.

- A. The village folk were present. ✓ **Correct answer**
- B. The village folk was present.
- C. The village folks were present.
- D. The village folks was present.

A. correct: "folk" is a plural noun, so it takes the plural verb "were".

B. wrong: "folk" is plural, so "was" is wrong.

C. wrong: "folks" is not the correct plural form here.

D. wrong: both the noun form and the verb are wrong.

Question 58 The number of chiral centres in

The number of chiral centres in a molecule of 5-bromo-3-chlorohexan-2-ol is/are:

- A. 1
- B. 3 ✓ **Correct answer**
- C. 2
- D. 5

A. wrong: there are three chiral centres, not one.

B. correct: in 5-bromo-3-chlorohexan-2-ol, C-2 (bearing OH), C-3 (bearing Cl) and C-5 (bearing Br) are all chiral centres — three in total.

C. wrong: there are three chiral centres.

D. wrong: only three of the six carbons are chiral.

Question 59 Which group when attached to benzene

Which group when attached to benzene will increase its reactivity?

- A. –NHR ✓ **Correct answer**
- B. –$NH3^{+}$
- C. –C≡N
- D. –COR

A. correct: the –NHR group donates electrons into the ring by resonance, activating the benzene ring toward electrophilic substitution.

B. wrong: the –$NH3^{+}$ group withdraws electrons and deactivates the ring.

C. wrong: the cyano group withdraws electrons and deactivates the ring.

D. wrong: the acyl group withdraws electrons and deactivates the ring.

60 The compound which has purely acidic

The compound which has purely acidic character is:

- A. Mg(OH)2
- B. Al(OH)3
- C. Si(OH)4 ✓ **Correct answer**
- D. None of the above

A. wrong: magnesium hydroxide is basic.

B. wrong: aluminium hydroxide is amphoteric, not purely acidic.

C. correct: silicic acid, Si(OH)4, is purely acidic.

D. wrong: Si(OH)4 is purely acidic.

Question 61 Which of the following is a

Which of the following is a non-sense codon?

- A. UGA ✓ **Correct answer**
- B. UAU
- C. CAU
- D. GAU

A. correct: UGA is a stop (non-sense) codon, which does not code for any amino acid.

B. wrong: UAU codes for tyrosine.

C. wrong: CAU codes for histidine.

D. wrong: GAU codes for aspartic acid.

Question 62 If a disorder is not present

If a disorder is not present in a child’s family but the fetus itself is infected before birth, it

- A. Somatic mutation
- B. Hereditary mutation
- C. Germ line mutation
- D. De novo mutation ✓ **Correct answer**

A. wrong: a somatic mutation occurs in body cells after birth, not in the fetus before birth.

B. wrong: a hereditary mutation is inherited from a parent.

C. wrong: a germ-line mutation is present in the parents' germ cells.

D. correct: a mutation that appears for the first time in the fetus, with no family history, is a de novo (new) mutation.

Question 63 What will happen if a nucleotide

What will happen if a nucleotide is deleted from a gene having 9 nucleotides in its transcriptional unit?

- A. Change in phenotype ✓ **Correct answer**
- B. No change in phenotype
- C. Synthesis of 3 amino acids
- D. Synthesis of 4 amino acids

A. correct: deleting one nucleotide from a 9-nucleotide gene causes a frameshift, changing the amino acid sequence and so the phenotype.

B. wrong: a frameshift changes the protein.

C. wrong: the deletion changes the reading frame, so the protein is altered, not simply shortened to 3 amino acids.

D. wrong: 9 nucleotides code for 3 amino acids, not 4.

64 Work function for a certain surface

Work function for a certain surface is 3.26 eV. Minimum frequency light must have in order to eject electron from surface will be:

- A. 1.6 × 10^15 Hz
- B. 3.2 × 10^15 Hz
- C. 4.8 × 10^15 Hz
- D. 6.4 × 10^15 Hz

No answer is given for this question, and none is taught. NO CORRECT OPTION — DEFECTIVE-excluded (decided by assistant under owner's 8 Nov 2026 delegation)

A. Cannot be correct: the threshold frequency is $f_0 = \varphi/h$ = 3.26 eV / 4.14 × 10^-15 eV·s ≈ 7.9 × 10^14 Hz, not 1.6 × 10^15 Hz.

B. Cannot be correct: the threshold frequency is about 7.9 × 10^14 Hz.

C. Cannot be correct: the threshold frequency is about 7.9 × 10^14 Hz.

D. Cannot be correct: the threshold frequency is about 7.9 × 10^14 Hz; the printed key records D, but D is wrong by a factor of about 8. (DEFECTIVE-excluded: the work function 3.26 eV gives a threshold frequency $f_0 = \varphi/h \approx 7.9 \times 10^{14}$ Hz, which is not among the options (all × 10^15 Hz), and the printed key D (6.4 × 10^15 Hz) does not match the calculation. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 65 The units of Plancks constant are

The units of Planck’s constant are the same as that of:

- A. Angular momentum ✓ **Correct answer**
- B. Work
- C. Force
- D. Torque

A. correct: Planck's constant h has units of energy × time (J·s), the same as angular

B. wrong: work has units of joules, not joule-seconds.

C. wrong: force has units of newtons.

D. wrong: torque has units of newton-metres.

Question 66 A radioactive substance has a half-life

A radioactive substance has a half-life of 60 minutes. During 3 hours, the percentage of the material that decayed would be:

- A. 12.5%
- B. 87.5% ✓ **Correct answer**
- C. 8.5%
- D. 25.1%

A. wrong: 12.5% is the fraction remaining, not the fraction decayed.

B. correct: 3 hours is 3 half-lives, so the fraction remaining is $(1/2)^3 = 1/8 = 12.5\%$, and the fraction decayed is $100 - 12.5 = 87.5\%$.

C. wrong: this does not follow from the half-life.

D. wrong: this does not follow from the half-life.

Question 67 While the city has earned record

While the city has earned record revenue this year, ____ well behind in exports:

- A. it still lag
- B. it still lags ✓ **Correct answer**
- C. it lag still
- D. it lags still

A. wrong: the subject "it" needs the third-person singular "lags".

: still lags well behind in exports" is grammatically correct.

C. wrong: both the verb form and the word order are wrong.

D. wrong: the adverb "still" must come before the verb.

Question 68 The compound which can be hydrolyzed

The compound which can be hydrolyzed by means of water is:

- A. CCl_4
- B. $SiCl_4$ ✓ **Correct answer**
- C. CH_4
- D. None of the above

A. wrong: carbon tetrachloride is not hydrolysed by water (carbon has no vacant d-orbitals).

B. correct: silicon tetrachloride is hydrolysed by water because silicon has vacant d-orbitals that accept the lone pairs of water.

C. wrong: methane is not hydrolysed by water.

D. wrong: $SiCl_4$ is hydrolysed by water.

Question 69 Choose the correct statement about cycloalkanes

Choose the correct statement about cycloalkanes:

- A. Cyclopropane and cyclobutane are liquids at room temperature.
- B. Cycloalkanes are insoluble in ethanol and ether but soluble in water.
- C. Their melting and boiling points show a gradual increase with increase in molecular weight. ✓ **Correct answer**
- D. Both (B) & (C) are correct

A. wrong: cyclopropane and cyclobutane are gases at room temperature.

cloalkanes are insoluble in water but soluble in organic solvents such as ethanol and ether.

C. correct: like the alkanes, the melting and boiling points of cycloalkanes rise gradually with molecular weight.

D. wrong: statement B is wrong.

Question 70 Which one is a strong nucleophile

Which one is a strong nucleophile?

- A. C6H5–O-
- B. H–O-
- C. NH3
- D. C2H5–O- ✓ **Correct answer**

A. wrong: the phenoxide ion is stabilised by resonance, making it a weaker nucleophile.

B. wrong: the hydroxide ion is a weaker nucleophile than the ethoxide ion.

C. wrong: ammonia is a neutral, weaker nucleophile than the alkoxide ions.

D. correct: the ethoxide ion is the strongest nucleophile of the four — it is a strong base with no resonance stabilisation.

Question 71 Choose the correct arrangement of the

Choose the correct arrangement of the various regions of the electromagnetic spectrum in terms of wavelength.

- A. IR > UV > visible > microwave > radio frequency
- B. Microwave > IR > visible > UV > radio frequency
- C. Radio frequency > microwave > IR > visible > UV ✓ **Correct answer**
- D. Visible > IR > UV > microwave > radio wave

e order is scrambled.

B. wrong: radio waves have the longest wavelength, not the shortest.

C. correct: in order of decreasing wavelength, radio waves > microwaves > infrared > visible light > ultraviolet.

D. wrong: the order is scrambled.

Question 72 If one of the following components

If one of the following components is missing, bacteria cannot increase the number of its plasmid copies.

- A. Antibiotic resistance gene
- B. Origin of replication ✓ **Correct answer**
- C. Cloning site
- D. Ligase enzymes

A. wrong: the resistance gene is a selectable marker, not what increases the plasmid copy number.

B. correct: without an origin of replication the plasmid cannot replicate, so the bacteria cannot increase the number of plasmid copies.

C. wrong: the cloning site is where foreign DNA is inserted, not what drives replication.

D. wrong: ligase joins DNA fragments; it does not increase the plasmid copy number.

Question 73 Identify the mismatched pair in the

Identify the mismatched pair in the following:

- A. Cyanobacteria – primary producer
- B. Grasshopper – primary consumer
- C. Fungi – decomposer

plankton – secondary consumer ✓ **Correct answer**

A. wrong as the mismatched pair: cyanobacteria are correctly primary producers.

B. wrong as the mismatched pair: grasshoppers eat plants, so they are correctly primary consumers.

C. wrong as the mismatched pair: fungi are correctly decomposers.

D. correct as the mismatched pair: zooplankton eat phytoplankton (producers), so they are primary consumers, not secondary consumers.

Question 74 What will happen if a vector

What will happen if a vector (plasmid) is cut with a different restriction enzyme than the one which cuts the external DNA to be incorporated in the vector (plasmid)?

- A. Ligation
- B. No ligation ✓ **Correct answer**
- C. Tight ligation
- D. Cloning

A. wrong: ligation cannot occur because the ends are incompatible.

B. correct: cutting the vector and the foreign DNA with different restriction enzymes produces incompatible (non-complementary) ends, so no ligation takes place.

C. wrong: no ligation at all takes place.

D. wrong: cloning requires ligation first, which does not happen here.

Question 75 The acceleration of free fall on

The acceleration of free fall on the Moon is one-sixth of that on Earth. On Earth, it takes time ‘t’ for a stone to fall from rest a distance of 2 m. What is the time taken for a stone to fall from rest a distance of 2 m on the Moon?

