



QUESTION WORKBOOK

Nutrient cycles: nitrogen, phosphorus and eutrophication

Ecology, populations and environmental change · Unit B20

AQA 3.5.4 · OCR A 6.3.1 · Edexcel A Topic 5 · CAIE 18.1

6 questions · 22 marks

PRINT EDITION

SECTION A · Short, 1 to 2 marks

- A1** Name the genus of bacteria that oxidises ammonium to nitrite, and name the genus that oxidises nitrite to nitrate. [2]

SECTION B · Standard, 3 to 5 marks

- B1** Describe the sequence of events by which nitrate leaching from a fertilised field leads to the death of fish in a lake. [5]

- B2** Compare nitrogen fixation with nitrification, referring to what each starts with, what each produces, the organisms responsible and the part oxygen plays. [4]

- B3** Explain why a well-drained, ploughed soil holds more nitrate than a compacted, waterlogged one. [4]

- B4** A 25-hectare field receives ammonium nitrate, NH_4NO_3 , at 200 kg per hectare; take its relative formula mass as 80 and the relative atomic mass of nitrogen as 14. Over the following months a stream draining the field carries 8.0×10^7 litres of water, and its nitrogen concentration is on average 5.6 mg per litre higher than upstream of the field. Calculate the mass of nitrogen applied and calculate what percentage of it reached the stream. [4]

- B5** Phosphate is usually the nutrient in shortest supply in fresh water, and the phosphorus cycle has no gaseous stage. Suggest why stripping phosphate from effluent at a sewage works reduces algal blooms in the river below it, and suggest why phosphate carried out to sea is not replaced on any useful timescale. [3]
