



QUESTION WORKBOOK

The Calvin cycle: three steps, and the arithmetic behind them

Photosynthesis and primary productivity · Unit B13

AQA 3.5.1 · OCR A 5.2.1 · Edexcel A Topic 5.5 · CAIE 13.1

6 questions · 21 marks

NAVY SCREEN EDITION

SECTION A · Short, 1 to 2 marks

- A1** State the name of the enzyme that catalyses the fixation of carbon dioxide in the Calvin cycle, and state how many molecules of GP one turn of the cycle produces. [2]

SECTION B · Standard, 3 to 5 marks

- B1** Calculate the number of turns of the Calvin cycle, the number of molecules of triose phosphate made, the number of molecules of ATP used and the number of molecules of reduced NADP used in producing two molecules of glucose. [5]

- B2** Describe the three stages of the Calvin cycle, naming the compounds involved and saying what reduced NADP and ATP each contribute. [4]

B3 A plant photosynthesising steadily in bright light is placed in complete darkness, with its carbon dioxide supply unchanged. Explain what happens to the concentrations of GP, of triose phosphate and of RuBP in the stroma over the following minute. [4]

B4 Six turns of the Calvin cycle make twelve molecules of triose phosphate, and only two of them leave the cycle. Explain why the other ten cannot be allowed to leave. [3]

B5 On a hot, dry, bright day the productivity of a wheat crop falls even though light intensity is high. Suggest how the properties of rubisco account for this. [3]