- B. t/6
- C. t√6 ✓ **Correct answer**
- D. t/√2

A. wrong: the time increases by √6, not by 6.

B. wrong: the weaker gravity makes the fall slower, not faster.

C. correct: the time to fall a distance h is t = √(2h/g), and with g_moon = g/6 the time becomes t√6.

D. wrong: this does not follow from the one-sixth gravity.

Question 76 Before a thunderstorm hair stands on

Before a thunderstorm, hair stands on end. A hair with mass 0.50 mg and charge 1.0 pC is supported only by the electric force. What is the electric field strength?

- A. 4.9 × 10^3 N C-1
- B. 4.9 × 10^5 N C-1
- C. 4.9 × 10^6 N C-1 ✓ **Correct answer**
- D. 4.9 × 10^9 N C-1

A. wrong: this is a thousand times too small.

B. wrong: this is ten times too small.

C. correct: the electric force balances the weight, qE = mg, so E = mg/q = (0.50 × 10^-6 kg × 9.8 m/s^2)/(1.0 × 10^-12 C) = 4.9 × 10^6 N/C.

D. wrong: this is a thousand times too large.

Question 77 Two lamps are connected in series

Two lamps are connected in series to a 250 V power supply. One lamp is rated 240 V, 60

ther rated 10 V, 2.5 W. Which statement most accurately describes what happens?

- A. Both lamps light at less than their normal brightness.
- B. Both lamps light at their normal brightness. ✓ **Correct answer**
- C. Only the 240 V lamp lights.
- D. The 10 V lamp blows.

A. wrong: both lamps receive their rated voltage.

B. correct: the 240 V, 60 W lamp has resistance $240^2/60 = 960\ \Omega$ and the 10 V, 2.5 W lamp has resistance $10^2/2.5 = 40\ \Omega$; in series the total is $1000\ \Omega$, the current is $250/1000 = 0.25$ A, so the lamps get 240 V and 10 V respectively — their rated voltages.

C. wrong: both lamps light.

D. wrong: the 10 V lamp receives exactly its rated 10 V.

Question 78 Every person must learn

Every person must learn ____.

- A. that how wisely his time can be used
- B. to make wise use of his time ✓ **Correct answer**
- C. that this time need a wise uses
- D. to using his time in a wisely manner

A. wrong: this is ungrammatical.

B. correct: "Every person must learn to make wise use of his time" is the correct idiom.

C. wrong: this is ungrammatical.

D. wrong: "to using" and "in a wisely manner" are both ungrammatical.

79 In movies during fight a blood

In movies during fight a blood red solution is used as an artificial blood. Which of the following complex ions is used for this solution?

- A. [Fe(H2O)6]2+
- B. [Cu(NH3)4(H2O)2]2+
- C. [Fe(SCN)(H2O)5]2+ ✓ **Correct answer**
- D. [Fe(H2O)6]3+

A. wrong: the hexaaquairon(II) ion is pale green, not blood red.

B. wrong: the tetraamminecopper(II) ion is deep blue, not blood red.

C. correct: the iron(III) thiocyanate complex is blood red and is used as artificial blood in films.

D. wrong: the hexaaquairon(III) ion is pale violet-yellow, not blood red.

Question 80 The compound which can form hydrogen

The compound which can form hydrogen bond with water is:

- A. CH3–O–CH3
- B. CH3–CH2–OH ✓ **Correct answer**
- C. CH3–CH2–NH2
- D. None of the above

A. Wrong: dimethyl ether cannot donate a hydrogen bond to water (it has no O–H or N–H bond).

B. Also correct on the facts: ethanol donates a hydrogen bond to water through its O–H group.

C. Correct per the printed key: ethylamine donates a hydrogen bond to water through its N–H group.

both ethanol and ethylamine form hydrogen bonds with water. (PICK-ONE: the printed key records B/C — both ethanol (B) and ethylamine (C) form hydrogen bonds with water, so both are correct; the key itself states both options are correct. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 81 The compound with most exothermic lattice

The compound with most exothermic lattice energy is:

- A. $CaCl_2$
- B. K_2O
- C. CaO ✓ **Correct answer**
- D. $BaCl_2$

A. wrong: calcium chloride has a less exothermic lattice energy than calcium oxide.

B. wrong: potassium oxide has singly charged ions, so its lattice energy is less exothermic.

C. correct: calcium oxide has doubly charged ions (Ca^{2+} and O^{2-}) of small size, giving the most exothermic lattice energy of the four.

D. wrong: barium chloride has a less exothermic lattice energy than calcium oxide.

Question 82 Sarcolemma is the membrane around

Sarcolemma is the membrane around:

- A. Bone
- B. Joints
- C. Muscle fiber ✓ **Correct answer**
- D. Heart

A. wrong: the membrane around a bone is the periosteum.

B. wrong: joints are covered by cartilage, not by the sarcolemma.

e sarcolemma is the cell membrane around a muscle fibre.

D. wrong: the membrane around the heart is the pericardium.

Question 83 The deficiency of calcitonin results in

The deficiency of calcitonin results in:

- A. Bone formation
- B. Kidney stone ✓ **Correct answer**
- C. Hyperthyroidism
- D. Hypothyroidism

A. wrong: calcitonin deficiency does not cause bone formation.

B. correct: calcitonin lowers blood calcium; its deficiency raises blood calcium, which can lead to kidney stones.

C. wrong: hyperthyroidism is overactivity of the thyroid, not a calcitonin deficiency.

D. wrong: hypothyroidism is underactivity of the thyroid, not a calcitonin deficiency.

Question 84 In which of the following are

In which of the following are the female workers sterile?

- A. Ants ✓ **Correct answer**
- B. Honeybee
- C. Baboon
- D. Parrots

A. Correct per the printed key: in ants the female workers are sterile.

B. Also correct on the facts: in honeybees the female workers are sterile.

C. Wrong: baboon females are fertile.

arrot females are fertile. (PICK ONE: the printed key records A/B — both ants (A) and honeybees (B) have sterile female workers, so both are correct; the key itself states both options are correct. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 85 If in solution some bacteria infected

If in solution some bacteria infected by a certain phage had somehow developed the ability to make a particular amino acid that was not in their genes before. What would be the possible explanation for this new ability?

- A. Induction
- B. Transformation
- C. Transduction ✓ **Correct answer**
- D. Conjugation

A. wrong: induction is the activation of a prophage, not the transfer of a new gene.

B. wrong: transformation is the uptake of naked DNA, not phage-mediated transfer.

C. correct: transduction is the transfer of bacterial genes from one bacterium to another by a bacteriophage.

D. wrong: conjugation is direct cell-to-cell transfer through a pilus, not phage-mediated.

Question 86 Identify in which of the following

Identify in which of the following the genetic information is catalyzed using reverse transcription:

- A. Protein → DNA
- B. RNA → DNA ✓ **Correct answer**
- C. DNA → RNA
- D. RNA → Protein

otein is never reverse-transcribed into DNA.

B. correct: reverse transcription is the synthesis of DNA from an RNA template, catalysed by reverse transcriptase.

C. wrong: DNA to RNA is ordinary transcription.

D. wrong: RNA to protein is translation.

Question 87 Which one is not an opportunistic

Which one is not an opportunistic disease related to HIV infection?

- A. Destruction of body immune system ✓ **Correct answer**
- B. Recurrent pneumonia
- C. Pulmonary tuberculosis
- D. Toxoplasmosis

A. correct as the exception: the destruction of the immune system is the underlying effect of HIV, not an opportunistic disease.

B. wrong as the exception: recurrent pneumonia is an opportunistic disease in HIV infection.

C. wrong as the exception: tuberculosis is an opportunistic disease in HIV infection.

D. wrong as the exception: toxoplasmosis is an opportunistic disease in HIV infection.

Question 88 A tuning fork A produces 4

A tuning fork A produces 4 beats/second with another tuning fork B of frequency 280 Hz. When fork A is loaded with a little wax, the beat frequency changes to 2. The frequency of fork A before loading is:

- A. 292 Hz
- B. 284 Hz ✓ **Correct answer**

Hz

- D. 288 Hz

A. wrong: loading with wax lowers the frequency, so the original frequency cannot be 292 Hz.

B. correct: fork A is 276 or 284 Hz (4 beats with 280 Hz); loading lowers its frequency, and the beat frequency falls to 2, so A must have been 284 Hz (lowered to 282 Hz, giving 2 beats with 280 Hz).

C. wrong: 290 Hz would give 10 beats with 280 Hz.

D. wrong: 288 Hz would give 8 beats with 280 Hz.

Question 89 The sound waves of frequency more

The sound waves of frequency more than 20 kHz are termed as:

- A. Supersonic
- B. Audible
- C. Infrasonic
- D. Ultrasonic ✓ **Correct answer**

A. wrong: supersonic describes speeds above the speed of sound, not sound frequencies.

B. wrong: audible sound is 20 Hz to 20 kHz.

C. wrong: infrasonic sound is below 20 Hz.

D. correct: sound of frequency above 20 kHz is ultrasonic.

Question 90 The refractive index is equal to

The refractive index is equal to the tangent of the angle of polarization. It is called:

- A. Brewster’s law ✓ **Correct answer**
- B. Malus’s law

gg's law
- D. Grimaldi's law

A. correct: Brewster's law states that the refractive index equals the tangent of the polarising angle.

B. wrong: Malus's law describes the intensity of polarised light through an analyser.

C. wrong: Bragg's law describes X-ray diffraction by crystals.

D. wrong: Grimaldi is associated with diffraction, not with the polarising angle.

Question 91 He is busy Would you like

"He is busy. Would you like to leave a message?" said the assistant. [Indirect form of the sentence is:]

- A. The assistant told that he is busy and asked me to leave a message. ✓ **Correct answer**
- B. The assistant told that he is busy and ask me to leave a message.
- C. The assistant told that he was busy and asked me to leave a message.
- D. The assistant told that he was busy and asked me to leave a message.

A. wrong: the indirect form must shift "is" to "was".

B. wrong: "ask" should be "asked" and "is" should be "was".

C. correct: the present tense shifts to the past ("is" → "was") and the request becomes "asked me to leave a message".

D. This prints identically to C in the source, so it states the same correct sentence; the printed key records C. (Noted: options C and D are identical as printed in the source; the answer is unambiguous since both state the same sentence.)

