MDCAT (FMDC entry test) — 2017 · Solved Past Paper

Body: Federal Medical & Dental College (FMDC) · **Post:** MDCAT (FMDC entry test) · **Year:** 2017 · **Questions:** 120 in the original paper — **108 solved and verified**, 12 excluded as defective (Q21, Q27, Q28, Q29, Q62, Q63, Q64, Q66, Q79, Q82, Q94, Q108) · **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: mdcatguide.com compilation, 'NUMS PAST PAPERS 2012–2020 — COMPLETE COLLECTION — 9 YEARS', NUMS 2017 section (pp. 69–84), served via noteslelo.pk (120 MCQs; 150 minutes, no negative marking; accessed 14 Nov 2026). The bundle mislabels this section 'NUMS 2017'; the paper is the HEC Phase-I test held Sunday 13 August 2017 for FMDC admissions (verified against the archived HEC Phase-I Green booklet, HAT-UG-M-5817-GREEN, on archive.org, and against the official NUMS 2017 pattern of 180 MCQs held 27 August 2017, which is a different paper). The quick answer grid (p. 81) and the complete key with detailed explanations (pp. 81–84) agree 120/120, and the archived HEC key agrees on every shared question it covers (Q1–Q80). 6 printed-key corrections; 4 PICK-ONE; 12 DEFECTIVE-excluded (Q21, Q27, Q28, Q29, Q62, Q63, Q64, Q66, Q79, Q82, Q94, Q108). Subjects follow served content: Biology Q2–Q40, Q58–Q60, Q103–Q104 (44), Chemistry Q47–Q51, Q61–Q90 (35), Physics Q1, Q91–Q102, Q105–Q120 (29), English Q41–Q46, Q52–Q57 (12) — the reproduction's printed section headers (Physics Q1–Q30, Chemistry Q31–Q60, English Q61–Q80, Biology Q81–Q120) do not match the served content, disclosed in the file. 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.

1 Physics

The number of significant figures in 0.00340 is

- A. 5
- B. 3 ✓ **Correct answer**
- C. 6
- D. 2

A. Wrong: leading zeros are not significant, so 0.00340 does not have 5 significant figures.

B. Correct: the significant figures are 3, 4 and the trailing 0 (3, 4, 0), so there are 3.

C. Wrong: the number has only 5 digits in total, and only 3 of them are significant.

D. Wrong: the trailing zero after the 4 is significant, so there are 3, not 2.

Question 2 Biology

When a hemophilic carrier woman marries a normal man, who among her offsprings may be affected:

- A. All her children
- B. All her daughters
- C. Half of her daughters
- D. None of above ✓ **Correct answer**

A. Wrong: the printed key records A, but a carrier mother (X^H X^h) crossed with a normal father (X^H Y) does not have all her children affected — her daughters receive a normal X from their father.

B. Wrong: daughters receive X^H from their father, so they are carriers, not affected.

C. Wrong: half her daughters are carriers, but carriers are not affected by this recessive trait.

D. Correct: the children who may actually be affected are half her SONS (those who receive

their mother), and that option is not listed, so "None of above" is the answer. (Printed-key correction: key A → D, decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 3 Biology

The oxygen bonding protein present in the skeletal muscles is:

- A. Globin
- B. Glycogen
- C. Myoglycogen
- D. Myoglobin ✓ **Correct answer**

A. Wrong: globin is the protein part of haemoglobin, not the muscle oxygen-binding protein.

B. Wrong: glycogen is a stored carbohydrate, not an oxygen-binding protein.

C. Wrong: myoglycogen is muscle glycogen, a storage polysaccharide, not an oxygen carrier.

D. Correct: myoglobin is the oxygen-binding protein of skeletal (and cardiac) muscle.

Question 4 Biology

The excretory product that requires minimum water for its elimination compare to others:

- A. Creatinine
- B. Ammonia
- C. Urea
- D. Uric Acid ✓ **Correct answer**

A. Wrong: creatinine is a minor waste product and needs more water than uric acid to excrete.

ammonia is highly toxic and needs the MOST water for its elimination, not the least.

C. Wrong: urea needs a moderate amount of water, more than uric acid.

D. Correct: uric acid is almost insoluble and is excreted as a semi-solid, needing the least water of all. (The stem prints a stray "Physi 1" prefix; it was stripped.)

Question 5 Biology

Homeostasis thermostat is present in brain:

- A. Hypothalamus ✓ **Correct answer**
- B. Medulla
- C. Cerebrum
- D. Pons

A. Correct: the hypothalamus is the body's thermostat, regulating temperature and homeostasis.

B. Wrong: the medulla controls breathing and heart rate, not the homeostasis thermostat.

C. Wrong: the cerebrum handles conscious thought and voluntary action, not thermoregulation.

D. Wrong: the pons relays signals between brain regions; it is not the thermostat.

Question 6 Biology

Pulmonary veins supply blood to heart chamber

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

e printed key records A, but the right atrium receives blood from the venae cavae (body), not from the pulmonary veins.

B. Correct: the pulmonary veins carry oxygenated blood from the lungs into the left atrium.

C. Wrong: the right ventricle receives blood from the right atrium, not directly from the pulmonary veins.

D. Wrong: the left ventricle receives blood from the left atrium, not directly from the pulmonary veins. (Printed-key correction: key A → B, decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 7 Biology

Sensation of pleasure, punishment or sexual arousal when stimulated by the parts of brain:

- A. Hippocampus
- B. Hypothalamus
- C. Amygdala ✓ **Correct answer**
- D. Thalamus

A. Wrong: the hippocampus handles memory formation, not pleasure and punishment.

B. Wrong: the hypothalamus regulates drives such as hunger and thirst, but the pleasure/punishment centre is the limbic amygdala.

C. Correct: the amygdala (part of the limbic system) is the centre for pleasure, punishment and sexual arousal.

D. Wrong: the thalamus is a relay station for sensory signals, not the pleasure centre. (The stem carries a watermark fragment — "CE TEST – 2017 d: 150 Minutes Qs = 120 Pattern ogy 40 sh 20 mistry 30 ics 30" — which was stripped; it is quoted in the attribution note above.)

8 Biology

Goiter is one of the abnormalities due to the deficiency of hormone:

- A. Adrenaline
- B. Thyroxin ✓ **Correct answer**
- C. Oxytocin
- D. Parathormone

A. Wrong: adrenaline deficiency does not cause goitre.

B. Correct: goitre is caused by deficiency of thyroxine (usually from iodine deficiency), which enlarges the thyroid gland.

C. Wrong: oxytocin controls uterine contraction and milk ejection, not the thyroid.

D. Wrong: parathormone regulates blood calcium, not the thyroid gland.

Question 9 Biology

Which bond is present between the nucleotides of DNA:

- A. Peptide bond
- B. Phosphodiester bond ✓ **Correct answer**
- C. Glycosidic bond
- D. Ester bond

A. Wrong: peptide bonds join amino acids in proteins, not nucleotides in DNA.

B. Correct: adjacent nucleotides in a DNA strand are joined by 3'-5' phosphodiester bonds.

C. Wrong: the glycosidic bond joins the base to the sugar within a nucleotide, not two nucleotides to each other.

D. Wrong: an ester bond is a general chemical linkage; the specific bond between nucleotides is the phosphodiester bond.

10 Biology

Two parents one haemophilic & other carrier, chances among the male offspring to be haemophilic:

- A. 25%
- B. 50% ✓ **Correct answer**
- C. 75%
- D. 100%

A. Wrong: half, not a quarter, of the sons receive the affected X chromosome.

B. Correct: a haemophilic father (X^h Y) crossed with a carrier mother (X^H X^h) gives sons who receive Y from the father and either X^H (normal) or X^h (haemophilic) from the mother — 50% haemophilic.

C. Wrong: three-quarters is not the ratio for sons in this cross.

D. Wrong: half the sons receive the mother's normal X and are unaffected.

Question 11 Biology

Dark reaction of photosynthesis takes place:

- A. Grana
- B. Stroma ✓ **Correct answer**
- C. Thylakoid
- D. Both a & b

A. Wrong: the grana (stacks of thylakoids) are the site of the light reaction, not the dark reaction.

B. Correct: the dark reaction (Calvin cycle) takes place in the stroma of the chloroplast.

C. Wrong: thylakoids house the light-dependent reactions.

D. Wrong: the dark reaction is in the stroma only, not in the grana.

12 Biology

Uncontrolled production of WBCs results in a disorder called:

- A. Leukaemia ✓ **Correct answer**
- B. Oedema
- C. Thalassaemia
- D. Atherosclerosis

A. Correct: leukaemia is the uncontrolled production of white blood cells.

B. Wrong: oedema is swelling from fluid accumulation, not a WBC disorder.

C. Wrong: thalassaemia is a disorder of haemoglobin production, not of WBC numbers.

D. Wrong: atherosclerosis is the hardening of arteries, not a blood-cell disorder. (Option A prints "Leucaemia" in the source; it is corrected to "Leukaemia" and the correction is recorded.)

Note: Filed option A read "Leucaemia" (misprint in the source reproduction); corrected to "Leukaemia" as documented in the reviewed file.

Question 13 Biology

Which trait is not sex-linked recessive:

- A. Haemophilia
- B. Colour blindness
- C. Hypophosphatemic rickets ✓ **Correct answer**
- D. TFM syndrome

A. Wrong: haemophilia IS sex-linked recessive, so it is not the answer to "which is not".

B. Wrong: colour blindness IS sex-linked recessive, so it is not the answer.

C. Correct: hypophosphatemic rickets is X-linked DOMINANT, not recessive, so it is the trait that is not sex-linked recessive.

sticular feminization (androgen insensitivity) syndrome IS X-linked recessive, so it is not the answer. (Option C prints "Hypophosphatemicrocket" and option D prints "tfm syndrome" in the source; both are corrected and the corrections are recorded.)

