

2026 EDITION · TRAP FOCUSED

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# IMAT Biology

*The complete trap architecture: 47 high frequency concepts, decoded.*

OFFICIAL PAPERS 2023 TO 2025 ANALYSIS · IMATIFY

## CORE INSIGHT

Most students who fail IMAT biology knew the content. That is not the problem. MUR writes questions specifically to exploit the gap between knowing a concept and knowing it precisely. I spent two full weeks reading every official IMAT paper from 2023 to 2025. Every question. Every wrong answer. I logged every concept that appeared more than twice, identified the exact distractor students pick, and wrote the trap logic for each one. This document is the result of that work. 47 concepts. The paper each one appeared in. The specific wrong answer it was designed to produce. If you are reading this, you have something most candidates will never see.

## REVISION METHOD THAT HOLDS UNDER PRESSURE

STEP	ACTION	WHY IT WORKS
01	Read the concept entry	Primes you on what MUR is actually probing

STEP	ACTION	WHY IT WORKS
02	Attempt the real past paper question blind	Forces honest self assessment before you see the logic
03	Classify your error type if wrong (Process / site / quantity / definition / sequence)	Targets weak pattern recognition
04	Write the save rule in your own words	Compression forces understanding, recall from memory
05	Return to the same concept in 3 days and 7 days	Spaced retrieval is the only thing that holds under exam pressure

**EFFECTIVE REVISION: READ ONE CONCEPT → ATTEMPT ORIGINAL OFFICIAL QUESTION BLIND → CHECK REASONING AGAINST TRAP LOGIC. THE TRAP YOU ALMOST FELL FOR IS MORE VALUABLE THAN THE CORRECT ANSWER YOU SELECTED.**

## THE MUR 47 • DIAGNOSTIC INVENTORY

Every high frequency concept identified from official 2023, 2024, 2025 IMAT papers. Mapped to paper, question number, and trap pattern. Concepts that recur across multiple papers are structurally important to distinguish.

#	Concept	Paper(s)	Trap Pattern
1	Glycolysis	2025 Q11 / 2023 Q29	Product and enzyme confusion
2	Krebs cycle	2025 Q12 / 2024 Q12	Per acetyl CoA vs per glucose; matrix vs membrane
3	Fermentation	2025 Q10 / 2023 Q10	Pyruvate oxidised vs reduced confusion

#	Concept	Paper(s)	Trap Pattern
4	Oxidative phosphorylation	2025 Q13, Q22, Q23	Component narrowing, mobile carriers ignored
5	Respiratory chain	2025 Q14, Q23	Electron carrier role confusion
6	ATP as energy currency	2024 Q16, Q17	ATP identity vs ATP reaction type
7	Competitive inhibition	2025 Q20	Active site vs allosteric site
8	Digestive enzymes	2025 Q21	Enzyme class mismatch
9	Protein structure and location	2025 Q15	Extracellular vs intracellular confusion
10	Muscle contraction trigger	2025 Q16 / 2023 Q24	Calcium target and event order confusion
11	Actin myosin interaction	2025 Q17	ATP role inversion
12	Bohr effect	2025 Q18	Affinity direction confusion
13	Urea cycle	2025 Q25	Organ specificity confusion
14	Triglyceride storage	2025 Q26	Energy density vs tissue function
15	Lysosome origin and function	2025 Q27 / 2023 Q28	Golgi vs ER confusion
16	Organelle DNA	2025 Q28 / 2023 Q16	DNA distribution confusion
17	Plasma membrane function	2025 Q29 / 2024 Q23	Function vs composition confusion
18	Exergonic reactions	2025 Q30 / 2024 Q17	Thermodynamic term confusion