92 The less energetic and more stable

The less energetic and more stable compound among the following is:

- A. Cyclobutane
- B. Hex-1-ene
- C. Cyclopropane
- D. Propene ✓ **Correct answer**

A. wrong: cyclobutane is strained and higher in energy.

B. wrong as the answer here: of the two alkenes, the keyed answer is the smaller propene.

C. wrong: cyclopropane is highly strained and higher in energy.

D. correct: propene is the least energetic and most stable of the four compounds listed.

Question 93 Amorphous solids are made by fusing

Amorphous solids are made by fusing silicates with:

- A. Boric acid
- B. Aluminum oxide
- C. Phosphorus pentoxide
- D. All of the above ✓ **Correct answer**

A. wrong on its own: boric acid alone does not make amorphous solids from silicates.

B. wrong on its own: aluminium oxide alone does not make amorphous solids from silicates.

C. wrong on its own: phosphorus pentoxide alone does not make amorphous solids from silicates.

D. correct: amorphous solids (glasses) are made by fusing silicates with boric acid, aluminium oxide or phosphorus pentoxide.

94 What is the product when chlorine

What is the product when chlorine gas is passed over element silicon in powdered state and heated to produce a colorless liquid having formula?

- A. SiCl2
- B. SiCl4 ✓ **Correct answer**
- C. Si2Cl3
- D. SiCl

A. wrong: chlorine reacts with silicon to give silicon tetrachloride, not SiCl2.

B. correct: Si + 2Cl2 → SiCl4, a colourless liquid.

C. wrong: this is not the product.

D. wrong: this is not the product.

Question 95 Compound resistant to thermal decomposition is

Compound resistant to thermal decomposition is:

- A. Li2CO3
- B. NaNO3
- C. Ba(NO3)2
- D. Na2CO3 ✓ **Correct answer**

A. wrong: lithium carbonate decomposes readily on heating.

B. wrong: sodium nitrate decomposes on heating.

C. wrong: barium nitrate decomposes on heating.

D. correct: sodium carbonate is resistant to thermal decomposition (it does not decompose on heating).

96 If CO2 level increases from the

If CO2 level increases from the normal level, what will happen?

- A. Decrease in sea level
- B. Increase in sea level ✓ **Correct answer**
- C. Longer winter season
- D. Daytime will increase

A. wrong: rising CO2 warms the Earth and melts ice, raising the sea level.

B. correct: more CO2 strengthens the greenhouse effect, warming the climate and melting glaciers, which raises the sea level.

C. wrong: global warming shortens winters.

D. wrong: CO2 levels do not change the length of the day.

Question 97 Approximately how many kilocalories of free

Approximately how many kilocalories of free energy are stored in plant biomass for every mole of CO2 fixed during photosynthesis?

- A. 110
- B. 112
- C. 114 ✓ **Correct answer**
- D. 116

A. wrong: the textbook value is 114 kcal.

B. wrong: the textbook value is 114 kcal.

C. correct: about 114 kcal of free energy is stored in plant biomass for every mole of CO2 fixed during photosynthesis.

D. wrong: the textbook value is 114 kcal.

98 Which of the following vaccines has

Which of the following vaccines has least side effects?

- A. Attenuated vaccine
- B. Killed vaccine
- C. Subunit vaccine ✓ **Correct answer**
- D. Toxoid vaccine

A. wrong: live attenuated vaccines carry the most risk of side effects.

B. wrong: killed vaccines have more side effects than subunit vaccines.

C. correct: subunit vaccines contain only part of the pathogen, so they have the least side effects.

D. wrong: toxoid vaccines have more side effects than subunit vaccines.

Question 99 The energy stored in a stretched

The energy stored in a stretched spring is:

- A. Kinetic energy
- B. Electrical energy
- C. Elastic potential energy ✓ **Correct answer**
- D. Solar energy

A. wrong: the energy stored in a stretched spring is potential, not kinetic.

B. wrong: no electrical energy is involved.

C. correct: a stretched spring stores elastic potential energy, $\frac{1}{2}kx^2$.

D. wrong: no solar energy is involved.

100 The kinetic energy and potential energy

The kinetic energy and potential energy of a particle executing simple harmonic motion will be equal for the displacement (where x0 is the amplitude):

- A. x0/√3
- B. x0/2
- C. x0/√2 ✓ **Correct answer**
- D. x0√2

A. wrong: at this displacement the kinetic and potential energies are not equal.

B. wrong: at x0/2 the potential energy is one quarter of the total, not one half.

C. correct: the potential energy is ½kx² and the total energy is ½kx0², so they are equal when $x^2 = x0^2/2$, i.e. $x = x0/\sqrt{2}$.

D. wrong: this displacement is greater than the amplitude, which is impossible.

Question 101 If x-component of a vector is

If x-component of a vector is √3 and y-component is 1, then the angle made by the vector with the x-axis is:

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

A. wrong: 60° would need tan θ = √3, i.e. the y-component larger than the x-component.

B. correct: tan θ = y/x = 1/√3, so θ = 30°.

C. wrong: 45° would need equal components.

D. wrong: 90° would need the x-component to be zero.

102 Which compound will undergo substitution reaction

Which compound will undergo substitution reaction faster than benzene?

- A. Bromobenzene (C6H5–Br)
- B. Aniline (C6H5–NH2) ✓ **Correct answer**
- C. Benzaldehyde (C6H5–CHO)
- D. Nitrobenzene (C6H5–NO2)

A. wrong: bromine deactivates the ring, so bromobenzene reacts more slowly than benzene.

B. correct: the amino group donates electrons into the ring, activating it, so aniline undergoes electrophilic substitution faster than benzene.

C. wrong: the aldehyde group deactivates the ring.

D. wrong: the nitro group strongly deactivates the ring.

Question 103 The IUPAC name of the compound

The IUPAC name of the compound given below (a benzene ring with –NO2 and –COOH on adjacent carbons):

- A. m-nitro benzoic acid
- B. o-nitro benzene methanoic acid ✓ **Correct answer**
- C. o-nitro benzoic acid
- D. None of the above

A. wrong: the nitro group is ortho to the acid group, not meta.

B. correct: the systematic IUPAC name of o-nitrobenzoic acid is 2-nitrobenzenemethanoic acid (benzoic acid is phenylmethanoic acid), with the nitro group ortho to the acid group.

C. wrong as the IUPAC name: this is the retained common name, not the systematic IUPAC name.

e systematic IUPAC name is option B.

Question 104 The first organisms that oxygenated the

The first organisms that oxygenated the atmosphere were:

- A. Cyanobacteria ✓ **Correct answer**
- B. Phototrophic organisms
- C. Anaerobic organisms
- D. All of the above

A. correct: cyanobacteria were the first organisms to oxygenate the atmosphere through photosynthesis.

B. wrong as the answer here: cyanobacteria are the specific first group.

C. wrong: anaerobic organisms do not produce oxygen.

D. wrong: only the cyanobacteria first oxygenated the atmosphere.

Question 105 What event is thought to have

What event is thought to have contributed to the evolution of eukaryotes?

- A. Global warming
- B. Glaciations
- C. Volcanic activity
- D. Oxygenation of the atmosphere ✓ **Correct answer**

A. wrong: global warming did not drive the evolution of eukaryotes.

B. wrong: glaciations did not drive the evolution of eukaryotes.

C. wrong: volcanic activity did not drive the evolution of eukaryotes.

D. correct: the oxygenation of the atmosphere (by cyanobacteria) is thought to have contributed to the evolution of eukaryotes, allowing aerobic respiration.

106 Which of the locomotor organs would

Which of the locomotor organs would likely be the shortest?

- A. A flagellum
- B. A cilium ✓ **Correct answer**
- C. An extended pseudopod
- D. A pellicle

A. wrong: a flagellum is longer than a cilium.

B. correct: a cilium is the shortest of the locomotor organs listed (shorter than a flagellum or an extended pseudopod).

C. wrong: an extended pseudopod is longer than a cilium.

D. wrong: a pellicle is a protective covering, not a locomotor organ.

Question 107 In Youngs double slit experiment with

In Young’s double slit experiment with sodium light, the slits are 0.589 m apart. What is the angular width of the third maximum given λ = 589 nm?

- A. sin-1(3 × 10-6) ✓ **Correct answer**
- B. sin-1(3 × 10-8)
- C. sin-1(3 × 10-6)
- D. sin-1(3 × 10-8)

A. Correct per the printed key: with the printed slit separation d = 0.589 m and λ = 589 nm, sin θ = nλ/d = 3 × 589 × 10^-9 / 0.589 = 3 × 10^-6, so the angular position of the third maximum is $\sin^{-1}(3 \times 10^{-6})$.

B. Wrong: this value does not follow from the given numbers.

C. This prints identically to A in the source, so it states the same correct value.

D. Wrong: this value does not follow from the given numbers. (PICK-ONE: the printed key

— options A and C are identical as printed, so both state the same correct value; the key itself states both options are correct. Note: the printed slit separation of 0.589 m is presumably a misprint for 0.589 mm, but the keyed value follows the numbers as printed. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 108 Which of the following cannot be

Which of the following cannot be polarized?

- A. Radio waves
- B. Ultraviolet rays
- C. X-rays
- D. Ultrasonic waves ✓ **Correct answer**

A. wrong: radio waves are electromagnetic and can be polarised.

B. wrong: ultraviolet rays are electromagnetic and can be polarised.

C. wrong: X-rays are electromagnetic and can be polarised.

D. correct: ultrasonic waves are mechanical (sound) waves, and only transverse waves can be polarised — sound waves are longitudinal, so they cannot be polarised.

Question 109 When a ray of light enters

When a ray of light enters a glass slab from air:

- A. Its wavelength decreases ✓ **Correct answer**
- B. Its wavelength increases
- C. Its frequency increases
- D. Its frequency decreases

A. correct: on entering the denser glass the speed of light falls, and since the frequency is unchanged, the wavelength decreases.

B. wrong: the wavelength decreases in glass.

e frequency of light does not change on refraction.

D. wrong: the frequency of light does not change on refraction.

Question 110 Choose the antonym of the word

Choose the antonym of the word “UNTENABLE”.

- A. Tender
- B. Sheepish
- C. Supportable ✓ **Correct answer**
- D. Tremulous

A. wrong: tender means soft or gentle, not the opposite of untenable.

B. wrong: sheepish means embarrassed.

C. correct: untenable means indefensible (cannot be supported), so its antonym is supportable.

D. wrong: tremulous means trembling.

Question 111 Coagulation of proteins may be caused

Coagulation of proteins may be caused by:

- A. Heat
- B. Change in pH
- C. Heavy metal salts
- D. All of the above ✓ **Correct answer**

A. wrong on its own: heat does coagulate proteins, but so do pH change and heavy metal salts.

B. wrong on its own: pH change does coagulate proteins, but so do heat and heavy metal salts.

its own. Heavy metal salts do coagulate proteins, but so do heat and pH change.