Note: Filed option C read "Hypophosphatemicrocket" (misprint in the source reproduction); corrected to "Hypophosphatemic rickets" as documented in the reviewed file. Filed option D read "tfm syndrome" (misprint in the source reproduction); corrected to "TFM syndrome" as documented in the reviewed file.

Question 14 Biology

Plants of this group are called ferns:

- A. Filicinae ✓ **Correct answer**
- B. Angiospermae
- C. Gymnospermae
- D. All of them

A. Correct: ferns belong to the class Filicinae (Pteropsida).

B. Wrong: angiosperms are flowering plants, not ferns.

C. Wrong: gymnosperms are cone-bearing seed plants, not ferns.

D. Wrong: only the Filicinae are ferns.

Question 15 Biology

The mechanism by which organisms stability of cellular movement is known as:

- A. Homeostasis ✓ **Correct answer**
- B. Natural health
- C. Structural adaptation
- D. Osmoregulation

A. Correct: homeostasis is the mechanism by which organisms maintain a stable internal

B. Wrong: this is not a biological mechanism.

C. Wrong: structural adaptation is a long-term evolutionary change, not the maintenance of internal stability.

D. Wrong: osmoregulation is only the control of water and salt balance, a part of homeostasis, not the whole mechanism. (The stem's "stability of cellular movement" is filed as printed; the intended sense is the maintenance of a stable internal environment.)

Question 16 Biology

When the concentration of external medium is equal to the concentration of internal medium of cell, the situation is called:

- A. Hypertonic
- B. Hypotonic
- C. Isotonic ✓ **Correct answer**
- D. Heterotonic

A. Wrong: hypertonic means the external medium is MORE concentrated than the cell.

B. Wrong: hypotonic means the external medium is LESS concentrated than the cell.

C. Correct: isotonic means the external and internal concentrations are equal, so there is no net water movement.

D. Wrong: this is not a term used for tonicity.

Question 17 Biology

Brassica and rose plant belong to the group of plants:

- A. Hydrophytes
- B. Mesophytes ✓ **Correct answer**

ophytes

- D. Succulent

A. Wrong: hydrophytes live in water; Brassica and rose are land plants.

B. Correct: Brassica and rose are mesophytes, plants of moderate water supply.

C. Wrong: xerophytes are adapted to dry conditions, which these are not.

D. Wrong: succulents store water in fleshy tissues; neither Brassica nor rose is a succulent.

Question 18 Biology

Animals which are unable to adjust their internal salt concentration according to external environment is:

- A. Anhydrobiosis
- B. Osmoregulators
- C. Thermoregulatory
- D. Osmoconformers ✓ **Correct answer**

A. Wrong: anhydrobiosis is survival in a dried state, not the inability to regulate salt.

B. Wrong: the printed key records B, but osmoregulators CAN adjust their internal salt concentration — that is the opposite of what the stem asks.

C. Wrong: thermoregulation concerns temperature, not salt concentration.

D. Correct: osmoconformers cannot adjust their internal salt concentration and instead conform to the external medium. (Printed-key correction: key B → D, decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 19 Biology

Which of the following animal can survive without drinking water?

- A. Kangaroo rat ✓ **Correct answer**

- C. Kangaroo
- D. Camel

A. Correct: the kangaroo rat survives without ever drinking water, producing metabolic water from its dry-seed diet.

B. Wrong: pigs need to drink water regularly.

C. Wrong: kangaroos drink water when it is available.

D. Wrong: camels can go long periods without water, but they do drink water; they do not survive without it indefinitely.

Question 20 Biology

Nitrogenous wastes are produced as a result of:

- A. Photosynthesis
- B. Ingestion
- C. Assimilation
- D. Deamination ✓ **Correct answer**

A. Wrong: photosynthesis produces carbohydrates and oxygen, not nitrogenous wastes.

B. Wrong: ingestion is taking in food, not the production of nitrogenous waste.

C. Wrong: assimilation builds body substances from absorbed nutrients; it does not produce nitrogenous waste.

D. Correct: deamination removes the amino group from amino acids, producing ammonia and other nitrogenous wastes.

Question 21 Biology

Fresh water proteroants pumped out excess water by a special structure called:

l groove Contractive vacuole

- B. Vesicle
- C. Vacuole

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. The source prints only three option rows and option A merges two option texts ("Oral groove" and "Contractive vacuole"), so the item cannot be served complete.

B. The printed key records B, but with the option layout broken the question cannot be served as a four-option MCQ.

C. The correct structure is the contractile vacuole, which is trapped inside the merged option A, so no option can be filed as the answer. (DEFECTIVE-excluded: only three option rows are printed in the source and option A merges two option texts; the printed key B is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 22 Biology

The word glycogenesis means, the conversion of:

- A. Glucose to glycogen ✓ **Correct answer**
- B. Lactic acid to glycogen
- C. Glycogen to glucose
- D. Amino acid to glycogen

A. Correct: glycogenesis is the synthesis of glycogen from glucose.

B. Wrong: converting lactic acid to glycogen is part of gluconeogenesis, not glycogenesis.

C. Wrong: the printed key records C, but glycogen to glucose is glycogenolysis, the opposite process.

mino acids are converted to glucose by gluconeogenesis, not by glycogenesis. (Printed-key correction: key C → A, decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 23 Biology

Which of the following nitrogenous compound is much more soluble in water?

- A. Uric Acid
- B. Urea
- C. Ammonia ✓ **Correct answer**
- D. Creatine

A. Wrong: uric acid is almost insoluble in water.

B. Wrong: the printed key records B, but although urea is very soluble, ammonia is far more soluble (about 700 volumes of ammonia dissolve in one volume of water).

C. Correct: ammonia is by far the most water-soluble of the four nitrogenous compounds.

D. Wrong: creatine is only slightly soluble in water. (Printed-key correction: key B → C, decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 24 Biology

It is the smallest eukaryote:

- A. Virus
- B. Bacteria
- C. Plasmodium ✓ **Correct answer**
- D. Sponge

A. Wrong: a virus is not a cell at all, so it cannot be a eukaryote.

B. Wrong: bacteria are prokaryotes, not eukaryotes.

f the options, Plasmodium is the only single-celled eukaryote (a protozoan); the sponge is a multicellular eukaryote and much larger.

D. Wrong: a sponge is a multicellular animal, far larger than a single-celled protozoan.

Question 25 Biology

Trypsinogen is activated by:

- A. Chymotrypsin
- B. Enteropeptidase ✓ **Correct answer**
- C. Trypsin
- D. HCL

A. Wrong: chymotrypsin is a different protease, activated from chymotrypsinogen; it does not activate trypsinogen.

B. Correct: enteropeptidase (enterokinase) of the intestinal wall activates trypsinogen to trypsin.

C. Wrong: trypsin can activate further trypsinogen (autocatalysis), but the initial activator is enteropeptidase.

D. Wrong: hydrochloric acid activates pepsinogen in the stomach, not trypsinogen in the intestine.

Question 26 Biology

Role of lysosomes are:

- A. Hydrolytic enzymes
- B. Autophagy
- C. Destruction of cell
- D. All of above ✓ **Correct answer**

A. Wrong as the sole answer: lysosomes do contain hydrolytic enzymes, but that is only

B. Wrong as the sole answer: lysosomes do carry out autophagy, but that is only one of their roles.

C. Wrong as the sole answer: lysosomes do destroy the cell (autolysis), but that is only one of their roles.

D. Correct: lysosomes contain hydrolytic enzymes, carry out autophagy and can destroy the cell, so all of the above are their roles.

Question 27 Biology

Which of the following statement is incorrect:

- A. Competitive inhibitor binds to alternative site
- B. The substrate binds to active site
- C. Enzymes work best in low pH
- D. Both a & b

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. This statement IS incorrect (a competitive inhibitor binds to the ACTIVE site; it is the non-competitive inhibitor that binds an alternative site), so A is an incorrect statement.

B. This statement is CORRECT, so it cannot be the incorrect statement.

C. This statement is ALSO incorrect as a general claim (most enzymes work best near neutral pH; only a few, such as pepsin, prefer low pH), so C is a second incorrect statement.

D. The printed key records D, but D is wrong because B is a correct statement, and there is no option covering both incorrect statements (A and C), so the question has no uniquely correct option. (DEFECTIVE-excluded: two statements are incorrect (A and C) but no option

the printed key D is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 28 Biology

All of the following are characteristics of kingdom fungi except:

- A. Heterotrophy
- B. Sessil
- C. Cell wall
- D. All of above

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. Fungi ARE heterotrophic, so this is a genuine characteristic, not the exception.

B. Fungi ARE sessile (non-motile), so this is a genuine characteristic, not the exception.

C. Fungi DO have cell walls (of chitin), so this is a genuine characteristic, not the exception.

D. The printed key records D, but D cannot be the exception since A, B and C are all genuine fungal characteristics, so the question has no correct option. (DEFECTIVE-excluded: no option is the exception to the fungal characteristics; the printed key D is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 29 Biology

Italic is the scientific name of a

- A. Fungus
- B. Smut
- C. Bacterium
- D. Yeast

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

A. The name that would identify the organism is lost from the stem, so no option can be chosen on the evidence.

B. The name that would identify the organism is lost from the stem, so no option can be chosen on the evidence.

C. The name that would identify the organism is lost from the stem, so no option can be chosen on the evidence.

D. The printed key records D, but the scientific name (printed in italics in the original) is lost and only the word "Italic" survives in the stem, so the question cannot be answered. (DEFECTIVE-excluded: the scientific name in the stem is lost; only the word "Italic" survives. The printed key D is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 30 Biology

The stored food in fungi is usually lipid droplets of:

- A. Glucose
- B. Glycogen ✓ **Correct answer**
- C. Starch
- D. Protein

A. Wrong: glucose is not the stored food of fungi.

B. Correct: fungi store food as glycogen (and lipid droplets).

C. Wrong: starch is the stored food of plants, not of fungi.

D. Wrong: protein is not the stored food of fungi. (The stem's "lipid droplets of" is filed as printed; the intended question is evidently "the stored food in fungi is usually ___".)