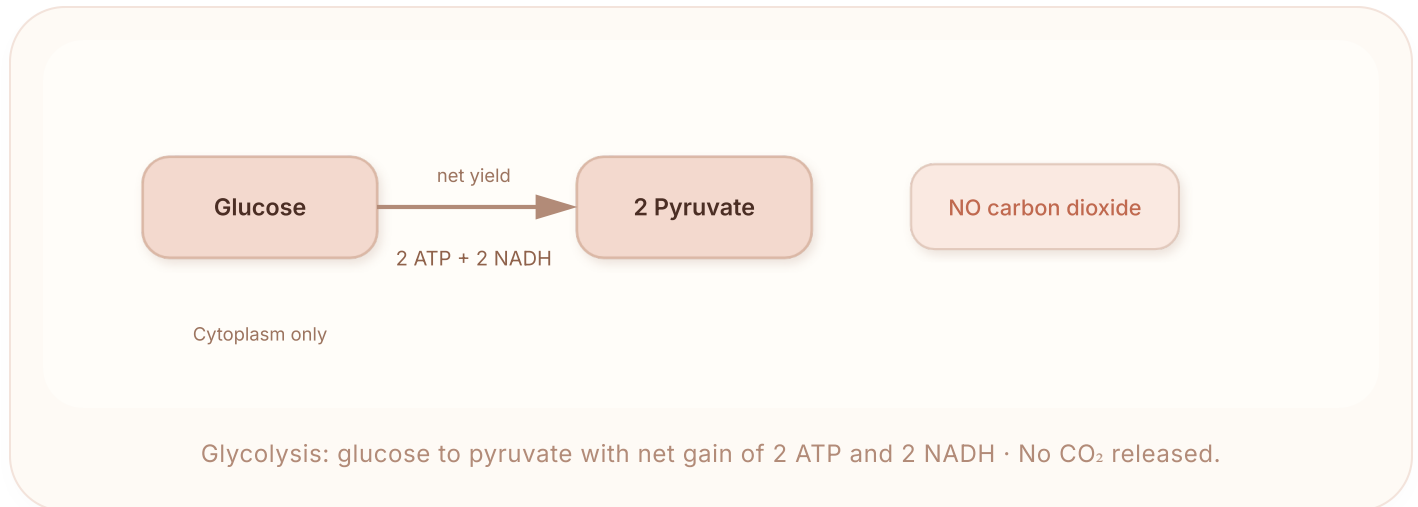
#	Concept	Paper(s)	Trap Pattern
19	Osteoblast function	2025 Q31	Formation vs breakdown reversal
20	Insulin action	2025 Q32 / 2023 Q12, Q17	Hormone effect inversion
21	Mitochondrial function	2024 Q10, Q20	Process location confusion
22	Weak interactions	2024 Q11	Intermolecular vs intramolecular confusion
23	Monosaccharide classification	2024 Q13	Sugar class confusion
24	RNA sugar	2024 Q14	Ribose vs deoxyribose
25	Carrier proteins	2024 Q15	Membrane transport vs unrelated transport
26	Cellular compartmentalisation	2024 Q18	Eukaryote vs prokaryote inversion
27	Microtubule structure	2024 Q19	Structural organelle confusion
28	Anticodon	2024 Q21	tRNA vs mRNA confusion
29	Ribosome composition	2024 Q22	RNA plus protein vs DNA contamination
30	Translation definition	2024 Q24, Q29	Translation vs transcription
31	Cytoskeleton components	2024 Q25	Internal scaffold vs ECM and motors
32	Alleles	2024 Q26	Gene form vs phenotype confusion
33	Dominance in heterozygotes	2024 Q27	Dominant vs recessive certainty

#	Concept	Paper(s)	Trap Pattern
34	Mutation definition	2024 Q28 / 2023 Q18	Mutation vs metabolic change
35	DNA complementarity	2024 Q30	Base pairing and strand orientation
36	Replication	2024 Q31	DNA to DNA vs DNA to RNA
37	Operon	2024 Q32	Functional gene unit vs protein complex
38	X linked recessive	2023 Q11, Q15	Sex distribution and pedigree logic
39	Enzyme pH range	2023 Q13	Overlap logic failure
40	Viral genome composition	2023 Q14	Uracil in DNA trap
41	Homeostasis	2023 Q17	Stable variable vs broad body trait
42	Redox in living systems	2023 Q19	Electron transfer vs vague energy wording
43	Allele frequency	2023 Q20	Allele count vs genotype count
44	Circadian rhythm	2023 Q21	Brain structure misdirection
45	Photosynthesis equation	2023 Q22	Reactant and product inversion
46	Stop codon percentage	2023 Q23	3 out of 64 calculation trap
47	Prokaryotic DNA and Golgi	2023 Q25, Q28	Prokaryote vs eukaryote structure inversion