D. correct: heat, change in pH and heavy metal salts all cause coagulation (denaturation) of proteins.

Question 112 Kolbes electrolysis of sodium butyrate CH3CH2CH2COONa

Kolbe's electrolysis of sodium butyrate CH3CH2CH2COONa gives:

- A. C6H12
- B. C6H14 ✓ **Correct answer**
- C. C5H10
- D. C5H12

A. wrong: Kolbe electrolysis of butyrate gives the saturated dimer hexane, not hexene.

B. correct: two propyl radicals couple, 2CH3CH2CH2· → CH3CH2CH2CH2CH2CH3 (hexane, C6H14), with CO2 evolved.

C. wrong: this is not the Kolbe product.

D. wrong: this is not the Kolbe product.

Question 113 Chlorine gas dissolves in water to

Chlorine gas dissolves in water to some extent to give:

- A. Yellow colored solution
- B. Greenish colored solution ✓ **Correct answer**
- C. Bluish colored solution
- D. Colorless solution

A. wrong as the answer here: chlorine water is greenish, not purely yellow.

hlorine dissolves in water to give a greenish-yellow (greenish) solution of chlorine water.

C. wrong: chlorine water is not blue.

D. wrong: chlorine water is coloured.

Question 114 One of the following statements is

One of the following statements is true regarding Basidiomycota.

- A. They are most important source of antibiotics
- B. They have no known sexual stage.
- C. Hyphae fuse to give rise to dikaryotic mycelium ✓ **Correct answer**
- D. The vast majority of spores are formed asexually

A. wrong: antibiotics come mainly from Ascomycota (for example Penicillium), not Basidiomycota.

B. wrong: Basidiomycota have a well-known sexual stage (basidia).

C. correct: in Basidiomycota, compatible hyphae fuse (plasmogamy) to form a dikaryotic mycelium.

D. wrong: in Basidiomycota most spores (basidiospores) are formed sexually.

Question 115 The sprouting gametophyte of a moss

The sprouting gametophyte of a moss consists of a filamentous, branched structure called:

- A. Mycelium
- B. Hyphae
- C. Protonema ✓ **Correct answer**
- D. Bud

ycelium is the vegetative body of a fungus.

B. wrong: hyphae are fungal filaments.

C. correct: the sprouting moss gametophyte begins as a filamentous, branched protonema.

D. wrong: the bud is a later stage that grows from the protonema.

Question 116 Which seedless plant is a renewable

Which seedless plant is a renewable source of energy?

- A. Club moss
- B. Horsetail
- C. Sphagnum moss ✓ **Correct answer**
- D. Fern

A. wrong: club moss is not used as a renewable energy source.

B. wrong: horsetail is not used as a renewable energy source.

C. correct: Sphagnum (peat moss) forms peat, which is a renewable source of energy.

D. wrong: ferns are not used as a renewable energy source.

Question 117 Light of wavelength 500 10-9 m

Light of wavelength 500 × 10-9 m falls normally on a plane diffraction grating having 8 × 10^3 lines per cm. The minimum number of images seen is:

- A. 3
- B. 4
- C. 5 ✓ **Correct answer**
- D. 1

A. wrong: the maximum order allows 5 images.

e maximum order allows 5 images.

C. correct: the grating spacing is $d = 1/(8 \times 10^3)$ cm $= 1.25 \times 10^{-6}$ m, so the maximum order is $n = d/\lambda = 1.25 \times 10^{-6}/500 \times 10^{-9} = 2.5$, giving orders 0, ±1, ±2 — 5 images in total.

D. wrong: more than one image is seen.

Question 118 The speed of sound in air

The speed of sound in air at NTP is 300 m s-1. If the air pressure becomes 4 times, then the speed of the sound will be:

- A. 150 m s-1
- B. 300 m s-1 ✓ **Correct answer**
- C. 600 m s-1
- D. None

A. wrong: the speed of sound does not halve when the pressure quadruples.

B. correct: at constant temperature the speed of sound in a gas is independent of pressure, so it stays 300 m/s.

C. wrong: the speed of sound does not double when the pressure quadruples.

D. wrong: the speed stays 300 m/s.

Question 119 Standing waves are produced in a

Standing waves are produced in a 10 m long stretched string. If the string vibrates in 5 segments and wave velocity is 20 m s-1, its frequency is:

- A. 2 Hz
- B. 4 Hz
- C. 5 Hz ✓ **Correct answer**
- D. 10 Hz

is does not follow from the given values.

B. wrong: this does not follow from the given values.

C. correct: 5 segments in 10 m means λ = 2 × 10/5 = 4 m, so f = v/λ = 20/4 = 5 Hz.

D. wrong: this does not follow from the given values.

Question 120 Why did your supervisor take such

Why did your supervisor take such a strong disciplinary action when you were innocent? [Passive form of the sentence is:]

- A. Why has such a strong disciplinary action taken by your supervisor when you were innocent?
- B. Why was such a strong disciplinary action being taken by your supervisor when you were innocent?
- C. Why was such a strong disciplinary action taken by your supervisor when you were innocent? ✓ **Correct answer**
- D. Why such a strong disciplinary action was taken by your supervisor when you were innocent?

A. wrong: the tense and the passive form are wrong.

B. wrong: the continuous "being taken" changes the meaning.

C. correct: the active past "did take" becomes the passive past "was taken" in the question form.

D. wrong: the word order of the question is wrong.

Question 121 Ka values of some compounds are

Ka values of some compounds are given below, select the correct order of acidic strength: i. H2O ↔️ H+ + OH- Ka = 1 × 10-14 ii. ROH ↔️ RO- + H+ Ka = 1 × 10-18 iii. RCOOH

H+ Ka = 1 × 10-5 iv. C6H5OH ↔ C6H5O- + H+ Ka = 1 × 10-10

- A. ROH > H2O > C6H5OH > RCOOH
- B. C6H5OH > H2O > ROH > RCOOH
- C. RCOOH > C6H5OH > H2O > ROH ✓ **Correct answer**
- D. RCOOH > ROH > C6H5OH > H2O

A. wrong: the order is reversed — RCOOH is the strongest acid.

B. wrong: RCOOH is the strongest acid, not the weakest.

C. correct: the larger the Ka, the stronger the acid, so the order is RCOOH (10^{-5}) > phenol (10^{-10}) > water (10^{-14}) > alcohol (10^{-18}).

D. wrong: ROH is the weakest acid, not the second strongest.

Question 122 The compound which cannot be hydrolyzed

The compound which cannot be hydrolyzed by water is:

- A. CH3–CH2–CO–Br
- B. CH3–CO–O–CO–CH3
- C. CH3–CH2–CO–NH2
- D. None of the above ✓ **Correct answer**

A. wrong: an acid bromide is readily hydrolysed by water.

B. wrong: an acid anhydride is readily hydrolysed by water.

C. wrong: an amide is hydrolysed by water (slowly, but it is hydrolysed).

D. correct: all three compounds can be hydrolysed by water, so none of them is a compound that cannot be hydrolysed.

Question 123 KOH alcoholic CH32CHCH2Br The reactants in

KOH (alcoholic) + (CH3)2CH–CH2Br. The reactants in the condition given will undergo:

leophilic substitution reaction.

- B. Elimination reaction. ✓ **Correct answer**
- C. Nucleophilic addition.
- D. None of the above.

A. wrong: alcoholic KOH with an alkyl halide gives elimination, not substitution.

B. correct: alcoholic KOH is a dehydrohalogenating agent — it removes HX from the alkyl halide to give an alkene (elimination).

C. wrong: no addition takes place here.

D. wrong: elimination takes place.

Question 124 Phosphorus white catches fire in air

Phosphorus (white) catches fire in air and burns with the formation of white smoke. The product formed is:

- A. Phosphorus (III) oxide
- B. Phosphorus (V) oxide
- C. Phosphorus (II) oxide
- D. Both (A) & (B) ✓ **Correct answer**

A. wrong on its own: the burning also gives the (V) oxide.

B. wrong on its own: the burning also gives the (III) oxide.

C. wrong: no phosphorus(II) oxide is formed.

D. correct: white phosphorus burning in air gives both phosphorus(III) oxide and phosphorus(V) oxide (the white smoke is principally the (V) oxide).

Question 125 Coordination number six complex having d2sp3

Coordination number six complex having d2sp3 hybridization exists in:

- B. Square planar shape
- C. Trigonal bipyramidal shape
- D. Octahedral shape ✓ **Correct answer**

A. wrong: a tetrahedral complex has coordination number 4, not 6.

B. wrong: a square planar complex has coordination number 4, not 6.

C. wrong: a trigonal bipyramidal complex has coordination number 5, not 6.

D. correct: a coordination number 6 complex with d^2sp^3 hybridisation is octahedral.

Question 126 What type of hybridization isare present

What type of hybridization is/are present in hex-4-en-1-yne?

- A. sp2
- B. sp
- C. sp and sp2
- D. sp, sp2, sp3 ✓ **Correct answer**

A. wrong on its own: the molecule also has sp and sp3 carbons.

B. wrong on its own: the molecule also has sp2 and sp3 carbons.

C. wrong: the molecule also has sp3 carbons.

D. correct: in hex-4-en-1-yne, the triple-bond carbons are sp, the double-bond carbons are sp2, and the single-bond carbons are sp3 — all three hybridisations are present.

Question 127 In order to see various aspects

In order to see various aspects of specimen a three dimensional image of the object can be produced using:

- A. Compound microscope

k microscope

- C. Transmission electron microscope
- D. Scanning electron microscope ✓ **Correct answer**

A. wrong: a compound microscope gives a two-dimensional image.

B. wrong: a dark-field microscope gives a two-dimensional image.

C. wrong: a transmission electron microscope gives a two-dimensional image.

D. correct: a scanning electron microscope produces a three-dimensional image of the surface of a specimen.

Question 128 The usual position of the two

The usual position of the two centrioles in relation to each other is at right angle in:

- A. Higher plant cells
- B. Lower plant cells
- C. Animal cells
- D. Both (B) & (C) ✓ **Correct answer**

A. wrong: higher plant cells lack centrioles.

B. wrong on its own: centrioles at right angles also occur in animal cells.

C. wrong on its own: centrioles at right angles also occur in lower plant cells.

D. correct: the two centrioles of a centrosome lie at right angles to each other in animal cells and in lower plant cells.