31 Biology

The haploid number of chromosomes in human beings:

- A. 4
- B. 10
- C. 24
- D. 23 ✓ **Correct answer**

A. Wrong: 4 is not the haploid chromosome number of humans.

B. Wrong: 10 is not the haploid chromosome number of humans.

C. Wrong: 24 is one more than the haploid number (the diploid number is 46).

D. Correct: the haploid number in human gametes is 23 chromosomes.

Question 32 Biology

Rod shaped bacteria are known as:

- A. Cocci
- B. Bacilli ✓ **Correct answer**
- C. Spirilla
- D. None of these

A. Wrong: cocci are spherical bacteria, not rod-shaped.

B. Correct: rod-shaped bacteria are called bacilli.

C. Wrong: spirilla are spiral-shaped bacteria, not rod-shaped.

D. Wrong: "bacilli" is the correct term.

Question 33 Biology

Curve screw shaped bacteria are known as:

- B. Bacilli
- C. Spirilla ✓ **Correct answer**
- D. None of these

A. Wrong: cocci are spherical, not curved or screw-shaped.

B. Wrong: bacilli are straight rods, not curved or screw-shaped.

C. Correct: curved, screw-shaped bacteria are called spirilla.

D. Wrong: "spirilla" is the correct term. (Option C prints "Sprilla" in the source; it is corrected to "Spirilla" and the correction is recorded.)

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

Question 34 Biology

In many bacteria cell wall is enclosed within a slime capsule made up of:

- A. Polysaccharides ✓ **Correct answer**
- B. Cellulose
- C. Amino Acids
- D. Proteins

A. Correct: the bacterial slime capsule is made of polysaccharides.

B. Wrong: cellulose is the cell-wall material of plants, not the bacterial slime capsule.

C. Wrong: amino acids are the units of proteins, not the material of the slime capsule.

D. Wrong: the slime capsule is polysaccharide, not protein.

35 Biology

The DNA of the bacterium is present in distinct region called:

- A. Nucleolus
- B. Centrosome
- C. Nucleoid ✓ **Correct answer**
- D. Nucleus

A. Wrong: the nucleolus is a structure inside a eukaryotic nucleus, not the bacterial DNA region.

B. Wrong: the centrosome organises microtubules in animal cells; it is not the bacterial DNA region.

C. Correct: the bacterial DNA lies in a distinct region called the nucleoid.

D. Wrong: bacteria have no true nucleus; their DNA is in the nucleoid.

Question 36 Biology

The cellular DNA of a bacterium is known as the

- A. Plasmid ✓ **Correct answer**
- B. Genes
- C. Chromosomes
- D. Histone

A. Filed: the printed key records A, and this is the textbook's intended answer for the extra-chromosomal DNA of a bacterium (the small circular DNA molecule separate from the main chromosome).

B. Wrong: genes are units of heredity, not the name for the bacterial cellular DNA.

C. Also defensible: the bacterium's main cellular DNA IS its single chromosome (in the nucleoid), so a reader who takes "cellular DNA" to mean the main DNA would choose this;

D. Wrong: histones are the proteins that package DNA in eukaryotes, not the bacterial DNA itself. (PICK-ONE: A is filed per the printed key; C is also defensible.)

Question 37 Biology

The bacteria can cope unfavourable condition by producing

- A. Mesosomes
- B. Zygospores
- C. Endospores ✓ **Correct answer**
- D. Cysts

A. Wrong: mesosomes are invaginations of the bacterial cell membrane, not survival structures.

B. Wrong: zygospores are the resting spores of some fungi, not of bacteria.

C. Correct: bacteria survive unfavourable conditions by producing resistant endospores.

D. Wrong: cysts are the resting stages of some protozoa, not the bacterial survival structure.

Question 38 Biology

The cell membrane of a bacterial cell often invaginates to produce membranous structures referred to as:

- A. Centrosomes
- B. Mesosomes ✓ **Correct answer**
- C. Dictyosomes
- D. Polysomes

A. Wrong: centrosomes are microtubule-organising centres of animal cells, not bacterial membrane invaginations.

invaginations of the bacterial cell membrane are called mesosomes.

C. Wrong: dictyosomes are stacks of the Golgi apparatus in plant cells.

D. Wrong: polysomes are groups of ribosomes on a messenger RNA, not membrane invaginations.

Question 39 Biology

Mitosis can't take place in bacteria because they lack ---

- A. Chromosomes
- B. Nucleus ✓ **Correct answer**
- C. Centrosome
- D. Mesosomes

A. Wrong: bacteria DO have a chromosome (a single circular DNA molecule), so this is not what they lack.

B. Correct: bacteria have no true nucleus, and mitosis is the division of a nucleus, so it cannot take place in them.

C. Wrong: the absence of a centrosome is not the reason mitosis cannot occur; the absence of a nucleus is.

D. Wrong: bacteria DO have mesosomes, so this is not what they lack.

Question 40 Biology

Apparently which bacteria is more resistance to antibiotics?

- A. Gram positive bacteria
- B. Gram negative bacteria ✓ **Correct answer**
- C. Both a & b
- D. None of these

Gram-positive bacteria lack the outer membrane that gives Gram-negative bacteria their extra resistance.

B. Correct: Gram-negative bacteria are generally more resistant to antibiotics because of their outer membrane, which blocks many drugs.

C. Wrong: the two groups are not equally resistant; Gram-negative bacteria are more resistant.

D. Wrong: Gram-negative bacteria are the more resistant group.

Question 41 English

He invited and Zia to dinner.

- A. we
- B. you ✓ **Correct answer**
- C. us
- D. them

A. Wrong: "we" is a subject pronoun and cannot follow the verb "invited" as its object.

B. Filed: the printed key records B ("He invited you and Zia to dinner"), the test-maker's intended answer.

C. Also grammatical: "He invited us and Zia to dinner" is correct English, so this is also defensible.

D. Also grammatical: "He invited them and Zia to dinner" is correct English, so this is also defensible. (PICK-ONE: B is filed per the printed key; C and D are also grammatical in the blank.)

Question 42 English

Neither they nor their friend _____ solved the question.

✓ Correct answer

- B. have
- C. was
- D. were

A. Correct: with "neither ... nor" the verb agrees with the nearer subject ("their friend", singular), so "has" is correct.

B. Wrong: "have" is plural and does not agree with the singular nearer subject "their friend".

C. Wrong: "was" is the wrong verb entirely — the sentence needs "has solved", not "was solved".

D. Wrong: "were" is plural and the wrong verb for this sentence.

Question 43 English

He asked me_____

- A. how are you.
- B. how was I?
- C. how you are?
- D. How I was. ✓ **Correct answer**

A. Wrong: in reported speech the question word order and tense must change; "He asked me how are you" is incorrect.

B. Wrong: the pronoun is wrong — he asked about the speaker ("me"), not about himself ("I" as the subject of the reported question is misplaced here).

C. Wrong: the word order is that of a direct question, which is incorrect in reported speech.

D. Correct: in reported speech, "How are you?" becomes "how I was" — "He asked me how

Question 44 English

She asked me .

- A. bring a glass of water for her.
- B. to bring a glass of water for me.
- C. to bring a glass of water for her. ✓ **Correct answer**
- D. None of these

A. Wrong: after "asked me" the infinitive "to bring" is needed; the bare "bring" is incorrect.

B. Wrong: the water is for HER (she asked), not for the speaker ("me").

C. Correct: "She asked me to bring a glass of water for her."

D. Wrong: option C is correct. (The stem is truncated — "She asked me ." — and the infinitive sits in the options; the keyed C is unaffected.)

Question 45 English

When your friend .he'll be very tired.

- A. arrived
- B. will arrive
- C. arrives ✓ **Correct answer**
- D. is arriving

A. Wrong: the past tense does not fit a "when" clause referring to the future.

B. Wrong: "will" is not used in a "when" clause for the future; the present simple is used.

C. Correct: "When your friend arrives, he'll be very tired" — the present simple is used in the "when" clause for a future event.

D. Wrong: the present continuous does not fit this conditional future sense. (The stem is

"When your friend .he'll be very tired." — and the blank sits in the options; the keyed C is unaffected.)

Question 46 English

The sentence which has one dependent and one independent class is called

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

A. Wrong: a compound sentence has two or more INDEPENDENT clauses, not one dependent and one independent.

B. Correct: a complex sentence has one independent clause and at least one dependent clause.

C. Wrong: a compound-complex sentence has two or more independent clauses plus at least one dependent clause.

D. Wrong: an exclamatory sentence expresses strong feeling; it is not defined by its clause structure. (Option D carries a stray "Pick up the wrong one:" — the instruction for a later question — which was stripped.)

Question 47 Chemistry

The IUPAC name of CH3-CH2-OH is

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

A. Wrong: methanol is CH3-OH (one carbon), not CH3-CH2-OH.

H3-CH2-OH has two carbons and an -OH group, so its IUPAC name is ethanol.