# CONCEPT DEEP DIVES · TRAP LOGIC AND SAVE RULES

## CONCEPT 1 · HIGH FREQUENCY

### Glycolysis



**Appeared in:** 2025 Q11 and 2023 Q29

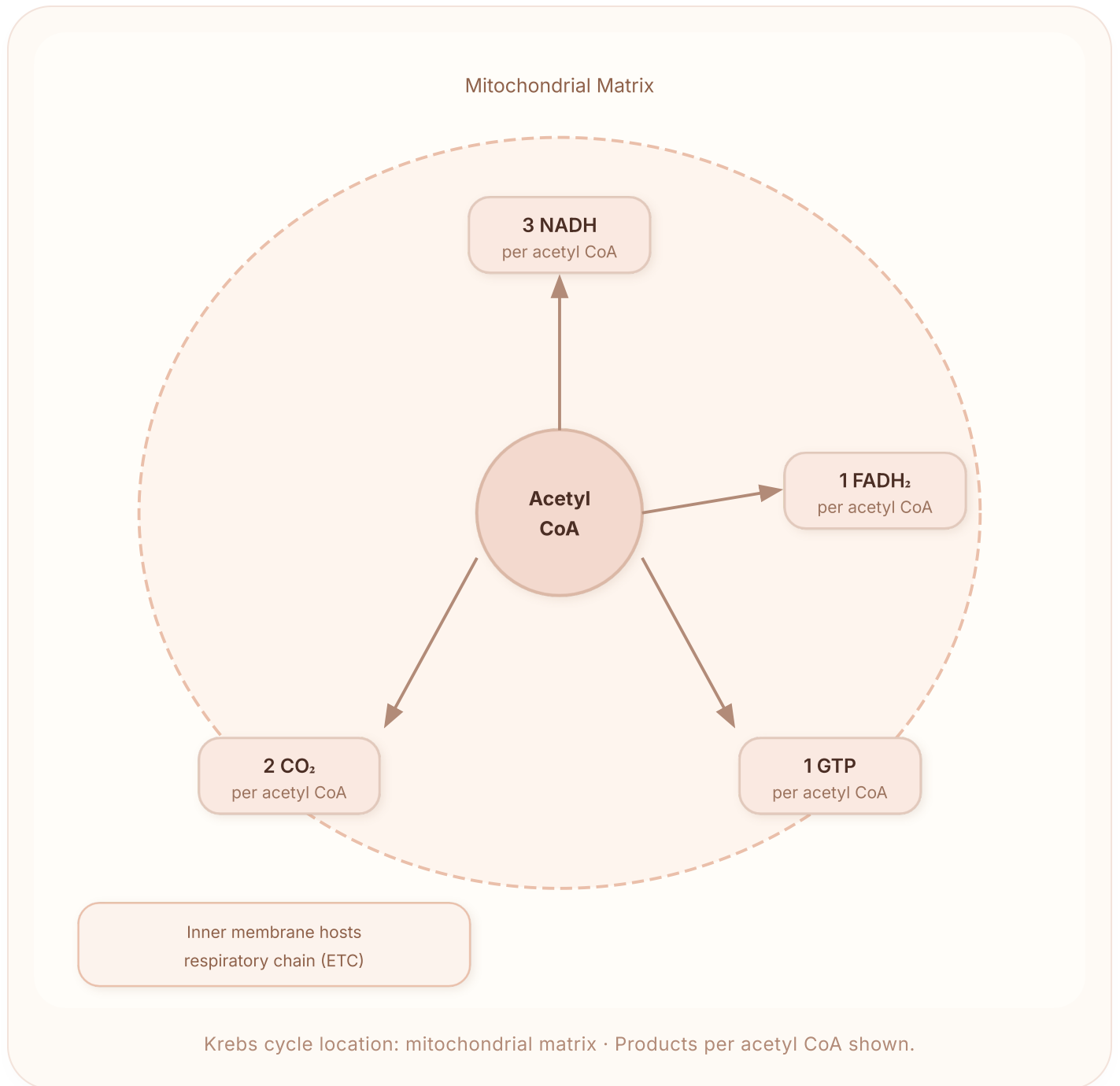
**WHAT MUR TESTED:** In 2025, students were asked which statement about glycolysis is correct. Options included NAD reduction, CO production, FADH<sub>2</sub> formation, and enzyme specifics. In 2023, the question asked where isomerase enzymes act within the pathway.