Question 129 In saturated fatty acids more hydrogen

In saturated fatty acids more hydrogen are not accommodated because of:

- A. Presence of single bonds between carbon atoms. ✓ **Correct answer**
- B. Presence of double bonds between carbon atoms.

- C. Presence of double bonds between carbon atoms.
- D. Absence of bond between carbon atoms.

A. correct: in a saturated fatty acid every carbon is joined by single bonds and already carries the maximum number of hydrogens, so no more hydrogen can be accommodated.

B. wrong: saturated fatty acids have no double bonds.

C. wrong: this prints identically to B and is wrong for the same reason.

D. wrong: the carbons are joined by single bonds. (Noted: options B and C are identical as printed in the source.)

Question 130 A particle executes SHM along a

A particle executes SHM along a straight line. Its amplitude is A. The potential energy of the particle is equal to the kinetic energy when the displacement of the particle from the mean position is:

- A. Zero
- B. ±A/2
- C. ±A/√2 ✓ **Correct answer**
- D. 2A

A. wrong: at zero displacement the potential energy is zero and the kinetic energy is maximum.

B. wrong: at A/2 the potential energy is one quarter of the total, not one half.

C. correct: the potential energy is $\frac{1}{2}kx^2$ and the total energy is $\frac{1}{2}kA^2$, so they are equal when $x^2 = A^2/2$, i.e. $x = \pm A/\sqrt{2}$.

D. wrong: a displacement of 2A is beyond the amplitude and impossible.

131 In SHM the fraction of kinetic

In S.H.M, the fraction of kinetic energy to total energy when displacement is one-half of the amplitude is:

- A. 1/8
- B. 1/2
- C. 1/4
- D. 3/4 ✓ **Correct answer**

A. wrong: this is not the kinetic-energy fraction at half amplitude.

B. wrong: the kinetic energy is three quarters of the total, not one half.

C. wrong: 1/4 is the potential-energy fraction at half amplitude.

D. correct: at x = A/2 the potential energy is ¼ of the total, so the kinetic energy is 1 − ¼ = ¾ of the total.

Question 132 Laplace corrected Newtons formula for the

Laplace corrected Newton’s formula for the velocity of sound in gas because the sound propagates:

- A. As longitudinal waves
- B. Adiabatically ✓ **Correct answer**
- C. Isothermally
- D. Under isobaric conditions

A. wrong: sound is longitudinal, but that is not why Laplace corrected Newton's formula.

B. correct: Laplace corrected Newton's formula because the compressions and rarefactions in sound propagation are so rapid that no heat is exchanged — the process is adiabatic, not isothermal.

C. wrong: Newton assumed isothermal propagation, which Laplace corrected to adiabatic.

e correction was about adiabatic, not isobaric, conditions.

Question 133 Rhizobium belongs to

Rhizobium belongs to:

- A. Beta-proteobacteria
- B. Gamma-proteobacteria
- C. Alpha-proteobacteria ✓ **Correct answer**
- D. Delta-proteobacteria

A. wrong: Rhizobium is not a beta-proteobacterium.

B. wrong: Rhizobium is not a gamma-proteobacterium.

C. correct: Rhizobium belongs to the alpha-proteobacteria.

D. wrong: Rhizobium is not a delta-proteobacterium.

Question 134 Poisonous red-tides in coastal area are

Poisonous red-tides in coastal area are caused by the blooms of:

- A. Euglenoids
- B. Rhodophyta
- C. Diatoms
- D. Dinoflagellates ✓ **Correct answer**

A. wrong: euglenoids do not cause red tides.

B. wrong: red algae do not cause red tides.

C. wrong: diatoms do not cause red tides.

D. correct: blooms of dinoflagellates cause poisonous red tides in coastal areas.

135 Two bodies are dropped from different

Two bodies are dropped from different heights h1 and h2. The ratio of the times taken by them to reach the ground will be:

- A. h22 : h12
- B. h1 : h22
- C. √h1 : √h2 ✓ **Correct answer**
- D. None of the above

A. wrong: the time is proportional to the square root of the height, not to the square.

B. wrong: the ratio is of square roots, not of h1 to $h2^2$.

C. correct: the time to fall a height h is t = √(2h/g), so t1:t2 = √h1:√h2.

D. wrong: the ratio is √h1:√h2.

Question 136 A bullet of mass m moving

A bullet of mass m moving with a velocity v is fired into a large wooden block of mass M. If the bullet remains embedded in the wooden block, the velocity of the system will be:

- A. Mv/(M + m)
- B. mv/(M + m) ✓ **Correct answer**
- C. Mv/(M – m)
- D. mv/(M – m)

A. wrong: the bullet's momentum is mv, not Mv.

B. correct: by conservation of momentum, mv = (M + m)V, so V = mv/(M + m).

C. wrong: this does not follow from conservation of momentum.

D. wrong: the masses add after the collision, they do not subtract.

137 A particle is moving with a

A particle is moving with a constant speed along a straight line. A force is NOT required to:

- A. Increase speed
- B. Decrease the momentum
- C. Change the direction
- D. Keep it moving with uniform velocity ✓ **Correct answer**

A. wrong: a force is required to increase the speed.

B. wrong: a force is required to decrease the momentum.

C. wrong: a force is required to change the direction.

D. correct: by Newton's first law, no force is required to keep a body moving with uniform velocity.

Question 138 He is grieving his deceased father

He is grieving ____ his deceased father.

- A. at
- B. for ✓ **Correct answer**
- C. on
- D. over

A. Wrong: "grieving at" is not the idiom.

B. Correct per the printed key: "grieving for his deceased father" is correct English.

C. Wrong: "grieving on" is not the idiom.

D. Also correct on the facts: "grieving over his deceased father" is also correct English. (PICK-ONE: the printed key records B/D — both "grieving for" (B) and "grieving over" (D) are correct idioms; the key itself states both options are correct. Decided by the assistant

Question 139 Which of the following atoms in

Which of the following atoms in the given oxidation state has the highest electronegativity?

- A. Mo(II)
- B. Mo(III)
- C. Mo(V)
- D. Mo(VI) ✓ **Correct answer**

A. wrong: the lowest oxidation state has the lowest electronegativity.

B. wrong: this is less electronegative than Mo(VI).

C. wrong: this is less electronegative than Mo(VI).

D. correct: electronegativity increases with oxidation state, so Mo(VI) has the highest electronegativity of the four.

Question 140 The existence of H22 is not

The existence of H22+ is not possible because:

- A. It would be disproportionate
- B. It would be radioactive
- C. It violates the Pauli exclusion principle
- D. No H–H bond would form ✓ **Correct answer**

A. wrong: disproportionation is not the reason $H2^{2+}$ cannot exist.

B. wrong: radioactivity is not the reason.

C. wrong: the Pauli principle is not violated.

D. correct: $H2^{2+}$ would have no electrons in the bonding molecular orbital, so no H–H bond

nd the ion cannot exist.

Question 141 Choose the anisotropic behavior

Choose the anisotropic behavior:

- A. Coefficient of thermal expansion ✓ **Correct answer**
- B. Lattice energy
- C. Viscosity
- D. Infrared spectroscopy

A. correct: the coefficient of thermal expansion is anisotropic — it varies with direction in a crystal.

B. wrong: lattice energy is a single scalar value, not direction-dependent.

C. wrong: viscosity is not an anisotropic property of crystals.

D. wrong: infrared spectroscopy is a technique, not an anisotropic property.

Question 142 Acetabularia mediterranea is

Acetabularia mediterranea is:

- A. A fungus
- B. An alga ✓ **Correct answer**
- C. A protozoan
- D. A prokaryote

A. wrong: Acetabularia is not a fungus.

B. correct: Acetabularia mediterranea is a green alga.

C. wrong: Acetabularia is not a protozoan.

D. wrong: Acetabularia is a eukaryote.

143 Excess of Ag2CrO4 was dissolved in

Excess of Ag2CrO4 was dissolved in distilled water; its solubility was found to be 1.3 × 10-4 mol dm-3. What is the solubility product?

- A. Ksp = [1.3×10-4]2 [1.3×10-4]
- B. Ksp = [2.6×10-4]2 [1.3×10-4] ✓ **Correct answer**
- C. Ksp = [1.3×10-8] [1.3×10-4]
- D. Ksp = [1.3×10-8]2 [1.3×10-4]2

A. wrong: the silver ion concentration is twice the solubility, not equal to it.

B. correct: $Ag2CrO4 \rightleftharpoons 2Ag^{+} + CrO4^{2-}$, so $[Ag^{+}] = 2 \times 1.3 \times 10^{-4} = 2.6 \times 10^{-4}$ and $[CrO4^{2-}] = 1.3 \times 10^{-4}$, giving $Ksp = (2.6 \times 10^{-4})^{2}(1.3 \times 10^{-4})$.

C. wrong: this does not follow from the dissolution stoichiometry.

D. wrong: this does not follow from the dissolution stoichiometry.

Question 144 Double fertilization occurs in

Double fertilization occurs in:

- A. Pinus
- B. Ferns
- C. Marchantia
- D. Maize ✓ **Correct answer**

A. wrong: Pinus is a gymnosperm, which does not show double fertilisation.

B. wrong: ferns do not show double fertilisation.

C. wrong: Marchantia is a liverwort, which does not show double fertilisation.

D. correct: double fertilisation occurs in angiosperms such as maize.

145 Most conspicuous sea-weeds are

Most conspicuous sea-weeds are:

- A. Red algae
- B. Blue-green algae
- C. Green algae
- D. Brown algae ✓ **Correct answer**

A. wrong: red algae are not the most conspicuous seaweeds.

B. wrong: blue-green algae (cyanobacteria) are microscopic, not conspicuous seaweeds.

C. wrong: green algae are not the most conspicuous seaweeds.

D. correct: brown algae (kelps) are the largest and most conspicuous seaweeds.

Question 146 An acinus is composed of

An acinus is composed of:

- A. 10–20 acinars
- B. 20–40 acinars ✓ **Correct answer**
- C. 20–30 acinars
- D. 30–40 acinars

A. wrong: an acinus has more than 20 acinar cells.

B. correct: an acinus (of the pancreas) is composed of 20–40 acinar cells.

C. wrong: the range is 20–40, not 20–30.

D. wrong: the range is 20–40, not 30–40.

Question 147 A circular disc of mass M

A circular disc of mass M and radius R is rotating about its axis with uniform speed v. Its

gy is:

- A. Mv2
- B. ½ Mv2
- C. ¼ Mv2 ✓ **Correct answer**
- D. 1/8 Mv2

A. wrong: this is twice the rotational kinetic energy.

B. wrong: this is the translational kinetic energy, not the rotational kinetic energy of the disc.

C. correct: for a disc, $I = \frac{1}{2}MR^2$ and $\omega = v/R$, so $KE = \frac{1}{2}I\omega^2 = \frac{1}{2}(\frac{1}{2}MR^2)(v/R)^2 = \frac{1}{4}Mv^2$.

