

GCE 2004

June Series



Mark Scheme

Biology B

BYB3/W

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.

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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) | beating/pumping of heart / contraction of ventricles/heart; | 1 |
| (b) | (at arterial end) hydrostatic pressure/blood pressure;
greater than pressure of water potential gradient /greater than
osmotic uptake; | 2 |
| (c) | removed by lymphatic system/lymph;
returned to blood; | 2 |
| (d) | less protein in blood;
water potential gradient is lower (less –ve/higher Ψ). | 2 |
| | Total | 7 |
-

Question 2

- | | | |
|-----|---|---|
| (a) | high (sugar content) during the day;
produced by photosynthesis; | 2 |
| (b) | sugar transported in phloem/moves down stem;
phloem removed with ring;
sugar cannot pass ringed area / transport prevented; | 3 |
| | Total | 5 |
-

Question 3

- | | | |
|-----|---|-------|
| (a) | high energy requirement/ATP required;
not enough oxygen for aerobic respiration;
anaerobic respiration occurs;
which produces lactate; | 3 max |
| b) | lactate is oxidised / converted to pyruvate;
broken down to release energy/glucose/glycogen synthesised;
in liver/muscles; | 2 max |
| | Total | 5 |
-

Question 4

- | | | | |
|-----|------|--|---------|
| (a) | (i) | 62 (ignore units) | 1 |
| | (ii) | fetal haemoglobin has higher affinity for oxygen / takes up oxygen (becomes saturated) at lower partial pressure; at partial pressures when adult haemoglobin dissociates fetal haemoglobin takes up oxygen; | 2 |
| (b) | (i) | new 'S' shaped curve draw to the right of the adult curve; | 1 |
| | (ii) | haemoglobin dissociates/unloads more readily / more oxygen delivered to cell/muscles/respiring tissue; at a particular partial pressure more oxygen is released; | 2 |
| | | | Total 6 |
-

Question 5

- | | | | |
|-----|---|---|---------|
| (a) | detect when lung inflated/inhaling;
impulse sent to respiratory centre/medulla;
to initiate exhalation / inhibits inhalation; | | 2 max |
| (b) | (i) | 173%;
($19 \div 11 = 1.727 \times 100$)
<i>(principle: increase in ventilation rate \div original ventilation rate for one mark)</i> | 2 |
| | (ii) | carbon dioxide concentration increases / low pH in blood;
monitored/detected by aortic/carotid bodies/chemoreceptors;
impulses to medulla/respiratory centre;
more impulses from medulla;
to diaphragm/intercostals;
increases breathing rate; | 4 max |
| | | | Total 8 |
-

Question 6

(a)	(i)	movement (of water) through cell walls/intercellular spaces;	1
	(ii)	Casparian bands; (<i>accept ref to suberin</i>) which are impermeable/waterproof; lower water potential in the cytoplasm of endodermis cell; enters symplastic pathway / cytoplasm of cell; by osmosis;	3 max
(b)	(i)	rate of flow increases to max at 1200 and then decreases; increasing transpiration/evaporation from leaves; transpiration creates tension / increases transpirational pull; water molecules are cohesive/stick together; produces a water column;	3 max
	(ii)	(increase transpiration) produce a higher tension / reduces the pressure in the xylem reducing the diameter; adhesive forces between xylem and water;	1 max
(c)		water moves in dead cells / xylem is non-living tissue; the process is passive / no energy is needed;	2
			Total 10

Question 7

(a)		SAN;	1
(b)	(i)	to allow the (complete) contraction/emptying of the atrium <u>before</u> <u>the ventricle contracts</u> / allows ventricles to fill <u>before contraction</u> ;	1
	(ii)	to force the blood upwards into the arteries/blood vessels/ out of heart;	1
(c)	(i)	0.3 s;	1
	(ii)	0.2 - 0.4 s;	1
(d)		thicker / more muscle in the left ventricle;	1

(e) Artery

1. thickest wall, enabling it to carry blood at high pressure / withstand pressure surges;
2. most elastic tissue, which smoothes out flow / maintains pressure;
3. most muscle which maintains pressure;
4. muscle in wall to control blood flow;

Vein

5. thin wall does not have to withstand high pressure;

Capillary

6. thin wall, allowing diffusion/exchange;
7. only endothelium present, allowing short diffusion pathway;

All vessels

8. have endothelium that reduces friction; 6 max

Total 12

QWC (See guidance)

1