**CORRECT ANSWER LOGIC:** Glycolysis runs in the cytoplasm. One glucose becomes two pyruvate. Net yield: 2 ATP and 2 NADH. No carbon dioxide is produced. One isomerase step converts glucose 6 phosphate to fructose 6 phosphate.

**TRAP:** Carbon dioxide is planted as a distractor. It belongs to pyruvate oxidation and the Krebs cycle, not glycolysis. MUR exploits the fact that students memorise the whole respiration sequence as one merged block.

**SAVE MARKS RULE:** Before reading a single option: cytoplasm, no CO<sub>2</sub>, net 2 ATP and 2 NADH. If an option mentions CO<sub>2</sub> in the context of glycolysis, eliminate it without reading further.

# Krebs cycle



**Appeared in:** 2025 Q12 and 2024 Q12

**WHAT MUR TESTED:** In 2025, the question asked what each acetyl CoA entering the cycle yields. Options differed by small numerical changes in NADH, FADH<sub>2</sub>, GTP, and CO<sub>2</sub>. In 2024, the question asked for the precise cellular site of Krebs reactions.

**CORRECT ANSWER LOGIC:** Per acetyl CoA: 3 NADH, 1 FADH<sub>2</sub>, 1 GTP, 2 CO<sub>2</sub>. Site in eukaryotes: mitochondrial matrix, not the inner membrane.

**TRAP:** Two traps appear simultaneously. First, students who memorised totals per glucose (6 NADH, 2 FADH<sub>2</sub>, 2 GTP) accidentally halve or double numbers mid answer. Second, students place Krebs on the inner membrane because they associate all mitochondrial respiration with that membrane.

**SAVE MARKS RULE:** Two separate checks: (1) Is the stem asking per acetyl CoA or per glucose? (2) Location = matrix. The inner membrane hosts the respiratory chain, not Krebs.

## Fermentation

**Appeared in:** 2025 Q10 and 2023 Q10

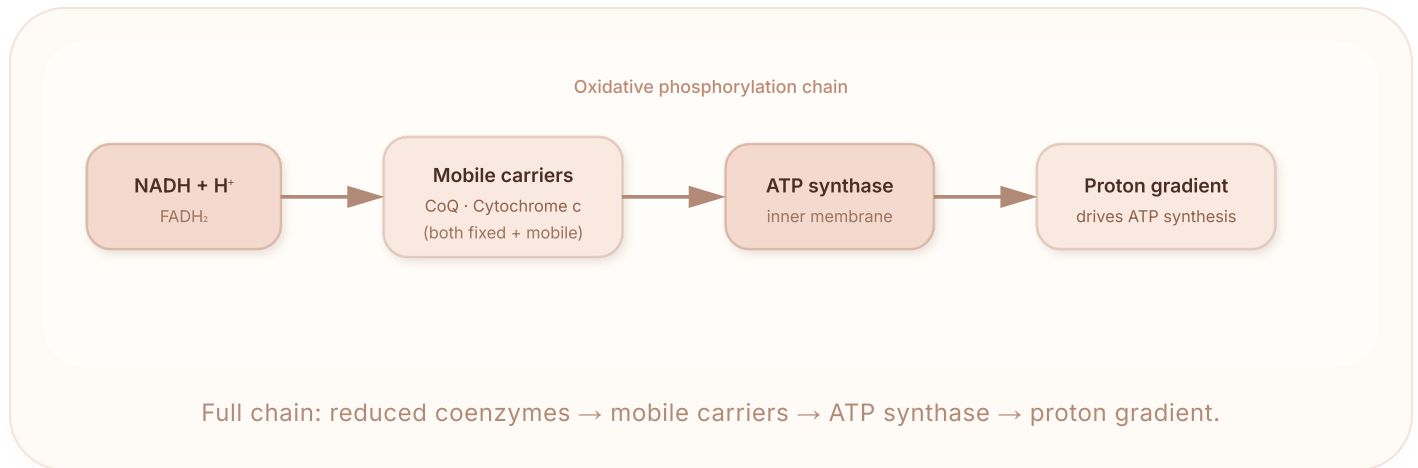
**WHAT MUR TESTED:** In 2025, the question asked what happens to pyruvic acid during lactic fermentation. The correct answer was "reduced." Distractors included oxidised, decarboxylated, phosphorylated, and dephosphorylated.