D. wrong: this is half the rotational kinetic energy.

Question 148 Moment of inertia of an object

Moment of inertia of an object does not depend upon:

- A. Mass of object
- B. Mass distribution
- C. Angular velocity ✓ **Correct answer**
- D. Axis of rotation

A. wrong: the moment of inertia does depend on the mass.

B. wrong: the moment of inertia does depend on how the mass is distributed.

C. correct: the moment of inertia does not depend on the angular velocity — it depends on the mass, its distribution and the axis of rotation.

D. wrong: the moment of inertia does depend on the axis of rotation.

Question 149 A body of mass 10 kg

A body of mass 10 kg is hanging from a spring inside a lift. If the lift falls with an

n of 10 m s-2 then what will be the reading of spring balance?

- A. Zero ✓ **Correct answer**
- B. 2.5 kg
- C. 5 kg
- D. 10 kg

A. correct: the lift falls with acceleration g, so it is in free fall and the apparent weight is zero — the spring balance reads zero.

B. wrong: the apparent weight is zero, not 2.5 kg.

C. wrong: the apparent weight is zero, not 5 kg.

D. wrong: 10 kg is the reading when the lift is at rest.

Question 150 That a driver swerves in order

That a driver swerves in order to avoid an accident can be proven by examining the marks on the pavements. [The underlined word nearly means:]

- A. Stops quickly
- B. Turns sharply ✓ **Correct answer**
- C. Hits something else
- D. Goes backward

A. wrong: swerve does not mean to stop quickly.

B. correct: to swerve is to turn sharply, as a driver does to avoid an accident.

C. wrong: swerving avoids hitting something.

D. wrong: swerving is a sharp turn, not going backward.

Question 151 A container is having mixture of

A container is having mixture of gases, 20% ammonia, 30% hydrogen and 50% oxygen

m pressure. Choose the correct partial pressures respectively:

- A. 10 atm, 25 atm, 15 atm
- B. 10 atm, 15 atm, 25 atm ✓ **Correct answer**
- C. 25 atm, 10 atm, 15 atm
- D. 15 atm, 25 atm, 10 atm

A. wrong: the order is wrong — hydrogen is 15 atm and oxygen is 25 atm.

B. correct: by Dalton's law, the partial pressure is the mole fraction times the total pressure: ammonia 20% of 50 = 10 atm, hydrogen 30% of 50 = 15 atm, oxygen 50% of 50 = 25 atm.

C. wrong: the order is wrong.

D. wrong: the order is wrong.

Question 152 A man walks for some time

A man walks for some time with velocity v due east. Then he walks for the same time with velocity v due north. The average velocity of the man is:

- A. 2v
- B. √2 v
- C. v
- D. v/√2 ✓ **Correct answer**

A. wrong: the average velocity is not the sum of the two velocities.

B. wrong: this is the magnitude of the total displacement per unit time, not divided by the total time.

C. wrong: the average velocity is v/√2.

D. correct: the displacement is vt√2 (east vt and north vt), the total time is 2t, so the average velocity is vt√2/2t = v/√2.

Question 153 The sum of 2 forces acting

The sum of 2 forces acting at a point is 16 N. If the resultant force is 8 N and its direction is perpendicular to the minimum force, then the forces are:

- A. 6 N and 10 N ✓ **Correct answer**
- B. 8 N and 8 N
- C. 4 N and 12 N
- D. —

A. correct: let the forces be F and 16 − F; with the resultant perpendicular to the smaller force, $F^2 + 8^2 = (16 - F)^2$, giving F = 6 N and the other force 10 N.

B. wrong: two equal forces of 8 N cannot give a resultant of 8 N perpendicular to one of them.

C. wrong: these do not satisfy the perpendicular-resultant condition.

D. wrong: the forces are 6 N and 10 N.

Question 154 A boy walks to his school

A boy walks to his school at a distance of 6 km with a speed of 3 km/h and walks back with a constant speed of 2 km/h. His average speed for round trip in km/h is:

- A. 2.5
- B. 2.4 ✓ **Correct answer**
- C. 5
- D. 2.3

A. wrong: the average speed is the total distance over the total time, not the mean of the two speeds.

B. correct: the total distance is 12 km and the total time is 6/3 + 6/2 = 5 h, so the average speed is 12/5 = 2.4 km/h.

s the sum of the two speeds.

D. wrong: the average speed is 2.4 km/h.

Question 155 Though Aleem is poor he is

Though Aleem is poor ____ he is honest.

- A. but
- B. nevertheless
- C. yet ✓ **Correct answer**
- D. still

A. wrong: "though ... but" is not the correct pairing.

B. wrong: "though ... nevertheless" is not the idiom used here.

C. correct: "Though Aleem is poor yet he is honest" is the correct concessive construction.

D. wrong: "though ... still" is not the idiom used here.

Question 156 Which cation is unstable in aqueous

Which cation is unstable in aqueous solution?

- A. Sb3+
- B. Bi3+
- C. Sn3+ ✓ **Correct answer**
- D. Fe3+

A. wrong: Sb^{3+} is stable in aqueous solution.

B. wrong: Bi^{3+} is stable in aqueous solution.

C. correct: Sn^{3+} is unstable in aqueous solution (tin is stable as Sn^{2+} or Sn^{4+}).

D. wrong: Fe^{3+} is stable in aqueous solution.

157 Choose the incorrect statement about corrosion

Choose the incorrect statement about corrosion:

- A. Corrosion cannot be eliminated completely.
- B. Employing modern techniques corrosion can be completely eliminated. ✓ **Correct answer**
- C. Corrosion process can be slowed down by certain methods.
- D. The presence of acidic oxide in the environment can accelerate the process of corrosion.

A. wrong as the incorrect statement: this is true — corrosion cannot be eliminated completely.

B. correct as the incorrect statement: even with modern techniques corrosion cannot be completely eliminated, only slowed down.

C. wrong as the incorrect statement: this is true.

D. wrong as the incorrect statement: this is true.

Question 158 AlBr3 which is used in the

AlBr3 which is used in the alkylation of benzene possesses the properties of:

- A. A catalyst
- B. A Lewis acid
- C. An electron deficient species
- D. All of the above ✓ **Correct answer**

A. wrong on its own: AlBr3 is a catalyst, but it is also a Lewis acid and an electron-deficient species.

B. wrong on its own: AlBr3 is a Lewis acid, but it is also a catalyst and electron-deficient.

C. wrong on its own: AlBr3 is electron-deficient, but it is also a catalyst and a Lewis acid.

BrS is a catalyst in Friedel-Crafts alkylation, a Lewis acid, and an electron-deficient species.

Question 159 2 FADH2 can yield energy

2 FADH2 can yield energy:

- A. 4 ATP ✓ **Correct answer**
- B. 8 ATP
- C. 6 ATP
- D. 10 ATP

A. correct: each FADH2 yields 2 ATP in the electron transport chain, so 2 FADH2 yield 4 ATP.

B. wrong: 8 ATP would need 4 ATP per FADH2.

C. wrong: 6 ATP would need 3 ATP per FADH2.

D. wrong: 10 ATP would need 5 ATP per FADH2.

Question 160 ABO blood groups are an example

ABO blood groups are an example of:

- A. Multiple alleles and incomplete dominance
- B. Co-dominance and incomplete dominance
- C. Incomplete dominance only
- D. Multiple alleles and co-dominance ✓ **Correct answer**

A. wrong: the ABO system shows codominance, not incomplete dominance.

B. wrong: the ABO system shows multiple alleles, not incomplete dominance.

C. wrong: the ABO system shows codominance and multiple alleles.

D. correct: the ABO blood groups are controlled by three alleles (multiple alleles), and IA

codominant.

Question 161 In a mating between two individuals

In a mating between two individuals that are heterozygous for a recessive lethal allele, what genotypic ratio (homozygous dominant : heterozygous : homozygous recessive) would you expect to observe in the (living) offspring?

- A. 1 : 2 : 1
- B. 3 : 1 : 1
- C. 1 : 2 : 0 ✓ **Correct answer**
- D. 0 : 2 : 1

A. wrong: the homozygous recessive offspring die, so they are not observed among the living offspring.

B. wrong: this is not the ratio among living offspring.

C. correct: the cross Aa × Aa gives 1 AA : 2 Aa : 1 aa, but the aa (homozygous recessive lethal) offspring die, so among the living offspring the ratio is 1 : 2 : 0.

D. wrong: the homozygous dominant offspring survive.

Question 162 How much kinetic energy will be

How much kinetic energy will be gained by an α-particle going from a point at 70 V to another point at 50 V?

- A. 40 eV ✓ **Correct answer**
- B. 40 KeV
- C. 40 MeV
- D. Zero

A. correct: the α-particle has charge 2e, and it falls through 70 − 50 = 20 V, so it gains KE = 2e × 20 V = 40 eV.

e gain is 40 eV, not 40 keV.

C. wrong: the gain is 40 eV, not 40 MeV.

D. wrong: the particle gains kinetic energy falling through the potential difference.

Question 163 The potentials of the two plates

The potentials of the two plates of a capacitor are +10 V and –10 V. The charge on one of the plates is 40 C. The capacitance of the capacitor is:

- A. 2 F ✓ **Correct answer**
- B. 4 F
- C. 0.5 F
- D. 0.25 F

A. correct: the potential difference is 10 − (−10) = 20 V, so C = Q/V = 40/20 = 2 F.

B. wrong: this uses a potential difference of 10 V.

C. wrong: this does not follow from the given values.

D. wrong: this does not follow from the given values.

Question 164 In a simple electrical circuit the

In a simple electrical circuit the current in a resistor is measured as (2.50 ± 0.05) mA. The resistor is marked as having a value of 4.7 ± 2%. If these values were used to calculate the power dissipated, what is the percentage uncertainty in the value obtained?

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

A. wrong: the current contributes twice its percentage uncertainty.

…s omits the resistor's 2% uncertainty.

C. correct: $P = I^2R$, so the percentage uncertainty is $2 \times (0.05/2.50 \times 100\%) + 2\% = 4\% + 2\% = 6\%$.

D. wrong: this does not follow from the uncertainties.

Question 165 Choose the synonym for the word

Choose the synonym for the word “ABRIDGE”.

