

GCE 2005

January Series



Mark Scheme

Biology Specification B

BYB3/W Physiology and Transport

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Further copies of this Mark Scheme are available to download from the AQA Website:
www.aqa.org.uk

Copyright © 2005 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334. Registered address AQA, Devas Street, Manchester. M15 6EX.

Dr Michael Cresswell Director General

Guidance on the award of the mark for Quality of Written Communication

Quality of Written Communication assessment requires candidates to:

- select and use a form and style of writing appropriate to purpose and complex subject matter;
- organise relevant information clearly and coherently, using specialist vocabulary when appropriate; and
- ensure text is legible, and spelling, grammar and punctuation are accurate, so that meaning is clear.

For a candidate to be awarded 1 mark for quality of written communication on the question identified as assessing QWC in a unit test, the minimum acceptable standard of performance should be:

- the longer parts (worth 4 marks or more) should be structured in a reasonably logical way, appropriate and relevant to the question asked;
- ideas and concepts should be explained sufficiently clearly to be readily understood. Continuous prose should be used and sentences should be generally be complete and constructed grammatically. However, minor errors of punctuation or style should not disqualify;
- appropriate AS/A level terminology should be used. Candidates should not use such phrases as ‘fighting disease’, ‘messages passing along nerves’, ‘enzymes being killed’ etc, but a single lapse would not necessarily disqualify. Technical terms should be spelled correctly, especially where confusion might occur, e.g. mitosis/meiosis, glycogen/glucagon.

The Quality of Written Communication mark is intended as a recognition of competence in written English. Award of the mark should be based on overall impression of performance on the question identified on the paper as assessing QWC. Perfection is not required, and typical slips resulting from exam pressure such as ‘of’ for ‘off’ should not be penalised. Good performance in one area may outweigh poorer performance in another. Care should be taken not to disqualify candidates whose lack of knowledge relating to certain parts of a question hampers their ability to write a clear and coherent answer; in such cases positive achievement on other questions might still be creditworthy. No allowance should be made in the award of this mark for candidates who appear to suffer from dyslexia or for whom English is a second language. Other procedures will be used by the Board for such candidates.

Examiners should record 1 or 0 at the end of the paper in the Quality of Written Communication lozenge. This mark should then be transferred to the designated box on the cover of the script.

BYB3/W**Question 1**

- (a) endodermis;
xylem; 2
- (b) Casparian strip / suberin (*accept casparien, not caspian*);
impermeable / barrier to water movement (*“idea” of waterproof, not waxy*);
water enters cell along water potential/osmotic gradient / by osmosis; 2 max
- (c) ATP supplies energy (*reject produces/creates energy*);
for active transport / movement against a concentration gradient
(*allow active uptake*);
to move sugars/sucrose (from phloem tissue) (*allow glucose, mineral ions
neutral, not carbohydrate*); 2 max
- Total 6
-

Question 2

- (a) endothelium / tunica intima (*accept endothelial cells*); 1
- (a) elastic tissue allows recoil
(*reject if wording implies a muscle e.g. contract/relax*)(*ignore expand*);
maintains blood pressure / constant/smooth blood flow
(*not increases blood pressure*); 2
- (c) (i) measuring radius / 12 mm / 12.5 mm / 1.2 cm / 1.25 cm;
correct calculation / $3.14 \times 12 \times 12 = 452$ / $3.14 \times 12.5 \times 12.5 = 490/491$;
allow for magnification $\div 100 = 4.52 / 4.9$;
(*allow 1 mark for correct calculation using incorrect radius*) 3
- Total 6
-