**CORRECT ANSWER LOGIC:** Lactic fermentation reduces pyruvate to lactate. This oxidises NADH back to NAD<sup>+</sup>, which allows glycolysis to keep running. ATP yield is not the point; NAD<sup>+</sup> regeneration is.

**TRAP:** Students know catabolism is overall oxidative, so they mark pyruvate as "oxidised." This is wrong. The substrate being reduced is precisely what makes NAD<sup>+</sup> regeneration possible.

**SAVE MARKS RULE:** In fermentation questions, the keyword is NAD<sup>+</sup> regeneration through pyruvate reduction. If an option says pyruvate is oxidised in lactic fermentation, eliminate it immediately.

# Oxidative phosphorylation



**Appeared in:** 2025 Q13, Q22, Q23

**CORRECT ANSWER LOGIC:** Oxidative phosphorylation equals energy from reduced coenzymes (NADH, FADH<sub>2</sub>) driving ATP synthesis via proton motive force across inner mitochondrial membrane. Components include both membrane bound proteins AND mobile carriers (CoQ, cytochrome c).

**TRAP:** MUR uses component narrowing: one distractor says only integral membrane proteins, another says only matrix proteins. Both sound technical and both are wrong. Students overfocus on ATP synthase and forget mobile electron carriers.

**SAVE MARKS RULE:** Full chain required: reduced coenzymes → respiratory chain (both fixed proteins and mobile carriers) → proton gradient → inner membrane → ATP synthesis.

# Muscle contraction sequence

**Appeared in:** 2025 Q16, Q17 and 2023 Q24

**CORRECT ANSWER LOGIC:** Order: ACh → membrane depolarisation → Ca<sup>2+</sup> release from SR → Ca<sup>2+</sup> binds troponin → tropomyosin shifts → actin sites exposed → myosin binds → ATP binding dissociates the complex.

**TRAP:** MUR knows you know all the terms. The question punishes you for not knowing which event precedes which. Students who can name every molecule still fail when order is shuffled.

**SAVE MARKS RULE:** Memorise the sequence as a single chain, not as isolated vocabulary. Write it out as a sequence once per revision session until it flows without hesitation.

## Translation and Anticodon



Central dogma: DNA → DNA (replication), DNA → mRNA (transcription), mRNA → polypeptide (translation).

**Appeared in:** 2024 Q21, Q24, Q29

**WHAT MUR TESTED:** Three questions defined anticodon, asked what translation is, and restated translation as polypeptide synthesis from mRNA. Correct options linked anticodon to tRNA and translation to conversion of mRNA into amino acid sequence.

**CORRECT ANSWER LOGIC:** Codon is on mRNA. Anticodon is on tRNA. Ribosome contains rRNA and proteins. Translation reads mRNA to build a polypeptide. Replication copies DNA. Transcription makes RNA from DNA.

**TRAP:** Language role swapping: any option mentioning three nucleotides and amino acids together sounds plausible. Students who do not have the role map locked will hesitate and often swap tRNA and mRNA.

**SAVE MARKS RULE:** Build and memorise a simple role map: DNA → (replication) → DNA, DNA → (transcription) → mRNA, mRNA → (translation) → polypeptide. tRNA carries the anticodon. rRNA is structural.

## Plasma membrane

**Appeared in:** 2025 Q29 and 2024 Q15, Q23

**WHAT MUR TESTED:** Questions across both years asked what carrier proteins do, what the cell membrane consists of, and the main function of the plasma membrane.

**CORRECT ANSWER LOGIC:** Phospholipid bilayer with integral and peripheral proteins. Carrier proteins facilitate transfer of specific molecules. Main function: selective regulation of exchange.

**TRAP:** Composition and function are tested interchangeably and students mix them. Triglycerides, phospholipids, cholesterol, and proteins are all learned together, so distractors containing correct words but wrong structural arrangement are easy to miss.

**SAVE MARKS RULE:** Three checks: phospholipid bilayer, membrane proteins (integral and peripheral), selective exchange. That covers the overwhelming majority of what MUR asks.