- A. To make a bridge
- B. Shorten ✓ **Correct answer**
- C. Magnify
- D. Divert

A. wrong: abridge has nothing to do with bridges.

B. correct: abridge means to shorten (a book or text).

C. wrong: magnify means to enlarge, the opposite of abridge.

D. wrong: divert means to turn aside.

Question 166 Choose the true product of the

Choose the true product of the following reaction: $CH3C{\equiv}N + 2H2O + HCl \rightarrow$

- A. $CH3COOH + NH3$
- B. $CH3COOH + NH4Cl$ ✓ **Correct answer**
- C. $CH3COCl + NH3$
- D. $CH3CONH2$

A. wrong: in acid solution the ammonia is protonated to the ammonium ion.

B. correct: acid hydrolysis of the nitrile gives ethanoic acid and ammonium chloride.

acetyl chloride is formed.

D. wrong: the amide is only an intermediate, not the final product of complete hydrolysis.

Question 167 Which polyatomic anion is unstable in

Which polyatomic anion is unstable in solution?

- A. BO_2^-
- B. SnO_3^{2-}
- C. $S_2O_3^{2-}$
- D. MnO_4^{2-} ✓ **Correct answer**

A. wrong: the borate ion is stable in solution.

B. wrong: the stannate ion is stable in solution.

C. wrong: the thiosulphate ion is stable in solution.

D. correct: the manganate ion (MnO_4^{2-}) is unstable in solution — it disproportionates to permanganate and manganese dioxide.

Question 168 Choose the molecule that could not

Choose the molecule that could not be represented by a single electronic structure formula:

- A. CH_4
- B. H_2O
- C. SO_2 ✓ **Correct answer**
- D. O_2

A. wrong: methane is represented by a single structure.

B. wrong: water is represented by a single structure.

C. correct: sulphur dioxide shows resonance and cannot be represented by a single

-ucture formula.

D. wrong: oxygen is represented by a single structure.

Question 169 Alkene O3 Ozonide Zn H2O Propanone

Alkene + O3 → Ozonide → (Zn + H2O) → Propanone + Propanal. The IUPAC name of the alkene is:

- A. Hex-2-ene
- B. Hex-3-ene
- C. 2-methylpent-1-ene
- D. 2-methylpent-2-ene ✓ **Correct answer**

A. wrong: ozonolysis of hex-2-ene gives ethanal and butanal.

B. wrong: ozonolysis of hex-3-ene gives two molecules of propanal.

C. wrong: ozonolysis of 2-methylpent-1-ene gives propanone and butanal.

D. correct: (CH3)2C=CHCH2CH3 cleaves to propanone, (CH3)2CO, and propanal, CH3CH2CHO.

Question 170 If a newborn baby possesses carboxyhemoglobin

If a newborn baby possesses carboxyhemoglobin instead of oxyhemoglobin, the condition may be:

- A. Embolism
- B. Atherosclerosis
- C. Cyanosis ✓ **Correct answer**
- D. Arteriosclerosis

A. wrong: embolism is a blockage by a clot or air bubble, not a haemoglobin defect.

B. wrong: atherosclerosis is hardening of the arteries, not a haemoglobin defect.

carboxyhaemoglobin cannot carry oxygen, so the tissues are starved of oxygen and the baby becomes cyanosed (bluish) — the textbook associates carbon monoxide poisoning with cyanosis.

D. wrong: arteriosclerosis is hardening of the arteries, not a haemoglobin defect. (Noted: strictly, carboxyhaemoglobin gives a cherry-red colour rather than true cyanosis, which is caused by deoxygenated haemoglobin; among the options, cyanosis is the only condition connected with impaired oxygen carriage, so the keyed answer stands.)

Question 171 Of 100 ml of arterial blood

Of 100 ml of arterial blood, oxygen provided to the tissues is:

- A. 2 ml
- B. 3 ml
- C. 4 ml
- D. 5 ml ✓ **Correct answer**

A. wrong: the tissues take up 5 ml of oxygen per 100 ml of arterial blood.

B. wrong: the tissues take up 5 ml.

C. wrong: the tissues take up 5 ml.

D. correct: of the about 20 ml of oxygen in 100 ml of arterial blood, about 5 ml is given up to the tissues.

Question 172 Nervous system that prepares itself for

Nervous system that prepares itself for fight or flight:

- A. Parasympathetic
- B. Sympathetic ✓ **Correct answer**
- C. Somatic
- D. Peripheral

e parasympathetic system promotes rest and digestion.

B. correct: the sympathetic nervous system prepares the body for fight or flight.

C. wrong: the somatic system controls voluntary skeletal muscle.

D. wrong: the peripheral system includes both the sympathetic and parasympathetic divisions.

Question 173 In a streamline flow the velocity

In a streamline flow the velocity of the liquid in contact with the containing vessel is:

- A. Zero ✓ **Correct answer**
- B. Minimum but not zero
- C. Large
- D. Peripheral

A. correct: in streamline (laminar) flow the liquid in contact with the wall of the vessel is at rest (the no-slip condition).

B. wrong: the velocity at the wall is zero.

C. wrong: the velocity is greatest at the centre, not at the wall.

D. wrong: this is not a velocity.

Question 174 Eight drops of water each of

Eight drops of water, each of radius 2 mm, are falling through air at a terminal velocity of 8 cm s-1. If they coalesce to form a single drop, the terminal velocity of the combined drop will be:

- A. 8 cm s-1
- B. 16 cm s-1
- C. 24 cm s-1

cm s⁻¹ ✓ **Correct answer**

A. wrong: the combined drop is larger, so its terminal velocity is greater.

B. wrong: the terminal velocity increases by a factor of 4, not 2.

C. wrong: the terminal velocity increases by a factor of 4.

D. correct: eight drops coalesce into one drop of twice the radius (volume × 8), and terminal velocity is proportional to r^2, so it becomes 4 × 8 = 32 cm/s.

Question 175 The frequency of a seconds pendulum

The frequency of a second's pendulum is:

- A. 1 Hz
- B. 2 Hz
- C. 5 Hz
- D. None of the above. ✓ **Correct answer**

A. wrong: a second's pendulum has a period of 2 s, so its frequency is 0.5 Hz, not 1 Hz.

B. wrong: 2 Hz is the period in seconds, not the frequency.

C. wrong: the frequency is 0.5 Hz.

D. correct: the frequency of a second's pendulum is 0.5 Hz, which is not among the options.

Question 176 It is a general perception that

It is a general perception that doctors have a callous disregard for feelings of others.

[The underlined word nearly means:]

- A. Respectable
- B. Careful
- C. Unfeeling ✓ **Correct answer**

A. wrong: callous does not mean respectable.

B. wrong: callous means the opposite of careful about feelings.

C. correct: callous means unfeeling — a callous disregard for feelings is an unfeeling disregard.

D. wrong: sensitive is the opposite of callous.

Question 177 The ratio of electric force between

The ratio of electric force between two protons to that between two electrons is of the order of:

- A. 10^{42}
- B. 1039
- C. 1036
- D. 1 ✓ **Correct answer**

A. wrong: 10^{42} is the ratio of the electric force to the gravitational force, not the ratio asked here.

B. wrong: this is not the ratio asked here.

C. wrong: this is not the ratio asked here.

D. correct: the electric force depends on the product of the charges, and the proton and the electron carry equal and opposite charges, so the two forces are equal in magnitude and their ratio is 1.

Question 178 When 1012 electrons are removed from

When 1012 electrons are removed from a neutral metal sphere, the charge on the sphere becomes:

5 μC ✓ **Correct answer**

- B. –0.16 μC
- C. 0.32 μC
- D. –0.32 μC

A. correct: removing electrons leaves the sphere positively charged, $Q = 10^{12} \times 1.6 \times 10^{-19}$ C $= 1.6 \times 10^{-7}$ C = 0.16 μC.

B. wrong: removing electrons makes the charge positive, not negative.

C. wrong: this is twice the charge.

D. wrong: the charge is positive and half this magnitude.

Question 179 An electric charge in an accelerated

An electric charge in an accelerated motion produces:

- A. An electric field only
- B. A magnetic field only
- C. Electromagnetic radiation only
- D. All of the above ✓ **Correct answer**

A. wrong on its own: an accelerated charge also produces a magnetic field and electromagnetic radiation.

B. wrong on its own: an accelerated charge also produces an electric field and electromagnetic radiation.

C. wrong on its own: an accelerated charge also produces electric and magnetic fields.

D. correct: an accelerated charge produces an electric field, a magnetic field and electromagnetic radiation.

180 Choose the synonym for the word

Choose the synonym for the word “ATTENUATE”.

- A. Appear
- B. Be absent
- C. Weaken ✓ **Correct answer**
- D. Testify

A. wrong: attenuate does not mean to appear.

B. wrong: attenuate does not mean to be absent.

C. correct: attenuate means to weaken or reduce in strength.

D. wrong: testify means to give evidence.

Question 181 At standard conditions 45 liters of

At standard conditions 45 liters of oxygen gas weigh about 64 g, whereas 45 liters of hydrogen weigh only 4 g. Which gas diffuses faster? Calculate how much faster.

- A. Hydrogen, 4 × O2 ✓ **Correct answer**
- B. Hydrogen, 2 × O2
- C. Oxygen, 8 × H2
- D. Oxygen, 3 × H2

A. correct: by Graham's law the rate of diffusion is inversely proportional to the square root of the molar mass; hydrogen (M = 2) diffuses √(32/2) = 4 times faster than oxygen (M = 32).

B. wrong: the factor is 4, not 2.

C. wrong: oxygen is the heavier gas and diffuses more slowly.

D. wrong: oxygen diffuses more slowly than hydrogen.

182 Arrange the following oxides of chromium

Arrange the following oxides of chromium in decreasing acidic character:

- A. CrO > Cr2O3 > CrO3
- B. CrO3 > Cr2O3 > CrO ✓ **Correct answer**
- C. Cr2O3 > CrO > CrO3
- D. CrO3 > CrO > Cr2O3

A. wrong: the order is reversed — acidity increases with oxidation state.

B. correct: the acidic character of chromium oxides increases with the oxidation state of chromium: CrO3 (Cr^{6+}) > Cr2O3 (Cr^{3+}) > CrO (Cr^{2+}).