C. Wrong: propanol has three carbons (CH3-CH2-CH2-OH).

D. Wrong: butanol has four carbons. (The stem prints "CH -CH -OH" with the subscripts lost; the formula CH3-CH2-OH is restored and the restoration is recorded.)

Question 48 Chemistry

Which of the following is an electrophile?

- A. NH3
- B. H2O
- C. BF3 ✓ **Correct answer**
- D. OH-

A. Wrong: ammonia has a lone pair and donates electrons, so it is a nucleophile, not an electrophile.

B. Wrong: water has lone pairs and donates electrons, so it is a nucleophile, not an electrophile.

C. Correct: boron trifluoride is electron-deficient (boron has only six electrons in its valence shell), so it accepts an electron pair — it is an electrophile.

D. Wrong: the hydroxide ion is electron-rich and donates electrons, so it is a nucleophile, not an electrophile. (The options print with subscripts lost — "NH", "H O", "BF", "OH" — and the formulae NH3, H2O, BF3 and OH- are restored and the restorations are recorded.)

Note: Filed option A read "NH" (misprint in the source reproduction); corrected to "NH3" as documented in the reviewed file. Filed option B read "H O" (misprint in the source reproduction); corrected to "H2O" as documented in the reviewed file. Filed option C read "BF" (misprint in the source reproduction); corrected to "BF3" as documented in the reviewed file. Filed option D read "OH" (misprint in the source reproduction); corrected to "OH-" as documented in the reviewed file.

49 Chemistry

Saponification is the hydrolysis of esters in the presence of

- A. Acid
- B. Base ✓ **Correct answer**
- C. Water
- D. Enzyme

A. Wrong: acid hydrolysis of esters is ordinary hydrolysis, not saponification.

B. Correct: saponification is the alkaline hydrolysis of esters (with a base such as NaOH), giving soap and glycerol.

C. Wrong: water alone does not define saponification; the base is the defining reagent.

D. Wrong: enzymes (lipases) can hydrolyse esters, but saponification is specifically the base-catalysed reaction.

Question 50 Chemistry

The monomer of natural rubber is

- A. Ethylene
- B. Propylene
- C. Isoprene ✓ **Correct answer**
- D. Styrene

A. Wrong: ethylene polymerises to polythene, not to natural rubber.

B. Wrong: propylene polymerises to polypropylene, not to natural rubber.

C. Correct: natural rubber is polyisoprene, made by polymerising isoprene (2-methylbuta-1,3-diene).

D. Wrong: styrene polymerises to polystyrene, not to natural rubber.

51 Chemistry

The boiling point of water at high altitude is

- A. Higher than 100°C
- B. Lower than 100°C ✓ **Correct answer**
- C. Same as 100°C
- D. Depends on humidity

A. Wrong: at high altitude the atmospheric pressure is lower, so water boils at a lower temperature, not a higher one.

B. Correct: at high altitude the air pressure is lower, so water boils below 100°C.

C. Wrong: the boiling point changes with pressure, so it is not the same as at sea level.

D. Wrong: the boiling point depends on atmospheric pressure, not on humidity.

Question 52 English

REAL:

- A. Copied
- B. Idea
- C. Original ✓ **Correct answer**
- D. Given

A. Wrong: "copied" is the opposite of "real" in this sense (a copy is not the real thing).

B. Wrong: an idea is a thought, not a synonym of "real".

C. Correct: "real" here means genuine or original, as opposed to a copy.

D. Wrong: "given" means granted or handed over, not "real".

53 English

ABSOLUTE:

- A. Division
- B. Complete ✓ **Correct answer**
- C. Small
- D. Half

A. Wrong: division means splitting, not "absolute".

B. Correct: "absolute" means total or complete (an absolute majority, absolute certainty).

C. Wrong: "small" is unrelated to "absolute".

D. Wrong: "half" is the opposite of complete.

Question 54 English

UNFOLD:

- A. Conceal
- B. Withhold
- C. Maintain
- D. Elaborate ✓ **Correct answer**

A. Wrong: "conceal" means to hide, the opposite of unfolding.

B. Wrong: "withhold" means to hold back, the opposite of unfolding.

C. Wrong: "maintain" means to keep up, not to unfold.

D. Correct: to unfold (a story, an argument) is to elaborate it, to lay it out in detail.

Question 55 English

COMMENCE:

- B. To Begin ✓ **Correct answer**
- C. Nearing Finish
- D. To Run

A. Wrong: "to end" is the opposite of "to commence".

B. Correct: "commence" means to begin.

C. Wrong: "nearing finish" is close to ending, the opposite of commencing.

D. Wrong: "to run" is unrelated to "commence". (The instruction for Q56–Q57 — "For question 56-57 choose the word nearly opposite in meaning to the given word." — is printed inside Q55's option D cell; it was stripped and option D filed as "To Run".)

Question 56 English

ANXIETY:

- A. Problem
- B. Worry
- C. Relaxed ✓ **Correct answer**
- D. Nervous

A. Wrong: a problem is a difficulty, not the opposite of anxiety.

B. Wrong: worry is a synonym of anxiety, not its opposite.

C. Correct: the opposite of anxiety is being relaxed (calm).

D. Wrong: nervous is a synonym of anxious, not its opposite. (Q56–Q57 ask for the word nearly opposite in meaning to the given word.)

Question 57 English

FORTH

k ✓ Correct answer

- B. Out
- C. Into view
- D. Onward

A. Correct: the opposite of "forth" (forward, onward) is "back".

B. Wrong: "out" is close in meaning to "forth" (as in "bring forth"), not its opposite.

C. Wrong: "into view" is close in meaning to "forth", not its opposite.

D. Wrong: "onward" is a synonym of "forth", not its opposite. (Option A prints "Black" in the source, evidently a misprint of "Back"; it is corrected to "Back" and the correction is recorded. Q56–Q57 ask for the word nearly opposite in meaning to the given word.)

Note: Filed option A read "Black" (misprint in the source reproduction); corrected to "Back" as documented in the reviewed file.

Question 58 Biology

Which of the following organisms has a three-chambered heart?

- A. Fish
- B. Frog ✓ **Correct answer**
- C. Bird
- D. Mammal

A. Wrong: fish have a two-chambered heart (one atrium, one ventricle).

B. Correct: frogs (amphibians) have a three-chambered heart (two atria, one ventricle).

C. Wrong: birds have a four-chambered heart.

D. Wrong: mammals have a four-chambered heart.

59 Biology

The process of cell division in which chromosome number is halved is

- A. Mitosis
- B. Meiosis ✓ **Correct answer**
- C. Amitosis
- D. Cytokinesis

A. Wrong: mitosis keeps the chromosome number the same; it does not halve it.

B. Correct: meiosis is the reduction division that halves the chromosome number (diploid to haploid).

C. Wrong: amitosis is direct nuclear division without chromosome halving.

D. Wrong: cytokinesis is the division of the cytoplasm, not the halving of the chromosome number.

Question 60 Biology

The first stage of mitosis is

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

A. Wrong: anaphase is the third stage, when sister chromatids separate.

B. Wrong: metaphase is the second stage, when chromosomes line up at the equator.

C. Correct: prophase is the first stage of mitosis (chromosomes condense, the spindle forms).

D. Wrong: telophase is the last stage, when the nuclei reform.

61 Chemistry

The amount (in litres) of Oxygen at STP that is required for the combustion of 4gm of ethylene

- A. 96 litres
- B. 9.6 litres ✓ **Correct answer**
- C. 44.8 litres
- D. 7.2 litres

A. Wrong: 96 litres is ten times too much; it is the volume for 40 g, not 4 g.

B. Correct: $C_2H_4 + 3O_2 \rightarrow 2CO_2 + 2H_2O$; 4 g of ethylene is 4/28 = 1/7 mol, needing 3/7 mol of O_2, which is 3/7 x 22.4 = 9.6 litres at STP.

C. Wrong: 44.8 litres is the volume of 2 moles of gas at STP, not the oxygen needed here.

D. Wrong: 7.2 litres does not follow from the 1:3 mole ratio of the balanced equation.

Question 62 Chemistry

CO and O_2 diffuse in the ratio of 0.58:0.55 what is the mass of O_2:

- A. 2.44
- B. 23.2
- C. 48.93
- D. 2.32

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. The stem does not state a determinable quantity: it gives a diffusion ratio but asks for "the mass of O_2" with no mass, volume or amount of CO given.

B. The stem does not state a determinable quantity, so no option can be derived from it.

C. The printed key records C, but the stem as printed asks an unanswerable question, so

ot be verified.

D. The stem does not state a determinable quantity, so no option can be derived from it. (DEFECTIVE-excluded: the stem is incoherent — it gives a diffusion ratio (0.58:0.55) and asks for "the mass of O2" with no starting quantity given; the printed key C is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 63 Chemistry

H and O are diffusing under same condition how much H2 gas will diffuse

- A. 4
- B. 16
- C. 32
- D. 0.5

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. The printed key records A, but the stem gives no starting amount of gas and no stated quantity to compute, so the key cannot be verified.

B. The stem gives no starting amount of gas, so no option can be derived from it.

C. The stem gives no starting amount of gas, so no option can be derived from it.

D. The stem gives no starting amount of gas, so no option can be derived from it. (DEFECTIVE-excluded: the stem is incoherent — "H and O are diffusing under same condition, how much H2 gas will diffuse?" — with no amount, volume or ratio given; the printed key A is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 64 Chemistry

The value of surface tension of isopropyl alcohol is:

- B. Less than ethylene glycol
- C. Less than methyl alcohol
- D. Same as ethyl alcohol

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. This is TRUE (isopropyl alcohol 21.7 mN/m is less than water's 72.8 mN/m), so it is a correct statement, not a wrong one.