Question 3

- (a) (i) anaerobic respiration; 1
- (ii) (transported in blood) to the liver;
converted back to pyruvate / glycogen / glucose / CO₂ and H₂O;
oxidised/reacted with oxygen;
(*must mention O₂, not just breakdown*) 2 max

| | | | |
|-----|------|---|---------|
| (b) | (i) | training delays/reduces/slows build-up of blood lactate; reference to a trend or specific data (<i>e.g. lower lactate at each running speed</i>); (<i>max 1 if graph not used</i>) | 2 |
| | (ii) | <i>reason linked with explanation:</i> <i>effect of training</i> lung capacity/volume / intercostal muscles developed (<i>accept intercostal muscles stronger</i>); cardiac output / heart muscle improved (<i>accept increased heart size / stroke volume / stronger heart muscle</i>); circulatory supply (e.g. capillary network) improved (<i>allow more efficient lungs</i>); red blood cell count / haemoglobin increased; more/larger mitochondria; | 1 max |
| | | <i>explanation</i> anaerobic respiration delayed (in muscles) / aerobic respiration carries on longer; more oxygen for aerobic respiration; blood/oxygen delivered quickly for rapid lactate breakdown; | 1 max |
| | | | Total 7 |

Question 4

| | | | |
|-----|------|--|---------|
| (a) | (i) | fall in pH / increased acidity / increased H ⁺ / increase in carbon dioxide; | 1 |
| | (ii) | respiration (occurring inside cells); (<i>anaerobic is neutral</i>) | 1 |
| | (b) | impulses (along neurones) (<i>accept action potentials</i>); diaphragm (muscles) / intercostal muscles <u>contract</u> ; | 2 |
| | (c) | as lungs inflate the frequency of impulses increases; to medulla / expiratory centre; inhibits inspiratory centre / relaxation of intercostal/ diaphragm muscles; | 3 |
| | | | Total 7 |

Question 5

| | | | |
|-----|------|---|---|
| (a) | (i) | right atrium and left atrium (<i>accept reference to left/right atria</i>); | 1 |
| | (ii) | deoxygenated blood mixes with oxygenated blood; less oxygen delivered to body tissues; | 2 |

- (b) (cells) require oxygen/glucose for respiration/growth;
(cells) require oxygen/glucose to keep cells alive;
(accept correctly named nutrient) 1 max
- (c) (i) 65; 1
- (ii) fetal haemoglobin has a greater affinity for oxygen;
(must indicate a comparison or reference to the graph)
loads oxygen from mother's haemoglobin/blood; 2
- Total 7
-

Question 6

- (a) 1. water evaporates/transpires from leaves;
2. reduces water potential in cell /water potential/osmotic gradient across cells (*ignore reference to air space*);
3. water is drawn out of xylem;
4. creates tension (*accept negative pressure, not reduced pressure*);
5. cohesive forces between water molecules;
6. water pulled up as a column; 4 max
- (b) (i) same surface area of leaf / number of leaves / age/thickness of cuticle; 1
- (ii) (environmental conditions) affect rate of transpiration/evaporation; 1
- (iii) presence of grease reduces water loss; 1
- (c) (i) 1.2 / 1.3g; 1
- (ii) more stomata on the lower surface;
(thicker) waxy cuticle on the upper surface; 2
- Total 10
-

Question 7

- (a) 1. rate of respiration increases (in muscle cells);
2. carbon dioxide concentration increases / pH falls / H⁺ increases / acidity increases;
3. in blood plasma;
4. chemoreceptors;
5. in aortic / carotid bodies / medulla (*accept reference to aorta / carotid arteries not sinus*);
6. (impulses to) medulla / cardioaccelerator centre;
7. increased frequency of impulses (*award only once*);
8. along sympathetic pathway;
9. to sinoatrial node/SAN (*not pacemaker*); 6 max

- (b) (i) through cardiac muscle;
to atrioventricular node;
along bundle of His / Purkyne fibres; 2 max
- (ii) sinoatrial node in the (right) atrium;
trace from healthy person is identical to the trace for the diseased
heart in the region of the atria / only differences seen in
trace for ventricles; 2
- Total 10
-
- QWC (See guidance) 1