C. wrong: CrO3 is the most acidic.

D. wrong: Cr2O3 is more acidic than CrO.

Question 183 Choose mercaptans of the following

Choose mercaptans of the following:

- A. R–S–R
- B. R–S–H ✓ **Correct answer**
- C. R–O–R
- D. R–O–H

A. wrong: R–S–R is a thioether (sulphide), not a mercaptan.

B. correct: a mercaptan (thiol) has the formula R–S–H.

C. wrong: R–O–R is an ether.

D. wrong: R–O–H is an alcohol.

184 If black and white true breeding

If black and white true breeding mice are mated and they result in all gray offspring, what inheritance pattern would this be indicative of?

- A. Dominance
- B. Co-dominance
- C. Multiple alleles
- D. Incomplete dominance ✓ **Correct answer**

A. wrong: dominance would give all offspring like one parent, not grey.

B. wrong: codominance would give offspring showing both colours.

C. wrong: multiple alleles are not involved here.

D. correct: black × white giving all grey offspring is the classic example of incomplete dominance.

Question 185 The rules forbid passengers to cross

The rules forbid passengers to cross the railway line. [Passive form of the sentence is:]

- A. Passenger was forbidden by the rules to cross the railway line.
- B. Passenger are being forbidden by the rules to cross the railway line.
- C. Passengers are forbidden by the rules to cross the railway line. ✓ **Correct answer**
- D. Passenger is forbid by the rules to cross the rail way line.

A. wrong: the subject must be plural ("passengers") and the tense present ("are").

B. wrong: the continuous "are being forbidden" is wrong and the subject is singular.

C. correct: the active "forbid" becomes the passive "are forbidden" with the plural subject "passengers".

D. wrong: "is forbid" is ungrammatical and the subject is singular.

186 Many hexaaqua complex ions can undergo

Many hexaaqua complex ions can undergo reaction with water as given below: [Fe(H2O)6]2+(aq) + H2O ↔️ [Fe(H2O)5OH]+ + H3O+ The reaction is classed as:

- A. Redox reaction
- B. Acid base reaction ✓ **Correct answer**
- C. Decomposition reaction
- D. Substitution reaction

A. wrong: no oxidation state changes in this reaction.

B. correct: the hexaaqua iron(II) ion donates a proton to water, acting as an acid — this is an acid-base (hydrolysis) reaction.

C. wrong: the complex is not decomposing.

D. wrong: no ligand is substituted here; a proton is transferred.

Question 187 Propene reacts with hypochlorous acid HOCl

Propene reacts with hypochlorous acid (HOCl) to form:

- A. CH3–CH(Cl)–CH2OH
- B. CH3–CH(OH)–CH2Cl ✓ **Correct answer**
- C. CH3–CH(OH)–CH2OH
- D. CH3–CH(Cl)–CH2Cl

A. wrong: the OH group adds to the more substituted carbon, not the Cl.

B. correct: propene reacts with HOCl to give the chlorohydrin 1-chloropropan-2-ol — the OH adds to the more substituted carbon (Markovnikov) and the Cl to the terminal carbon.

C. wrong: no diol is formed.

D. wrong: no dichloride is formed.

188 Which of the following radiations cannot

Which of the following radiations cannot cause excitation in the molecule?

- A. Red colour
- B. Green colour
- C. Ultraviolet
- D. None of the above ✓ **Correct answer**

A. wrong as the exception: red light can cause excitation.

B. wrong as the exception: green light can cause excitation.

C. wrong as the exception: ultraviolet radiation can cause excitation.

D. correct: all of the radiations listed can cause excitation in a molecule, so none of them is the answer.

Question 189 Which of the following do not

Which of the following do not play a role in intracellular movement?

- A. Microfilaments and intermediate filaments
- B. Microfilaments and microtubules
- C. Intermediate filaments and microtubules ✓ **Correct answer**
- D. Only microfilaments

A. wrong: microfilaments do play a role in intracellular movement (cytoplasmic streaming).

B. wrong: both microfilaments and microtubules play a role in intracellular movement.

C. correct: the textbook point is that intermediate filaments do not take part in intracellular movement (they provide mechanical support), and the printed key records this pair.

D. wrong: microfilaments do play a role in intracellular movement. (Noted: the question is

microtubules do play a role in vesicle transport — but the keyed pair is the one containing the intermediate filaments, which genuinely play no role in intracellular movement; the keyed answer stands.)

Question 190 Which statement about thylakoids in eukaryotes

Which statement about thylakoids in eukaryotes is not correct?

- A. Thylakoids are assembled into stacks
- B. Thylakoids exist as a maze of folded membranes. ✓ **Correct answer**
- C. The space surrounding thylakoids is called stroma.
- D. Thylakoids contain chlorophyll.

A. wrong as the incorrect statement: thylakoids are assembled into stacks (grana).

B. correct as the incorrect statement: thylakoids are stacked discs (grana), not a maze of folded membranes — that description fits the endoplasmic reticulum.

C. wrong as the incorrect statement: the space surrounding the thylakoids is the stroma.

D. wrong as the incorrect statement: thylakoids do contain chlorophyll.

Question 191 The three non-infective structural genes in

The three non-infective (structural) genes in HIV are:

- A. gag, pol, rev
- B. gag, pol, vpu
- C. gag, pol, vpr
- D. gag, pol, env ✓ **Correct answer**

A. wrong: rev is a regulatory gene, not a structural gene.

B. wrong: vpu is an accessory gene, not a structural gene.

C. wrong: vpr is an accessory gene, not a structural gene.

The three structural genes of HIV are gag, pol and env.

Question 192 A bomb explodes on the moon

A bomb explodes on the moon. How long will it take for the sound to reach the earth?

- A. 10 sec
- B. 1000 sec
- C. 1 day
- D. None of the above ✓ **Correct answer**

A. wrong: sound cannot travel through the vacuum between the Moon and the Earth.

B. wrong: sound cannot travel through the vacuum between the Moon and the Earth.

C. wrong: sound cannot travel through the vacuum between the Moon and the Earth.

D. correct: sound needs a medium, and there is no medium between the Moon and the Earth, so the sound never reaches the Earth.

Question 193 Macronutrients are

Macronutrients are:

- A. K–Mg–N–P ✓ **Correct answer**
- B. Cu–Mg–Mn–S
- C. Mn–S–P–Cu
- D. Mg–Mn–Ca–P

A. correct: potassium, magnesium, nitrogen and phosphorus are all macronutrients (needed in large amounts).

B. wrong: copper and manganese are micronutrients.

C. wrong: manganese and copper are micronutrients.

D. wrong: manganese is a micronutrient.

194 Sphagnum is also called as

Sphagnum is also called as:

- A. Sphenopsida
- B. Peat moss ✓ **Correct answer**
- C. Club moss
- D. Maiden hair ferns

A. wrong: Sphenopsida is the class of horsetails.

B. correct: Sphagnum is commonly called peat moss.

C. wrong: club moss is Lycopodium.

D. wrong: maidenhair fern is Adiantum.

Question 195 A body of mass 2 kg

A body of mass 2 kg collides with a wall with speed 100 m s-1 and rebounds with the same speed. The force exerted on the wall is 2 × 10^4 N. The time of contact is:

- A. 1/50 s ✓ **Correct answer**
- B. 1/25 s
- C. 1/60 s
- D. 1 s

A. correct: the change in momentum is $2 \times 100 - (-2 \times 100) = 400$ kg·m/s, and $F = \Delta p/\Delta t$, so $\Delta t = 400/2 \times 10^4 = 1/50$ s.

B. wrong: this is twice the contact time.

C. wrong: this does not follow from the given values.

D. wrong: the contact time is much shorter than 1 s.

196 An engine pumps out 40 kg

An engine pumps out 40 kg of water in a second. The water comes out vertically upward with a velocity of 3 m s-1. The power of the engine in kilowatt is:

- A. 1.2 kW ✓ **Correct answer**
- B. 12 kW
- C. 120 kW
- D. 1200 kW

A. correct: the power is P = mgv = 40 kg/s × 10 m/s² × 3 m/s = 1200 W = 1.2 kW.

B. wrong: this is ten times the power.

C. wrong: this is a hundred times the power.

D. wrong: this is a thousand times the power.

Question 197 Two boys weighing in the ratio

Two boys weighing in the ratio 4:5 go up stairs taking time in the ratio 5:4. The ratio of their power is:

- A. 1
- B. 16/25 ✓ **Correct answer**
- C. 25/16
- D. 4/5

A. wrong: the ratio is 16/25.

B. correct: power = work/time = mgh/t, so the ratio is (4/5) ÷ (5/4) = 16/25.

C. wrong: this is the inverse ratio.

D. wrong: this is the weight ratio, not the power ratio.

198 A thrifty buyer purchases fruits and

A thrifty buyer purchases fruits and vegetables in season. [The underlined word nearly means:]

- A. Careful ✓ **Correct answer**
- B. Professional
- C. Disinterested
- D. Healthy

A. correct: thrifty means careful with money — a thrifty buyer buys carefully, in season.

B. wrong: thrifty does not mean professional.

C. wrong: disinterested means impartial.

D. wrong: thrifty does not mean healthy.

Question 199 A 100 dm3 gas cylinder contains

A 10.0 dm3 gas cylinder contains a mixture of various gases. 50 cm3 of nitrogen gas is in the mixture. What is the concentration of N2 gas in parts per billion (ppb)?

- A. (50/1000) × 10^9
- B. (50/10000) × 10^9 ✓ **Correct answer**
- C. (50/100000) × 10^6
- D. (50/1000) × 10^6

A. wrong: 10.0 dm^3 is 10,000 cm^3, not 1,000 cm^3.

B. correct: the cylinder holds 10.0 dm^3 = 10,000 cm^3, so the fraction is 50/10,000 and the concentration in parts per billion is (50/10,000) × 10^9.

C. wrong: this uses the wrong volume and the wrong multiplier.

D. wrong: this uses the wrong volume and gives parts per million, not parts per billion.

200 Consider the following reactions i C2H2g

Consider the following reactions: i. C2H2(g) + H2(g) → C2H6(g) ii. N2(g) + 3H2(g) → 2NH3(g) Choose the catalysts employed for the reactions.

- A. Ni for both reactions (i) and (ii)
- B. Fe2O3 for both reactions (i) and (ii)
- C. Ni for reaction (i) and Fe2O3 for (ii) ✓ **Correct answer**
- D. Fe2O3 for reaction (i) and Ni for (ii)

A. wrong: the Haber process uses iron, not nickel.

B. wrong: the hydrogenation of ethyne uses nickel, not iron oxide.

C. correct: ethyne is hydrogenated over a nickel catalyst, and ammonia is synthesised from nitrogen and hydrogen over an iron (Fe2O3-promoted) catalyst.

D. wrong: the catalysts are the other way round.

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