B. This is TRUE (21.7 is less than ethylene glycol's 47.7 mN/m), so it is also a correct statement.

C. This is TRUE (21.7 is less than methyl alcohol's 22.5 mN/m), so it is a third correct statement.

D. The printed key records D, but isopropyl alcohol (21.7 mN/m) is not the same as ethyl alcohol (22.3 mN/m), and A, B and C are all true, so there is no unique answer. (DEFECTIVE-excluded: three options (A, B and C) are all true and the keyed D is wrong; the printed key D is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 65 Chemistry

A solution of Sodium Sulphate was electrolyzed using some inert electrode; the products at the electrodes are:

- A. O2, H2 ✓ **Correct answer**
- B. O2, Na
- C. O2, SO2
- D. O2, SO

A. Correct: in the electrolysis of aqueous sodium sulphate with inert electrodes, water is oxidised at the anode (giving O2) and reduced at the cathode (giving H2), because Na+ is

educe and SO4(2-) too hard to oxidise.

B. Wrong: sodium metal is not deposited at the cathode from an aqueous solution; hydrogen is.

C. Wrong: sulphur dioxide is not a product of this electrolysis.

D. Wrong: sulphur monoxide is not a product of this electrolysis. (The options print with subscripts lost — "0, Hi 2", "0, Na 2", "0, SO 2", "0, S O" — and the products O2/H2, O2/Na, O2/SO2 and O2/SO are restored and the restorations are recorded.)

Note: Filed option A read "0, Hi 2" (misprint in the source reproduction); corrected to "O2, H2" as documented in the reviewed file. Filed option B read "0, Na 2" (misprint in the source reproduction); corrected to "O2, Na" as documented in the reviewed file. Filed option C read "0, SO 2" (misprint in the source reproduction); corrected to "O2, SO2" as documented in the reviewed file. Filed option D read "0, S O" (misprint in the source reproduction); corrected to "O2, SO" as documented in the reviewed file.

Question 66 Chemistry

Which order reaction obey the expression t1/2 = — 1/2

- A. First
- B. Second
- C. Third
- D. Zero

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. The half-life expression in the stem is lost, so the order cannot be read from it.

B. The printed key records B, but the expression in the stem prints only as "t i = — 1/2" and cannot be identified (a second-order half-life is t1/2 = 1/k[A]0, a first-order half-life is t1/2 = 0.693/k), so the key cannot be verified.

fe expression in the stem is lost, so the order cannot be read from it.

D. The half-life expression in the stem is lost, so the order cannot be read from it. (DEFECTIVE-excluded: the half-life expression in the stem is lost in the source; the printed key B is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 67 Chemistry

Which of the following indicate the correct variation of electro negativity

- A. F>N>O>C
- B. F>N<O>C ✓ **Correct answer**
- C. F<N<O<C
- D. F>N>O<C

A. Wrong: this claims nitrogen is more electronegative than oxygen, but oxygen (3.5) is more electronegative than nitrogen (3.0).

B. Correct: read as F > N, O > N and O > C, this is satisfied by the true order F (4.0) > O (3.5) > N (3.0) > C (2.5).

C. Wrong: this claims fluorine is the least electronegative, but fluorine is the most electronegative element.

D. Wrong: this claims carbon is more electronegative than oxygen, but oxygen (3.5) is far more electronegative than carbon (2.5).

Question 68 Chemistry

The products of decomposition of Mg(NO3)2 are

- A. MgO and NO2
- B. Mg and NO2
- C. MgO, NO2, O2 ✓ **Correct answer**

A. Wrong: this omits the oxygen that is also evolved on heating magnesium nitrate.

B. Wrong: magnesium metal is not a product; the metal stays as the oxide MgO.

C. Correct: 2Mg(NO3)2 → 2MgO + 4NO2 + O2 on heating.

D. Wrong: this is the starting material, not a product.

Question 69 Chemistry

If a person is injected by shot of a gun and all the bullets are not removed from his body it may cause poisoning by

- A. Hg
- B. Pb ✓ **Correct answer**
- C. Fe
- D. As

A. Wrong: bullets are not made of mercury, so retained bullets do not cause mercury poisoning.

B. Correct: bullets are made of lead, and lead retained in the body causes lead poisoning.

C. Wrong: bullets are not made of iron, so retained bullets do not cause iron poisoning.

D. Wrong: bullets are not made of arsenic.

Question 70 Chemistry

Nitric Oxide has valence electrons.

- A. 10
- B. 13
- C. 11 ✓ **Correct answer**
- D. 12

trogen contributes 5 valence electrons and oxygen 6, which totals 11, not 10.

B. Wrong: 5 + 6 = 11, not 13.

C. Correct: nitric oxide (NO) has 5 (N) + 6 (O) = 11 valence electrons.

D. Wrong: 5 + 6 = 11, not 12. (Option C prints "il" in the source, evidently "11"; it is corrected to "11" and the correction is recorded.)

Note: Filed option C read "il" (misprint in the source reproduction); corrected to "11" as documented in the reviewed file.

Question 71 Chemistry

Which metal is used generally for the filament of electric bulbs?

- A. Pt
- B. Fe
- C. Cu
- D. W ✓ **Correct answer**

A. Wrong: platinum is too expensive and is not used for bulb filaments.

B. Wrong: iron melts at too low a temperature and oxidises, so it is not used for filaments.

C. Wrong: copper melts at too low a temperature for a filament.

D. Correct: tungsten (W) has a very high melting point (3422°C) and is the standard filament metal.

Question 72 Chemistry

Maleic Acid and fumaric acid are

- A. Cis-Trans isomers ✓ **Correct answer**
- B. Chain isomers
- C. Position isomers

A. Correct: maleic acid is the cis form and fumaric acid is the trans form of butenedioic acid — they are cis-trans (geometrical) isomers.

B. Wrong: chain isomers differ in the carbon skeleton; these two have the same skeleton.

C. Wrong: position isomers differ in where a group sits on the chain; these differ only in geometry around the double bond.

D. Wrong: metamers differ in the distribution of carbon atoms around a functional group, which is not the case here.

Question 73 Chemistry

All of the following react with KMnO4 but _____

- A. Ethane ✓ **Correct answer**
- B. Ethyne
- C. Ethyl benzene
- D. Ethene

A. Correct: ethane is a saturated alkane and does not react with (decolourise) potassium permanganate; it is the one that does NOT react.

B. Wrong: ethyne (an alkyne) is oxidised by KMnO4, so it does react.

C. Wrong: ethyl benzene is oxidised by KMnO4 (side-chain oxidation to benzoic acid), so it does react.

D. Wrong: ethene (an alkene) is oxidised by KMnO4, so it does react. (The stem prints "All of the following react with KMNO but 4" — the "4" is the displaced subscript of KMnO4 — and is filed as "All of the following react with KMnO4 but _____", i.e. which one does NOT react.)

74 Chemistry

The test used to distinguish among Primary, Secondary and Tertiary alcohols

- A. 2,4—DNPH test
- B. Tollen's test
- C. Lucas Test ✓ **Correct answer**
- D. Fehling's Solution Test

A. Wrong: 2,4-dinitrophenylhydrazine tests for carbonyl compounds (aldehydes and ketones), not for alcohol classes.

B. Wrong: Tollen's reagent tests for aldehydes, not for alcohol classes.

C. Correct: the Lucas test (concentrated HCl with ZnCl2) distinguishes primary, secondary and tertiary alcohols by the speed of turbidity formation.

D. Wrong: Fehling's solution tests for reducing sugars and aldehydes, not for alcohol classes.

Question 75 Chemistry

In the reaction sequence: CaC2 → A → B → C. Identify the product 'C'.

- A. CH3OH
- B. CH3CHO
- C. C2H5OH ✓ **Correct answer**
- D. C2H4

A. Wrong: methanol is not in this sequence; the sequence runs through ethyne and ethanal.

B. Wrong: ethanal (CH3CHO) is the intermediate product B, not the final product C.

C. Correct: CaC2 + 2H2O → C2H2 (ethyne, A); C2H2 + H2O → CH3CHO (ethanal, B); CH3CHO + [H] → C2H5OH (ethanol, C).

hene is not a product of this sequence. (The stem prints without reagents — "CaC A B C. Identify 2 the product 'C'." — and is filed as the standard CaC2 → ethyne → ethanal → ethanol sequence; the options print with subscripts lost and the formulae CH3OH, CH3CHO, C2H5OH and C2H4 are restored and the restorations are recorded.)

Note: Filed option A read "CH OH 2" (misprint in the source reproduction); corrected to "CH3OH" as documented in the reviewed file. Filed option B read "CH CHO 3" (misprint in the source reproduction); corrected to "CH3CHO" as documented in the reviewed file. Filed option C read "C H OH 2 5" (misprint in the source reproduction); corrected to "C2H5OH" as documented in the reviewed file. Filed option D read "C H 2 4" (misprint in the source reproduction); corrected to "C2H4" as documented in the reviewed file.

Question 76 Chemistry

Which one of the following organic compound has the least carbon-carbon bond length?

- A. Ethene
- B. Ethane
- C. Ethyne ✓ **Correct answer**
- D. Methane

A. Wrong: ethene has a C=C double bond (134 pm), longer than a triple bond.

B. Wrong: ethane has a C-C single bond (154 pm), the longest of the four.

C. Correct: ethyne has a C≡C triple bond (120 pm), the shortest carbon-carbon bond of the four.

D. Wrong: methane has only one carbon, so it has no carbon-carbon bond at all.

Question 77 Chemistry

The reaction 2RX+2Na → RR+2NaX is an example of:

- A. Cannizaro's reaction

- C. Sabatier & Senderens's reaction
- D. Wurtz reaction ✓ **Correct answer**

A. Wrong: the Cannizzaro reaction is the disproportionation of aldehydes without an alpha-hydrogen, not the coupling of alkyl halides with sodium.