## Genetics and Inheritance

**Appeared in:** 2023 Q11, Q15, Q20 and 2024 Q26, Q27

**WHAT MUR TESTED:** X linked recessive pedigrees (DMD, colour blindness), allele frequency calculation, definition of allele, and when an allele certainly expresses in a heterozygote.

**CORRECT ANSWER LOGIC:** Allele = one form of a gene. Dominant allele expresses in heterozygotes. X linked recessive: males (XY) show the phenotype with one copy. For frequency: count total alleles, not total individuals.

**TRAP:** Inheritance certainty traps: students confuse "dominant" with "certain to express." Counting traps: students count people instead of alleles in frequency questions.

**SAVE MARKS RULE:** Pedigrees: convert every individual to chromosomes before choosing. Frequency questions: count alleles, not people. In a population of N individuals, there are 2N alleles for autosomal loci.

## Mutation, Replication and Operon

**Appeared in:** 2023 Q18 and 2024 Q28, Q30, Q31, Q32

**WHAT MUR TESTED:** Mutation definition, complementary strand formation, replication, and prokaryotic operon structure.

**CORRECT ANSWER LOGIC:** Mutation = change in DNA sequence. Replication: DNA to DNA using template strand. Operon: adjacent prokaryotic genes under shared regulatory control, including structural genes and regulatory DNA sequences.

**TRAP:** Category leakage: once students recognise "molecular genetics", they stop verifying which process an option describes. An option describing transcription can be selected when the question asks about replication.

**SAVE MARKS RULE:** Force a process label before choosing: mutation changes sequence, replication copies DNA, transcription makes RNA, translation makes polypeptide, operon regulates prokaryotic gene clusters. Mislabel = wrong answer.

## Organelles and Cell Identity

**Appeared in:** 2023 Q16, Q25, Q28 and 2024 Q18, Q19, Q20 and 2025 Q27, Q28

**WHAT MUR TESTED:** Double membrane organelles in plant cells, prokaryotic DNA (no membrane), Golgi origin of lysosomes, compartmentalisation in eukaryotes, centriole structure, mitochondrial membranes, organelles containing DNA.

**CORRECT ANSWER LOGIC:** Prokaryotes: no membrane bound organelles, circular DNA in cytoplasm. Eukaryotes: lysosomes from Golgi, mitochondria and chloroplasts have their own DNA, matrix not equal to inner membrane. Centrioles: made of microtubules.

**TRAP:** Eukaryotic feature misplacement. MUR assigns real biological structures to wrong cell types or wrong organelle compartments. Familiar vocabulary escapes scrutiny.

**SAVE MARKS RULE:** Three contrasts: prokaryote vs eukaryote, matrix vs inner membrane, Golgi vs ER. If an option assigns a eukaryotic structure to a prokaryote, eliminate without hesitation.

## WHAT THIS MEANS FOR 2026

The strongest evidence: IMAT biology is not random across the syllabus. Cell biology, respiration, molecular genetics, membrane biology, enzymes, and core physiology dominate

2023 to 2025 consistently. Highest scorers revise high frequency domains deeply enough to defeat trap patterns — then cover the rest at a lighter but competent level.

**TIER 1 · CELLULAR**

**RESPIRATION** Glycolysis · Krebs · Fermentation · Oxidative Phosphorylation

Appeared in all three papers, massive repetition.

**TIER 1 · MOLECULAR**

**GENETICS** Mutation · Replication · Translation · Operon · Anticodon

6 questions in 2024 alone.

**TIER 1 · CELL**

**STRUCTURE** Organelles · Membranes · Prokaryote vs Eukaryote

8 questions across 3 years, high density.

**TIER 2 · CORE PHYSIOLOGY**

**Muscle · Insulin · Bohr effect · Urea cycle**

High individual question density.

**TIER 2 · GENETICS**

**Inheritance · Alleles · X linked · Frequency**

Pedigree and calculation questions.

**TIER 3 · REMAINING**

**SYLLABUS** Photosynthesis ·

**Evolution · Biotechnology · Circadian**

Lower frequency but must be covered.

The MUR 47 gives you the map. The concept pages give you depth. The revision method gives you the system. The only variable left is execution.

This analysis is published free by **Imatify**, a platform built specifically for IMAT candidates applying to Italian public universities through English language medicine programmes. If this was useful, the platform has more.

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