Exam Papers Practice

8.2 Cell Respiration

Mark Schemes

Course	DP IB Biology
Section	8. Metabolism, Cell Respiration & Photosynthesis (HL Only)
Topic	8.2 Cell Respiration
Difficulty	Medium

To be used by all students preparing for DP IB Biology HL
Students of other boards may also find this useful

1

The correct answer is **A** because a molecule is said to be oxidised when it either gains oxygen, loses hydrogen, loses electrons, or releases energy to the surroundings.

Oxidation	Reduction
Loss of electrons	Gain of electrons
Loss of hydrogen	Gain of hydrogen
Gain of oxygen	Loss of oxygen
Exergonic (releases energy)	Endergonic (absorbs energy)

2

The correct answer is **D**; because NAD already has a positive charge, i.e. it is technically NAD^+, it only needs to take on 1 hydrogen ion along with 2 electrons to balance its charge and become NADH (leaving a H^+ ion left over).

The reduction and oxidation of enzyme carriers such as NAD and FAD can be confusing so take some time to learn their equations.

3

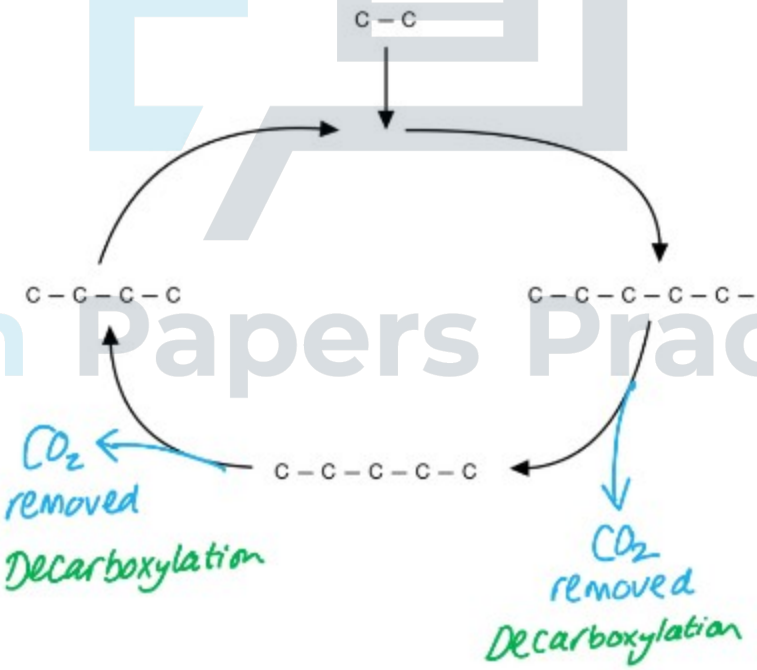
The correct answer is **C** because phosphorylation requires energy (endergonic) and dephosphorylation involves the addition of water to break bonds in a hydrolysis reaction.

4

The correct answer is **D** because while 4 ATP are produced, 2 are used within the reaction so there is a **net gain** of 2 ATP, 2 pyruvates are produced from the splitting of 1 glucose molecule, 2 molecules of NAD are reduced by addition of hydrogen. No glucose is produced as this is the main reactant of glycolysis.

5

The correct answer is **B** because decarboxylation is the removal of carbon (normally in the form of carbon dioxide) from a reaction. This happens twice per Krebs cycle, once between the 6C to the 5C compound and once between the 5C to the 4C compound.



6

The correct answer is **D**

7

The correct answer is **C**; the energy released when electrons move down the electron transport chain is used to move protons across the membrane of the cristae into the **intermembrane space**. The resulting proton gradient causes protons to **diffuse** back across the membrane via ATP synthase, leading to the **phosphorylation of ADP** and the resulting formation of ATP.

8

The correct answer is **A**; paradigm shifts are fundamental changes to the frameworks of ideas underlying scientific understanding. Mitchell's chemiosmotic theory led to huge changes in the ideas underpinning the field of bioenergetics and enabled scientific progress in many other areas.

New discoveries and scientific advances along with the acceptance of novel ideas can lead to paradigm shifts, but are not paradigm shifts in themselves.

The acceptance of Darwin's theory of natural selection is a famous example of a paradigm shift in biology.

9

The correct answer is **B**; ATP synthase is an enzyme found embedded in the membrane of the cristae of the mitochondria.

10

The correct answer is **D**; these features are large enough to be seen clearly and drawn using TEM images.

RNA and DNA are too small to see clearly and therefore draw.