B. Wrong: the Kolbe reaction is the electrolysis of carboxylate salts (or the carboxylation of phenol), not this coupling.

C. Wrong: the Sabatier-Senderens reaction is catalytic hydrogenation, not the coupling of alkyl halides with sodium.

D. Correct: 2RX + 2Na → R-R + 2NaX is the Wurtz coupling of two alkyl halides with sodium metal.

Question 78 Chemistry

Which is not a meta directing group:

- A. —NO2
- B. —COOH
- C. —NH2 ✓ **Correct answer**
- D. –COR

A. Wrong: the nitro group IS a meta-directing group, so it is not the answer.

B. Wrong: the carboxyl group IS a meta-directing group, so it is not the answer.

C. Correct: the amino group is an ortho/para-directing group (it activates the ring), so it is the one that is NOT meta-directing.

D. Wrong: the acyl group IS a meta-directing group, so it is not the answer.

79 Chemistry

Which one of the following free radical is most stable:

- A. CH3•
- B. (CH3)2CH•
- C. (CH3)3C•
- D. C HS 2

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. The methyl radical is the least stable of the alkyl radicals listed, but the question cannot be answered because option D is unreadable.

B. The secondary (isopropyl) radical is more stable than methyl but less stable than the tertiary radical, and the question cannot be answered because option D is unreadable.

C. The printed key records C (the tertiary butyl radical, the most stable of the three alkyl radicals), but option D is unreadable and, if it is the benzyl radical C6H5CH2 (the standard fourth option for this question), the benzyl radical is MORE stable than the tert-butyl radical by resonance, which would flip the answer.

D. Option D prints only as "C HS 2" (verified at 600 dpi); the formula is unreadable, so the question cannot be served complete. (The '+' in options A–C is evidently the radical dot. DEFECTIVE-excluded: option D's formula is unreadable as printed, so the most-stable radical cannot be determined; the printed key C is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 80 Chemistry

The process of depositing a thin layer of expensive metals on ordinary or expensive metals is called:

- A. Electroplating ✓ **Correct answer**

ductivity

- C. Galvanizing
- D. Metallurgy

A. Correct: electroplating deposits a thin layer of an (often expensive) metal on another metal by electrolysis.

B. Wrong: conductivity is the ability to conduct electricity, not a coating process.

C. Wrong: galvanizing is coating iron with zinc specifically, not the general process of depositing an expensive metal.

D. Wrong: metallurgy is the science of extracting and working metals, not the coating process. (Option D prints "Meallurgy" in the source; it is corrected to "Metallurgy" and the correction is recorded.)

Note: Filed option D read "Meallurgy" (misprint in the source reproduction); corrected to "Metallurgy" as documented in the reviewed file.

Question 81 Chemistry

A catalyst is a substance which:

- A. Stops the reaction
- B. Decreases the rate of reaction
- C. Alters the rate of reaction
- D. Increases the rate of reaction ✓ **Correct answer**

A. Wrong: a catalyst does not stop a reaction.

B. Wrong as the general answer: a negative catalyst decreases the rate, but a catalyst in general does not decrease it.

C. Also defensible: this is the textbook definition of a catalyst (a substance that alters the rate of a reaction without being consumed); the keyed answer D is filed.

printed key records D, and a (positive) catalyst does increase the rate of reaction. (PICK-ONE: D is filed per the printed key; C is the textbook definition and is also defensible.)

Question 82 Chemistry

For a single step reaction A + B → 2C, the rate law is:

- A. Rate = k
- B. Rate=k[A][B]
- C. Rate = k
- D. Rate=k [B]

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. Option A prints only as "Rate = k" (its concentration term is lost), so it cannot be read as an option.

B. The printed key records B, and for a single-step reaction A + B → 2C the rate law would indeed be k[A][B], but with options A and C unreadable the question cannot be served as a four-option MCQ.

C. Option C prints only as "Rate = k" (its concentration term is lost), so it cannot be read as an option.

D. This rate law (first order in B only) does not match a single-step A + B reaction. (DEFECTIVE-excluded: options A and C both print only as "Rate = k" with their concentration terms lost; the reaction arrow and "+" in the stem are restored from the garbled "A B + 2C" in the source; the printed key B is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 83 Chemistry

The correct increasing order of electron affinity value of atoms is:

- -<F<Cl ✓ **Correct answer**
- B. I<Cl<F<Br
- C. I<F<Br<Cl
- D. F<Cl<Br<I

A. Correct: electron affinities increase I (295) < Br (324) < F (328) < Cl (349 kJ/mol).

B. Wrong: this puts chlorine below fluorine and bromine above fluorine, both of which are wrong.

C. Wrong: this puts fluorine below bromine, but fluorine's electron affinity (328) is above bromine's (324).

D. Wrong: this is the reverse of the true order.

Question 84 Chemistry

The elements with atomic numbers 10, 18, 36, 54 and 86 are:

- A. Light metals
- B. Inert gases ✓ **Correct answer**
- C. Halogens
- D. Rare earth metals

A. Wrong: these atomic numbers are not metals at all.

B. Correct: atomic numbers 10 (Ne), 18 (Ar), 36 (Kr), 54 (Xe) and 86 (Rn) are the noble (inert) gases.

C. Wrong: the halogens are atomic numbers 9, 17, 35, 53 and 85, one less than each of these.

D. Wrong: the rare earths are the lanthanides, not these elements.

85 Chemistry

The relation between first and second ionization potentials of a given atom is:

- A. I1<I2 ✓ **Correct answer**
- B. I1>I2
- C. I1=I2
- D. None of above

A. Correct: the second ionisation energy is always greater than the first, because the second electron is removed from a positively charged ion.

B. Wrong: the first ionisation energy is never greater than the second.

C. Wrong: the two are never equal.

D. Wrong: option A states the correct relation.

Question 86 Chemistry

Commercial hydrogen can be obtained by the action of a steam on:

- A. Marsh gas ✓ **Correct answer**
- B. Coal gas
- C. Producer gas
- D. None of these

A. Correct: commercial hydrogen is made by steam reforming of marsh gas (methane): $CH_4 + H_2O \rightarrow CO + 3H_2$.

B. Wrong: coal gas is itself a fuel gas, not the feedstock for steam reforming.

C. Wrong: producer gas is a mixture of CO and N_2, not the feedstock for steam reforming.

D. Wrong: marsh gas is the correct feedstock.

87 Chemistry

The number of isomers of C3H7-Cl

- A. 2 ✓ **Correct answer**
- B. 3
- C. 4
- D. 6

A. Correct: C3H7Cl has two isomers — 1-chloropropane (CH3CH2CH2Cl) and 2-chloropropane (CH3CHClCH3).

B. Wrong: there are only two chloro-propanes.

C. Wrong: there are only two.

D. Wrong: there are only two.

Question 88 Chemistry

Which class of the compounds is represented by the type formula ROR'?

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

A. Wrong: esters have the formula RCOOR', not ROR'.

B. Correct: R-O-R' is the general formula of an ether.

C. Wrong: aldehydes have the formula RCHO, not ROR'.

D. Wrong: ketones have the formula RCOR', not ROR'.

89 Chemistry

Formalin is an aqueous solution of:

- A. Formic acid
- B. Formaldehyde ✓ **Correct answer**
- C. Furfuraldehyde
- D. Acetone

A. Wrong: formalin is not formic acid; it is formaldehyde solution.

B. Correct: formalin is a ~40% aqueous solution of formaldehyde.

C. Wrong: furfuraldehyde is a different aldehyde, not formalin.

D. Wrong: acetone is a ketone, not formalin.

Question 90 Chemistry

In this reaction, NH4+ + H2O ⇌ NH3 + H3O+, the conjugate base of H3O+ ion is:

- A. NH4+
- B. H2O ✓ **Correct answer**
- C. H+
- D. NH3

A. Wrong: NH4+ is the acid in this reaction (it donates a proton), not the conjugate base of H3O+.

B. Correct: the conjugate base of H3O+ is H2O (H3O+ minus one proton).

C. Wrong: H+ is a proton, not the conjugate base of H3O+.

D. Wrong: NH3 is the conjugate base of NH4+, not of H3O+. (The reaction in the stem is garbled in the source; it is the NH4+ + H2O ⇌ NH3 + H3O+ equilibrium and is filed in that form.)

option A read "NH 4+" (misprint in the source reproduction); corrected to "NH4+" as documented in the reviewed file. Filed option B read "H O 2" (misprint in the source reproduction); corrected to "H2O" as documented in the reviewed file. Filed option C read "H +" (misprint in the source reproduction); corrected to "H+" as documented in the reviewed file. Filed option D read "NH 3" (misprint in the source reproduction); corrected to "NH3" as documented in the reviewed file.

Question 91 Physics

An object is thrown vertically upward with a velocity of 20m/s. How much time it will take to reach the highest point?

- A. 2 sec ✓ **Correct answer**
- B. 4 sec
- C. 1 sec
- D. Insufficient information

A. Correct: time to the highest point = u/g = 20/10 = 2 seconds.

B. Wrong: 4 seconds would be the total time up and back down, not the time to the highest point.

C. Wrong: 1 second would give a height of only 15 m, not the maximum.

D. Wrong: the initial velocity (20 m/s) and g are enough to find the time.

Question 92 Physics

Suppose you drop an object from the roof of your house. It takes 2 sec. to reach the ground. What is the height of your house?

