



QUESTION WORKBOOK

The Krebs cycle and oxidative phosphorylation

Respiration and cellular energy · Unit B12

AQA 3.5.2 · OCR A 5.2.2 · Edexcel A Topic 7.4–7.5 · CAIE 12.2

6 questions · 23 marks

PRINT EDITION

SECTION A · Short, 1 to 2 marks

- A1** State the products of one complete turn of the Krebs cycle, and state how many turns take place per molecule of glucose. [2]

SECTION B · Standard, 3 to 5 marks

- B1** Explain how the reduced NAD produced by the earlier stages of respiration leads to the synthesis of ATP on the inner mitochondrial membrane. [5]

- B2** Describe one turn of the Krebs cycle, and account for every carbon atom that enters it. [4]

- B3** One molecule of glucose respired aerobically yields 10 reduced NAD, 2 reduced FAD and 4 ATP made directly. Calculate the theoretical ATP yield per glucose using the textbook ratios of 3 ATP per reduced NAD and 2 ATP per reduced FAD, and calculate it again using the better ratios of 2.5 and 1.5. [4]

- B4** A working cell is measured to yield around 30 molecules of ATP per molecule of glucose, rather than the 38 quoted in textbooks. Explain why the measured yield falls short of the theoretical one. [4]

- B5** A drug blocks the proton channel through ATP synthase in the inner mitochondrial membrane but does not affect the electron carriers themselves. Suggest what happens to the proton gradient, to ATP production, to the rate of electron transport and to the rate at which the tissue consumes oxygen. [4]