

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MARK SCHEME for the May/June 2008 question paper

0610 BIOLOGY

0610/31

Paper 31 (Extended Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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.

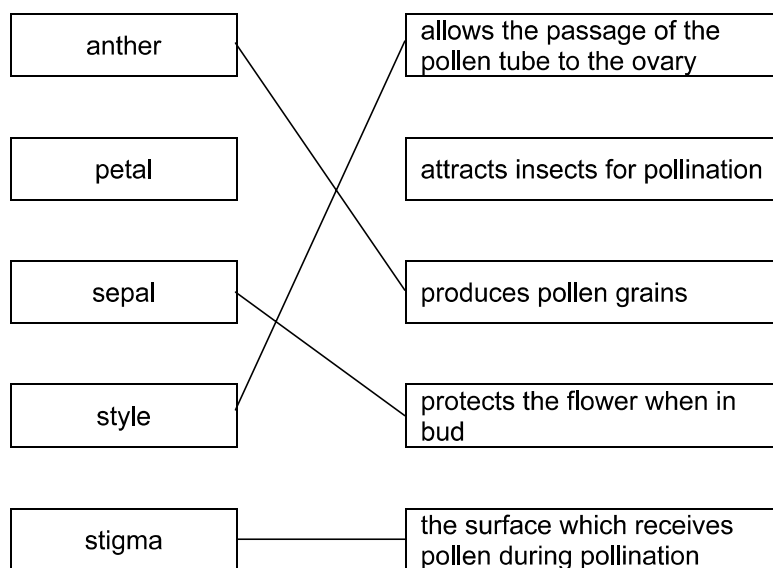
Mark schemes must be read in conjunction with the question papers and the report on the examination.

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- 1 (a) *reject lines to or from the same box, e.g. anther and petal to produce pollen grains*
A if lines do not touch box but meaning is clear



[4]

- (b) *assume answer is about stigma of wind-pollinated flower unless told otherwise, accept **ora**, 2 max for differences, 1 or 2 for significance*

wind-pollinated stigma,

insect-pollinated stigma

feathery / hairy ; **R** branched
ignore not sticky
 large(r) ; **A** large surface area
 outside flower / AW ;
A pendulous / exposed
ignore long and short

not, feathery / hairy ;
ignore sticky
 small(er) ; **A** small surface area
 inside flower / AW ;

[2 max]

explanation

to catch pollen / AW (in the wind) ; **A** for pollen to attach (to stigma)
 or make pollination more likely / easier
 increase chance of pollination ;

'more likely to catch pollen' = 2 marks

[max 3]

- (c) 1 little / less / AW / no, variation ; **R** cloning
 2 ref to becoming homozygous ; *ignore ref to gene*
 3 e.g. of consequence 'good' or 'bad' ;
 e.g. less chance of adapting to changing conditions / less ability to evolve /
 may become extinct / adapted variety spreads / AW ;
 4 greater chance of pollination / ensures pollination occurs ;
 A reproduction / fertilisation
 5 useful if no other plants (of same species) nearby ;
 6 less wastage of pollen ; **A** gametes
 7 not dependent on (named) agent of pollination ;

[max 3]

[Total: 10]

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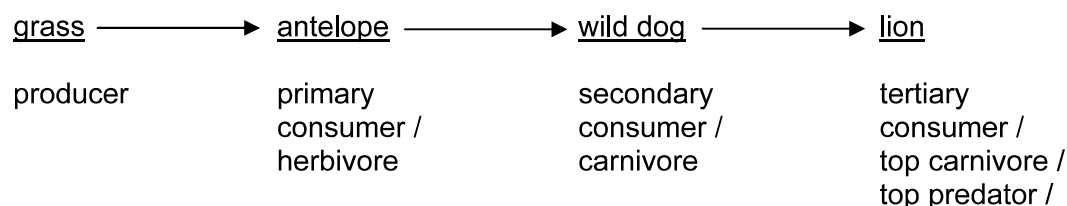
2 (a) (i) eats / consumes / feeds on, animals / meat / flesh ; [1]

(ii) fur / hair / whiskers / vibrissae ;
 external ear(s) / pinna(e) ;
 mammary glands / breasts / nipple / glands that produce milk / AW ;
R milk unqualified by external structure [max 1]

(b) (i) disease / parasite(s) / (named) pathogen(s) ;
 hunting (by farmers) ; **R** poaching
 shortage of, food / antelopes ; **A** idea of fewer
 shortage of water / drought ;
 predation (by lions) ; **A** more lions
 loss of habitat / AW e.g. territory ; **R** space unqualified
 change of climate / AW ;
 pollution ;
 AVP ; e.g. shortage of mates / small populations do not breed as much
R competition unqualified [max 2]

(ii) extinction / become endangered / become rare / inbreeding ; [1]

(c)