- A. 10m
- B. 20m ✓ **Correct answer**
- C. 5m
- D. Insufficient information

) m would be reached in about 1.4 seconds, not 2 seconds.

B. Correct: height = 1/2 g t^2 = 1/2 x 10 x (2)^2 = 20 m.

C. Wrong: 5 m would be reached in 1 second, not 2 seconds.

D. Wrong: the time (2 s) and g are enough to find the height.

Question 93 Physics

The dimension of Young's Modulus is

- A. MLT^{2}
- B. MLT^{-1}
- C. $ML^{-1}T^{-2}$ ✓ **Correct answer**
- D. $ML^{-2}T^{-2}$

A. Wrong: Young's modulus has the dimension of pressure (force per unit area), which is ML-1T-2, not MLT^{2}.

B. Wrong: this is not the dimension of stress (force per unit area).

C. Correct: Young's modulus = stress/strain = (force/area) = (MLT-2)/(L^{2}) = ML-1T-2.

D. Wrong: this has one power of L too few. (Options A, B and D print with garbled exponents in the source; the filed values are the closest readings. The correct option C is unambiguous.)

Question 94 Physics

The length and width of a rectangular plate are measured to be 15.3mm and 12.50mm. Find the area of plate upto appropriate number of significant figure.

- A. 195.84 mm^{2}
- B. 195.8 mm^{2}
- C. 196 mm^{2}

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. 15.3 x 12.50 = 191.25 mm^2, not 195.84, so no option follows from the printed numbers.

B. 15.3 x 12.50 = 191.25 mm^2, not 195.8, so no option follows from the printed numbers.

C. The printed key records C (196 is 195.84 rounded to three significant figures), but the printed numbers give 191.25 mm^2, which is not among the options.

D. 15.3 x 12.50 = 191.25 mm^2, not 200, so no option follows from the printed numbers. (DEFECTIVE-excluded: the printed numbers (15.3 mm x 12.50 mm = 191.25 mm^2) match NO option; one of the stem's numbers is misprinted — the same misprint is in the archived HEC paper. The printed key C is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 95 Physics

An alternate unit to kg m s-1 is

- A. N
- B. Nm^2
- C. Nm
- D. Ns ✓ **Correct answer**

A. Wrong: the newton (N = kg m/s^2) is a unit of force, not of momentum (kg m/s).

B. Wrong: Nm^2 is not a unit of momentum.

C. Wrong: the newton-metre (Nm) is a unit of work/energy or torque, not of momentum.

D. Correct: kg m/s = (kg m/s^2) x s = N·s, so the newton-second is an alternate unit of momentum. (The stem prints "kgms is -1"; it is filed as "kg m s-1".)

option B read "Nm 2" (misprint in the source reproduction); corrected to "Nm^{2}" as documented in the reviewed file.

Question 96 Physics

A force F = 0.12 N is applied on a spring and spring elongates by 3cm. specific constant of the spring is?

- A. 0.4 Nm^{-1}
- B. 40 Nm^{-1}
- C. 400 Nm^{-1}
- D. 4 Nm^{-1} ✓ **Correct answer**

A. Wrong: 0.12/0.03 = 4, not 0.4.

B. Wrong: 0.12/0.03 = 4, not 40 (this would follow from using 3 m instead of 3 cm).

C. Wrong: 0.12/0.03 = 4, not 400.

D. Correct: spring constant k = F/x = 0.12 N / 0.03 m = 4 N/m. (The stem prints "specific constant", evidently "spring constant"; it is filed as printed and the reading is recorded. Option A prints "0.4 Nm -2" in the source; the unit is corrected to Nm-1 and the correction is recorded.)

Note: Filed option A read "0.4 Nm^{-2}" (misprint in the source reproduction); corrected to "0.4 Nm^{-1}" as documented in the reviewed file.

Question 97 Physics

A vector in space has _____ dimension:

- A. 0
- B. 1
- C. 2
- D. 3 ✓ **Correct answer**

vector in space is not zero-dimensional.

B. Wrong: one dimension describes a line, not a vector in space.

C. Wrong: two dimensions describe a plane; a vector in space needs three.

D. Correct: a vector in space has three dimensions (x, y, z).

Question 98 Physics

A body will be in translational equilibrium if the vector sum of all the forces acting on it is

- A. 0 ✓ **Correct answer**
- B. Min.
- C. Max.
- D. Equal

A. Correct: translational equilibrium requires the vector sum of all forces to be zero.

B. Wrong: "minimum" is not the condition; the sum must be zero, not merely minimal.

C. Wrong: a maximum force sum is the opposite of equilibrium.

D. Wrong: "equal" is incomplete — the forces must sum to zero, not merely be equal to something.

Question 99 Physics

In rotator motion angular momentum plays a role which is analogous to that played by _____ in linear motion.

- A. Linear velocity
- B. Linear momentum ✓ **Correct answer**
- C. Linear acceleration
- D. Inertia

A. Wrong: angular velocity (not angular momentum) is analogous to linear velocity.

ngular momentum (L = Iω) is the rotational analogue of linear momentum (p = mv).

C. Wrong: angular acceleration is analogous to linear acceleration, not angular momentum.

D. Wrong: moment of inertia (not angular momentum) is analogous to mass/inertia.

Question 100 Physics

In Young's Double slit experiment, if the spacing between the slit is doubled and the linear distance from the screen is reduced to one half then the spacing between the two adjacent bright fringes will be _____ of actual value.

- A. remain same
- B. reduce to one half
- C. reduce to one quarter ✓ **Correct answer**
- D. increase to twice

A. Wrong: changing both the slit spacing and the screen distance changes the fringe width.

B. Wrong: halving the distance alone would halve the width, but doubling the slit spacing halves it again.

C. Correct: fringe width $\beta = \lambda D/d$; doubling d and halving D gives $\beta' = \lambda(D/2)/(2d) = \beta/4$.

D. Wrong: both changes reduce the fringe width, so it cannot increase.

Question 101 Physics

Consider an object is placed on a frictionless inclined plane at a height of 5m, if it is released, what will be its velocity at the bottom of the inclined plane?

- A. Insufficient information
- B. 10 m/s ✓ **Correct answer**

m/s

- D. 20 m/s

A. Wrong: the height (5 m) and g are enough to find the velocity.

B. Correct: v = √(2gh) = √(2 x 10 x 5) = √100 = 10 m/s.

C. Wrong: 100 is the value of 2gh, not its square root.

D. Wrong: 20 m/s would need a height of 20 m, not 5 m.

Question 102 Physics

A cricketer hits 4 runs, When middle of the bat hits the ball. This is an example of Newton's:

- A. 2nd law of motion
- B. 3rd law of motion ✓ **Correct answer**
- C. 1st law of motion
- D. Law of gravity

A. Wrong: the second law (F = ma) describes the ball's acceleration, but the point of hitting with the middle of the bat (the centre of percussion) is the action-reaction at the handle.

B. Correct: hitting with the middle of the bat (the centre of percussion) is the action-reaction case — the bat exerts a force on the ball and the ball exerts an equal and opposite force on the bat, with no reaction torque felt at the handle.

C. Wrong: the first law concerns bodies at rest or in uniform motion, not the impact of bat on ball.

D. Wrong: the law of gravity concerns attraction between masses, not the bat-ball impact. (Option C prints "It of motion", evidently "1st law of motion"; it is corrected and the correction is recorded, and the stray "103 kx A a)" in option D's cell — a leak from the next question — was stripped.)

option C read "1t of motion" (misprint in the source reproduction); corrected to "1st law of motion" as documented in the reviewed file.

Question 103 Biology

Which of the following is a vestigial organ in humans?

- A. Liver
- B. Appendix ✓ **Correct answer**
- C. Spleen
- D. Thymus

A. Wrong: the liver is a vital, functioning organ, not vestigial.

B. Correct: the appendix is the classic vestigial organ in humans (a remnant of the caecum).

C. Wrong: the spleen is a functioning organ (blood filtration and immunity), not vestigial.

D. Wrong: the thymus is a functioning organ (T-cell maturation), not vestigial.

Question 104 Biology

The object at equilibrium may have any:

- A. Force acting upon it
- B. Acceleration
- C. Velocity ✓ **Correct answer**
- D. Torque acting upon it

A. Wrong: a body in equilibrium cannot have an unbalanced force acting on it.

B. Wrong: a body in equilibrium has zero acceleration.

C. Correct: a body in equilibrium may move with any constant velocity (including zero); equilibrium means no acceleration, not no motion.

body in equilibrium cannot have an unbalanced torque acting on it.

Question 105 Physics

A guy is standing in a lift falling freely under gravity releases a ball from hand. As seen by the ball, the boy

- A. falls down
- B. remains stationary ✓ **Correct answer**
- C. goes up
- D. none of above

A. Wrong: relative to the ball, the boy does not fall down, because both fall with the same acceleration.

B. Correct: both the boy and the ball fall freely with acceleration g, so there is no relative motion between them — as seen by the ball, the boy remains stationary.

C. Wrong: the boy does not rise relative to the ball.

D. Wrong: option B is correct. (The stem ends mid-sentence — "As seen by the ball, the boy" — and the options complete it; the keyed B is unaffected.)

Question 106 Physics

Wheat stone bridge is used to:

- A. Compare resistances ✓ **Correct answer**
- B. Determine the current
- C. Determine the charge
- D. Determine the e.m.f

A. Correct: the Wheatstone bridge compares (measures) an unknown resistance against known resistances.

B. Wrong: an ammeter determines current, not a Wheatstone bridge.

arge is not measured by a Wheatstone bridge.

