

CIE A Level Biology 9700 Paper 4 Practice Paper - 100 Marks, 2 Hours

Practice paper · CIE A Level Biology 9700 · 100 · 2 h

Q 1 · Photosynthesis and limiting factors

- (a) State where the light-dependent stage takes place in a chloroplast. [2]
- (b) When light intensity rises from 20 to 40 units the oxygen rate rises from 0.15 to 0.3 cm³ per minute. Explain why. [4]
- (c) At 60 units, calculate the total oxygen released in 120 minutes (cm³). [3]
- (d) Above 60 units the curve becomes horizontal. Explain. [4]
- (e) Write the balanced equation for photosynthesis and explain the sharp fall in rate above 40 °C. [6]
- (f) Design an experiment using an aquatic plant to measure the effect of light intensity, and state two controlled variables. [6]

Q 2 · Genetics, mutation and gene expression

- (a) Define a gene mutation. [3]
- (b) The HBB coding region has 450 bases; in a patient one base changes from A to T. Calculate this as a percentage of the coding region and state the effect on the protein. [5]
- (c) How many amino acids does this coding region code for? Show your working. [4]
- (d) Some substitutions do not change the protein. Explain why. [3]
- (e) Two pea plants (RrYy x RrYy) produce 800 offspring. Using 9:3:3:1, calculate the expected number of each phenotype. [5]
- (f) Explain how two processes during meiosis increase genetic variation in offspring. [5]

Q 3 · Gas exchange and transport

- (a) Fish gills use a counter-current arrangement. Explain how this raises oxygen uptake. [4]
- (b) Stroke volume is 70 cm³ and heart rate is 72 per minute. Calculate cardiac output in dm³ min⁻¹. [4]
- (c) During exercise stroke volume rises to 110 cm³ and heart rate to 150. Calculate cardiac output and how many times the resting value it is. [5]
- (d) Tidal volume is 500 cm³, dead space 150 cm³ and breathing rate 12 per minute. Calculate alveolar ventilation as a percentage of total ventilation. [4]
- (e) Explain the benefit of the Bohr shift to exercising muscle. [4]
- (f) A patient haemoglobin falls from 15 to 8 g/dL. Each gram of haemoglobin binds 1.34 cm³ of oxygen. Calculate the percentage fall in oxygen content per 100 cm³ of blood. [4]

Q 4 • Energy flow and ecosystems

- (a)** Grass holds 50,000 kJ, rabbits 5,000 kJ and foxes 400 kJ. Calculate the transfer efficiency between each level. [3]
- (b)** An ecosystem has GPP of 2400 kJ m⁻² yr⁻¹ and respiration of 1560 kJ m⁻² yr⁻¹. Calculate NPP and its percentage of GPP. [4]
- (c)** Explain why food chains rarely have more than five trophic levels. [5]
- (d)** Explain the difference between nitrification and nitrogen fixation in the nitrogen cycle, giving one organism for each. [5]
- (e)** Explain why peat bogs and forests act as carbon sinks. [4]
- (f)** Explain how intensive farming reduces farmland biodiversity and suggest one mitigation. [4]

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