



MARK SCHEME for the November 2005 question paper

0610/03 BIOLOGY

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Paper 3, maximum mark 80

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

The minimum marks in these components needed for various grades were previously published with these mark schemes, but are now instead included in the *Report on the Examination* for this session.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

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- Q1 (a) (i)** ref. to moist skin ; [1]
- (ii)** mammal ;
bird ;
fish ;
reptile ; [max. 2]
- (b)** ref. to both belonging to the same genus (or ref. to Bufo) ; [1]
(ignore refs. to both animals being toads)
- (c)** ref. to sand dunes becoming developed for + camp sites ;
ref. to habitat is changing e.g. to woodland ; Ⓐ ref. to loss of habitat
natterjacks cannot survive in colder habitats AW ; [max. 2]
- (d)** ref. to some heathland or sand dunes becoming protected areas AW ;
ref. to removal of trees / seedling trees AW + from heathland ;
ref. to creation of more heathland / sand dunes + introduction of natterjacks ;
ref. to captive breeding programmes ; [max. 2]
- (e) (i)** secondary consumer / third level ; Ⓐ (top) carnivore [1]
- (ii)** insect larvae + adult insects ; (BOTH NEEDED FOR 1 MARK) [1]
- (iii)** ref. to a wider range of food sources AW ; [1]
- [max. 11]
- Q2 (a)** column drawn and shaded correctly ;
Y axis labelled ;
X axis labelled + units ; [3]
- (b) (i)** continuous ; [1]
- (ii)** ref. to different amounts of light ; Ⓑ environmental differences unequal.
ref. to different amounts of minerals ;
ref. to exposure to different temperatures ;
ref. to disease / fungal or viral infection ;
ref. to competition for water ;
ref. to genetic differences ;
ref. to trampling ;
ref. to grazing ; [max. 3]
- (c) (i)** ref. to large + petals ;
ref. to coloured + petals ;
ref. to scent ;
ref. to presence of nectar ; [max. 2]
- (ii)** ref. to pollination AW ; [1]
- (d)** ref. to self-pollination / ref. to other agents of pollination ;
so fertilization occurs using pollen from same flower AW ; [2]
- [max.12]

Page 2	Mark Scheme	Syllabus	Paper
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- Q3 (a) (i)** oxygen ;
glucose ; Ⓐ other valid substances [2]
- (ii) carbon dioxide ; [1]
- (b) (i)** muscle ; [1]
- (ii) ref. to contraction / shortening ; [1]
- (iii) ref. to increased pressure ;
so blood leaves heart + via aorta ;
ref. to volume decreases AW ; [max. 2]
- (c) (i)** ref. to high + fat diet / cholesterol AW ;
ref. to smoking ;
ref. to stress ;
ref. to lack of exercise ;
ref. to genetic influence AW ;
Ⓢ refs to blood clots [max. 2]
- (ii) all parts of artery below point B shaded ; [1]
- (d)** (structure) presence of valves ;
(explanation) prevents backflow of blood AW ;
(structure) ref. to wide lumen ;
(explanation) allows blood to flow with minimum resistance AW ;
(structure) ref. to tough wall / collagen present ;
(explanation) to prevent bursting AW ; [max. 4]
- [max. 14]
- Q4 (a) (i)** pupil drawn in both diagrams + smaller in first diagram ;
iris in both diagrams the same diameter ; [2]
- (ii) labels correct for:
iris ;
pupil ;
sclera ; [3]
- (b)** (pupils gets bigger)
ref. to contraction + of radial muscles ;
ref. to relaxation of circular muscles ; [2]
- (c)** ref. to role of rods in detecting black and white images AW ;
ref. to sensitivity even in low light intensities AW ;
ref. to role of cones in detecting colour AW ;
ref. to cones needing high light intensity to trigger them AW ; [max. 3]
- [max. 10]

Page 3	Mark Scheme	Syllabus	Paper
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- Q5 (a) (i)** ref. to recent meal / intake of carbohydrate food AW ; [1]
- (ii)** pancreas ; [1]
- (iii)** ref. to glucose absorbed from blood ;
ref. to conversion to glycogen ;
ref. to increased rate of respiration ; [max. 2]
- (iv)** homeostasis ; [1]
- (b) (i)** intake by mouth would result in digestion in the stomach AW ;
due to presence of + protease / pepsin ; [2]
- (ii)** insulin gene removed from human + DNA / chromosome ;
ref. to restriction + endonuclease / enzyme ;
ref. to plasmid cut open AW ;
ref. to use of ligase + in placing insulin gene into plasmid ;
ref. to formation of recombinant DNA ;
ref. to insertion of plasmid into host bacterial cell AW ;
ref. to culture of bacteria ;
ref. to use of + fermenter / bioreactor ; [max. 4]
- [max. 11]
- Q6 (a)** ref. to biological ;
catalyst AW ;
ref. to protein nature AW ; [max. 2]
- (b) (i)** ref. to stains may be protein / fat / not removable with detergent only AW ;
ref. to presence of lipase ;
breaks down fat (stain) + to form fatty acids and glycerol ;
ref. to presence of protease ;
breaks down protein (stain) + to form amino acids ;
ref. to products being soluble AW ; [max. 3]
- (ii)** high temperature denatures enzymes ;
so enzymes will not work AW ;
low temperature + enzymes work slowly AW ;
appropriate explanation e.g. ref to kinetic energy of molecules ;
ref. to constant temperature maintains optimum conditions AW ; [max. 3]
- (iii)** TEMPERATURE **AND** EXPLANATION NEEDED FOR THE MARK
around 37°C + ref. to optimum temperature for enzyme action ;
Ⓐ refs. to higher temperatures (up to 70°C with suitable explanation e.g.
modified to withstand high temperatures) [1]
- (c)** ref. to fermenter ;
ref. to source of enzyme e.g. yeast / fungus / bacteria ;
ref. to feedstock / starch solution ;
ref. to suitable conditions – air bubbled ;
ref. to suitable conditions – stirring ;
ref. to intracellular enzymes + microbes filtered ;
then crushed and extracted ;
ref. to extracellular enzymes + extracted from filtered feedstock ; [max. 4]
- [max. 13]

Page 4	Mark Scheme	Syllabus	Paper
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Q7 (a) some red blood cells are sickle shaped AW ;
 ref. to haemoglobin + distorts at low oxygen concentrations ;
 results in less efficient oxygen transport AW ;
 cells can block capillaries / become trapped in capillaries / ref. to crisis AW ;
[max. 2]

(b) (i) father = I^NI^S + mother = I^NI^S ;
 genetic make-up of gametes stated ;
 F1 genotypes stated or shown on diagram ;
 probability: 0.5 / 50% / one in two ; Ⓐ 1:1 **[4]**

(ii) malarial parasite is unable to breed / survive in I^NI^S blood cells ;
 so provides protection from malaria ; (or v.v)
 parent with I^SI^S + is likely to die from sickle cell anaemia ;
 parent with I^NI^N + is likely to die from malaria ; **[max. 3]**

[max. 9]