



**EXAM PAPERS PRACTICE**

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Practice questions created by actual  
examiners and assessment experts

Detailed mark scheme

Suitable for all boards

Designed to test your ability and  
thoroughly prepare you

2002

**XVIII**

1583

Time allowed  
**61 Minutes**

**Score**

**/51**

**Percentage**

**%**

**Biology**

**AQA  
AS & A LEVEL**

**Mark Scheme**

**3.5 Energy transfers in and  
between organisms (A-level  
only)**

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- 1 (a) Prevents oxygen being taken up / entering / being absorbed;  
*Accept: any idea of no contact with oxygen.*  
*Neutral: for anaerobic respiration / anaerobic conditions.*  
*Neutral: prevents entry of air.*  
*Reject: prevents entry of oxygen and another named gas.* 1
- (b) (i) 0.0155 / 0.016 = 2 marks;;  
 0.0775 / 0.077 / 0.078 / 0.08 = 1 mark  
 / 0.62 = 1 mark 2
- (ii) Glucose decreases / is a limiting factor / increase in ethanol / yeast / cells die / toxins build up;  
*Accept: glucose is used up.* 1
- (iii) 1. (Stays the) same / level / (relatively) constant;  
 2. Same volume / amount of oxygen uptake and carbon dioxide release;  
*Note: if m.p. 1 is awarded m.p 2 can be obtained without referring to 'same volume / amount'.* 2
- (c) 1. Oxygen is final / terminal (electron) acceptor / oxygen combines with electrons and protons;  
 2. Oxidative phosphorylation / electron transport chain provides (most) ATP / only glycolysis occurs without oxygen / no Krebs / no link reaction; 2
- [8]

2

(a) 1. No aerobic respiration / electron transfer / oxidative phosphorylation;  
*Reject reference to anaerobic respiration.*

2. (Because) no (respiratory) substrate / nothing to respire;  
*Reject idea of 'little' or 'less' – this would result in a change in oxygen concentration.*  
*Accept the idea of no residual respiratory substrate in the mitochondria.*

2

(b) (i) (Oxygen concentration falls because)

1. Aerobic respiration (uses oxygen);  
*Accept 'oxidative phosphorylation / electron transfer takes place'.*
  2. Oxygen is terminal / electron acceptor;
  3. (oxygen combines with) protons /  $H^+$  **and** electrons /  $e^-$  **to form** water /  $H_2O$ ;
- All aspects are required to gain mark.*

2 max

(ii) Phosphate (ions) / inorganic phosphate /  $P_i$ ;  
*Reject 'phosphorus' or 'P'.*  
*Accept ' $PO_4$ '.*

1

(c) 1. Oxygen concentration continues to fall in plants but stays constant in animals;  
*For 'plants' accept 'line R to T', for 'animals' accept 'line R to*

S'.

*MP1 and MP2. Accept answers in terms of 'use' of oxygen rather than change in concentration.*

2. (Oxygen concentration) falls more slowly in plants than before cyanide added;
3. (Because aerobic) respiration continues in plant (mitochondria);  
*Accept (because aerobic) respiration stops in animal (mitochondria).*
4. (Because) electron transfer / oxidative phosphorylation continues in plant (mitochondria);  
*Accept (because) electron transfer stops in animal (mitochondria).*  
**Accept for *one additional mark***  
*(up to 4 max) use of Resource A i.e: idea that plant cytochrome oxidase is (more) resistant to cyanide*  
**OR**  
*idea that animal cytochrome oxidase not resistant to cyanide.*

- 3 (a) 1. Equilibrium reached. *Accept equilibrate*
2. Allow for expansion / pressure change in apparatus;
3. Allow respiration rate of seeds to stabilise.  
*Ignore seeds acclimatise*
- 3
- (b) 1. Optimum temperature / temperature for normal growth of seeds;
2. (Optimum temperature) for enzymes involved in respiration.
- 2
- (c) 1. Oxygen taken up / used by seeds;
2. CO<sub>2</sub> given out is absorbed by KOH (solution);
3. Volume / pressure (in **B**) decreases.
- 3
- (d) 0.975 / 0.98.

*If incorrect,*

*0.26 × 6 / or incorrect numbers divided by 1.6 for 1 mark*

2

[10]

- 4 (a) 1. Oxidation of / hydrogen removed from pyruvate and carbon dioxide released;  
2. Addition of coenzyme A.  
*Accept: NAD reduced for oxidation* 2
- (b) (i) 1. Change (in shape) of active site / active site moulds around the substrate;  
*Reject: reference to inhibitor*  
*Accept: change in tertiary structure affecting active site*  
2. (Substrate / active site) now complementary.  
*Neutral: references to two active sites* 2
- (ii) 1. Is a competitive inhibitor / attaches to active site;  
*Neutral: reference to inhibitor forming an enzyme-substrate complex*  
2. Reduces / prevents enzyme-substrate / E-S complex forming.  
*Accept: Reduces / prevents acetylcoenzyme A binding to enzyme / citrate synthase* 2
- (c) (i) 1. Regenerates / produces NAD / oxidises reduced NAD;  
2. (NAD used) in glycolysis.  
*Accept: description of glycolysis*  
*Accept: glycolysis can continue / begin* 2
- (ii) (Pyruvate used) in aerobic respiration / (lactate / lactic acid) is toxic / harmful / causes cramp / (muscle) fatigue.  
*Accept: (pyruvate) can enter link reaction*  
*Accept: reduces cramp / (muscle) fatigue*  
*Neutral: 'reduces muscle aches'* 1

- 5 (a) 1. Geographic(al) isolation;
2. Separate gene pools / no interbreeding / gene flow (between populations);  
*Accept: reproductive isolation*  
*This mark should only be awarded in context of during the process of speciation. Do not credit if context is after speciation has occurred.*
3. Variation due to mutation;
4. Different selection pressures / different abiotic / biotic conditions / environments / habitats;  
*Neutral: different conditions / climates if not qualified*  
*Accept: named abiotic / biotic conditions*
5. Different(ial) reproductive success / selected organisms (survive and) reproduce;  
*Accept: pass on alleles / genes to next generation as equivalent to reproduce*
6. Leads to change / increase in allele frequency.  
*Accept: increase in proportion / percentage as equivalent to frequency*
- 6
- (b) 1. Capture / collect sample, mark and release;
2. Method of marking does not harm lizard / make it more visible to predators;
3. Leave sufficient time for lizards to (randomly) distribute (on island) before collecting a second sample;
4. (Population =) number in first sample × number in second sample divided by number of marked lizards in second sample / number recaptured.
- 4
- (c) 1. High concentration of / increase in carbon dioxide linked with respiration at night / in darkness;
2. No photosynthesis in dark / night / photosynthesis only in light / day;  
*Neutral: less photosynthesis*
3. In light net uptake of carbon dioxide / use more carbon dioxide than produced / (rate of) photosynthesis greater than rate of respiration;
4. Decrease in carbon dioxide concentration with height;  
*More carbon dioxide absorbed higher up*

*Accept: less carbon dioxide higher up / more carbon dioxide lower down*

5. (At ground level)  
less photosynthesis / less photosynthesising tissue / more respiration / more micro-organisms / micro-organisms produce carbon dioxide.

*Neutral: less leaves unqualified or reference to animals*

5

[15]