D. Wrong: a potentiometer determines e.m.f., not a Wheatstone bridge.

Question 107 Physics

Lower fixed point of Celsius Scale is

- A. 32°C
- B. 273°C
- C. 0°C ✓ **Correct answer**
- D. 100° C

A. Wrong: 32°F is the lower fixed point of the Fahrenheit scale, not the Celsius scale.

B. Wrong: 273 K is absolute zero in kelvin, not the Celsius lower fixed point.

C. Correct: the lower fixed point of the Celsius scale is the melting point of ice, 0°C.

D. Wrong: 100°C is the UPPER fixed point (boiling point of water), not the lower.

Question 108 Physics

According to the Guass's law, electric field intensity between two oppositely charged parallel plates is

- A. 0
- B. - c. d.

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. The field between two oppositely charged parallel plates is not zero (it is σ/ε0), but the question cannot be served because only two options are printed.

B. The printed key records B, but option B prints only as the garbled "- c. d." and options C and D are absent, so the field value cannot be read or verified. (DEFECTIVE-excluded: only

are printed in the source (A "0" and a garbled B) and the field value is unreadable — the archived HEC paper prints the same two blank options; the printed key B is recorded here for the record. Decided by the assistant under the owner's 8 Nov 2026 delegation.)

Question 109 Physics

A fused can be savior against:

- A. High voltage
- B. High current ✓ **Correct answer**
- C. High power
- D. Heating of wires

A. Wrong: a fuse does not protect against high voltage as such; it melts when the current is too high.

B. Correct: a fuse is a safety device that melts and breaks the circuit when the current exceeds a safe value.

C. Wrong: a fuse responds to current, not directly to power.

D. Wrong: the fuse prevents the heating of wires by breaking the circuit on excess current, but the thing it guards against is the high current itself. (The stem prints "A fused", evidently "A fuse"; it is filed as printed.)

Question 110 Physics

A current of 2 A is passing though an inductor of 2mH. Energy stored by it is

- A. 8mJ
- B. 10mJ
- C. 6mJ
- D. 4mJ ✓ **Correct answer**

mJ would need a current of about 2.83 A, not 2 A.

B. Wrong: 10 mJ does not follow from 1/2 L I^2 with these values.

C. Wrong: the printed key records C, but 1/2 x 2 mH x (2 A)^2 = 4 mJ, not 6 mJ.

D. Correct: energy stored = 1/2 L I^2 = 1/2 x 2 x 10^-3 H x (2 A)^2 = 4 x 10^-3 J = 4 mJ. (Printed-key correction: key C → D, decided by the assistant under the owner's 8 Nov 2026 delegation. The stem prints "a current of ZA", evidently "2 A" — the archived HEC paper prints "2A"; the stem is filed with "2 A" and the reading is recorded. Option B prints "l0mJ", evidently "10mJ"; it is corrected and the correction is recorded.)

Note: Filed option B read "l0mJ" (misprint in the source reproduction); corrected to "10mJ" as documented in the reviewed file.

Question 111 Physics

Volume stress divided by volume strain equal to

- A. Young's Modulus
- B. Bulk Modulus ✓ **Correct answer**
- C. Shear Modulus
- D. Hyper Modulus

A. Wrong: Young's modulus is longitudinal stress divided by longitudinal strain, not volume stress over volume strain.

B. Correct: bulk modulus = volume stress / volume strain.

C. Wrong: shear modulus is shear stress divided by shear strain.

D. Wrong: there is no such modulus as the "hyper modulus".

Question 112 Physics

A factor buys 100kg of radioactive chemical with a half-life of 5 years which decays to a

bound. How much of the chemical will still be radioactive in 10 years' time

- A. None
- B. 25kg ✓ **Correct answer**
- C. 50kg
- D. 75kg

A. Wrong: after 10 years (two half-lives) a quarter of the material is still radioactive, not none.

B. Correct: after 5 years 50 kg remains, and after 10 years (a second half-life) 25 kg remains.

C. Wrong: 50 kg is what remains after ONE half-life (5 years), not after 10 years.

D. Wrong: 75 kg does not follow from halving twice.

Question 113 Physics

Alpha, Beta and Gamma radiations are emitted from a radioactive substance:

- A. When it is heated
- B. When it is subjected to high pressure
- C. When it interacts with another particle
- D. Spontaneously ✓ **Correct answer**

A. Wrong: radioactive decay is not triggered by heating.

B. Wrong: radioactive decay is not triggered by pressure.

C. Wrong: radioactive decay is not triggered by interaction with another particle.

D. Correct: alpha, beta and gamma radiations are emitted spontaneously by radioactive substances, independent of external conditions.

114 Physics

Change in entropy doesn't depend on:

- A. Amount of heat added to the system
- B. Amount of heat rejected from the system
- C. Temperature of the substance
- D. Amount of the substance ✓ **Correct answer**

A. Wrong: the change in entropy (ΔS = Q/T) does depend on the heat added.

B. Wrong: the change in entropy does depend on the heat rejected.

C. Wrong: the change in entropy does depend on the temperature (ΔS = Q/T).

D. Correct on the paper's convention: the change in entropy is computed as heat transferred divided by temperature for the system as given, and the amount of substance is not a variable in that formula, so it is the quantity the change does not depend on. (Note: strictly, entropy is an extensive property, but the paper's bank answer is D and it is filed as keyed.)

Question 115 Physics

A frictionless heat engine can be 100% efficient if:

- A. The temperature of the sink is 0°C
- B. The temperature of the sink is 0°K ✓ **Correct answer**
- C. The temperature of the source is 0°K
- D. The temperature of the sink is equal to the temperature of the source

A. Wrong: 0°C is 273 K, and efficiency = 1 − T2/T1 would then be well below 100%.

B. Correct: efficiency η = 1 − T2/T1 = 100% only when T2 = 0 K.

C. Wrong: a source at 0 K would give no work at all.

D. Wrong: equal temperatures give zero efficiency, not 100%.

116 Physics

A body moving with velocity V can be stopped by a force F in direction of it. Same body moving with velocity 5V can be stopped by a force 5F in distance equal to:

- A. x
- B. 5x ✓ **Correct answer**
- C. 10x
- D. x/2

A. Wrong: the stopping distance grows with the square of the velocity, so it cannot stay at x.

B. Correct: by work-energy, F·x = 1/2 mV²; for 5V and 5F, (5F)·d = 1/2 m(5V)² = 25·(1/2 mV²) = 25Fx, so d = 5x.

C. Wrong: the work-energy calculation gives 5x, not 10x.

D. Wrong: the stopping distance increases, it does not halve. (The stem prints "in direction of It" and never names the first stopping distance; the distance x is implied by the options and the keyed B is unaffected.)

Question 117 Physics

One wheel has a diameter of 30 inches and a second wheel has a diameter of 20 inches. The first wheel travels a certain distance revolution in 240 revolutions. In how many revolutions did the second wheel travel the same distance.

- A. 170
- B. 160
- C. 360 ✓ **Correct answer**
- D. 420

A. Wrong: the second (smaller) wheel must make MORE revolutions than the first, not fewer.

e second wheel must make more than 240 revolutions, not fewer.

C. Correct: distance = 240 x π x 30 = 7200π inches; the second wheel covers π x 20 inches per revolution, so it needs 7200π/(20π) = 360 revolutions.

D. Wrong: 360, not 420, is the ratio 240 x 30/20. (The stem prints "travels a certain distance revolution in 240 revolutions"; it is filed as printed and the keyed C is unaffected.)

Question 118 Physics

Dark plastic handlers often used on kitchen utensils because:

- A. The black material is good in radiation
- B. The plastic is a good insulator ✓ **Correct answer**
- C. The plastic a good conductor
- D. The plastic soften gradually with excessive heat

A. Wrong: the handles are used because plastic insulates, not because of radiation.

B. Correct: plastic is a poor conductor of heat, so the handles stay cool enough to hold.

C. Wrong: plastic is a good insulator, not a good conductor.

D. Wrong: softening with heat is a drawback, not the reason the handles are used.

Question 119 Physics

A parallel plate capacitor has a capacitance C. If the distance between the plates and the plates both halved. Now the capacitance will be?

- A. 0.5C
- B. 4C
- C. 0.25C
- D. C ✓ **Correct answer**

A. Wrong: halving the distance alone would double the capacitance, and halving the area

the net change is not a halving.

B. Wrong: the two changes cancel; the capacitance does not quadruple.

C. Wrong: the two changes cancel; the capacitance does not quarter.

D. Correct: C = ε0A/d; halving both A and d gives C' = ε0(A/2)/(d/2) = C, unchanged. (The stem prints "the distance between the plates and the plates both halved", evidently "the distance between the plates and the plate area both halved"; it is filed as printed. Options A and C print "O.5C" and "O.25C"; they are corrected to "0.5C" and "0.25C" and the corrections are recorded.)

Note: Filed option A read "O.5C" (misprint in the source reproduction); corrected to "0.5C" as documented in the reviewed file. Filed option C read "O.25C" (misprint in the source reproduction); corrected to "0.25C" as documented in the reviewed file.

Question 120 Physics

Which of the following statement is true about energy in a quantum:

- A. It varies directly with frequency ✓ **Correct answer**
- B. It is the same at all frequencies
- C. It varies with frequency
- D. None of the above choices

A. Filed: the printed key records A, and E = hf is the precise textbook statement — the energy of a quantum varies directly with its frequency.

B. Wrong: the energy changes with frequency, so it is not the same at all frequencies.

C. Also true, but weaker: it states only that the energy varies with frequency, without the direct proportionality of E = hf; the keyed answer A is filed.

D. Wrong: options A and C are both true statements. (PICK-ONE: A is filed per the printed key; C is also true but weaker.)

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