1 mark for minimum of two arrows in correct direction ;
 1 mark for all organisms named and all in correct order as a chain ;
ignore sun / decomposers / parasites
 2 marks for labelling the trophic levels –
either producer, primary, secondary + tertiary consumer
or 1st, 2nd, 3rd, 4th ;;
if one or two labels incorrect award 1 mark

[4]

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- (d) (i) maintenance / protection / preservation / 'caring for' / 'looking after' ,
of, habitat / ecosystem / community / species / (named) organisms / resources;

'making a habitat' = 1 mark

One of the following for a max 1 mark

for future generations / prevent extinction ;
encourage breeding (in wild or in captivity) ;
ref to, biodiversity / genetic resources / AW ;

[max 2]

- (ii) prevent destruction of, grassland / habitat ; **A** preserve
(nature) reserve / wild life park / AW ;
rangers / wardens ;
ensure good supply of, food / antelopes / prey / AW ;
legislation / AW ; e.g. refs to poaching / wild life trade
control of, predators / lions ;
A 'kill lions' / 'drive lions away' / 'provide food for lions'
education of local population ;
captive *breeding* / *breed* in a zoo / *breeding* programme ;
reintroduction to the wild ;
AVP ; e.g. further detail of any of the above points

[max 3]

- (e) *ignore refs to nitrogen fixation / denitrification*
marking points 7 + 8 must be in the correct context

- 1 (eaten / digested by) (named) scavenger(s) / hyaenas / vultures ;
- 2 excretion / urine / egestion / faeces / AW ;
- 3 dung beetles / detritivores / maggots ;
- 4 decay / decomposition / rotting, by, bacteria / fungi / named decomposer ;
- 5 protein → amino acids ;
- 6 deamination / amino acids → ammonia ; } **A** protein → ammonia
- 7 ammonia → nitrite ; }
- 8 nitrite → nitrate ; } **A** ammonia → nitrate
- 9 nitrification / nitrifying bacteria ;
- 10 *Nitrosomonas* / *Nitrobacter* in correct context of nitrification ;
- 11 plants absorb, nitrate / ammonia ;

'decomposition by nitrifying bacteria' = 0

[max 5]

[Total: 19]

Page 5	Mark Scheme	Syllabus	Paper
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3 (a) (i) excretion ; [1]

(ii) biological ; **A** made by, cells / organisms
catalyst / described ;
(made of) protein / AW ;

bio-catalyst = 2 marks [max 2]

(b) (i) pH ; **A** ph / PH / Ph [1]

(ii) temperature ; **R** heat *ignore* room
size / mass / quantity / amount / surface area / type, of potato ;

volume of hydrogen peroxide ;
concentration of hydrogen peroxide ;

A 'amount' with respect to hydrogen peroxide
R refs to catalase / enzyme [max 2]

(c) *award two marks if correct answer (0.56 / 0.57 / 0.58) is given – may be in white space below the table*
if no answer or incorrect answer award one mark for correct working
if 0.5 or 0.6 award one mark

10 divided by 17.4

0.56 / 0.57 / 0.58 ;; [2]

(d) *graph*

1 *x-axis labelled* pH ;

2 *y-axis labelled – must have units*

rate (of oxygen production / of reaction), $\text{cm}^3 \text{min}^{-1}$ / cm^3 per min ;

3 points all correct ; use the overlay, but **A** *ecf from (c)*

4 continuous and clear line , which may be either a curve which may not go through all the points or straight lines between points

R if line goes beyond plotted points [4]

(e) (i) increase in rate to (pH) 6 then decrease / reaches a peak at (pH) 6 ;
any rate given as a data quote, **with** $\text{cm}^3 \text{min}^{-1}$ / cm^3 per min ; [2]

(ii) pH 6 is, optimum / when enzyme 'works best' ;

following points may refer to optimum or sub-optimum

ref to shape of enzyme ;

ref to active site ;

ref to denaturation ; **A** destroyed **R** 'killed'

ref to substrate / hydrogen peroxide, fitting into, enzyme / active site ; [max 3]

[Total: 17]

Page 6	Mark Scheme	Syllabus	Paper
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- 4 (a) try to mate them together, failure = suggests different species ;
 mate together, no offspring = suggests different species ;
 breed together and see if any offspring are, sterile / infertile ;
 test DNA / examine chromosomes ; [max 1]
- (b) (i) continuous ; **A** discrete [1]
- (ii) *Equus grevyi* ; **A** *grevyi* [1]
- (c) (i) phenotype ; **A** close phonetic spellings [1]
- (ii) *these two points are linked – ‘change’ unqualified does not get a mark, but ‘change in DNA’ gets 2 marks*
 change / AW ; e.g. substitution / deletion / error in meiosis
 in, DNA / gene(s) / chromosome(s) ;
 change in genotype / ‘genetic, structure / genetic make-up’ = 1 mark [2]
- (d) (i) exoskeleton / external skeleton ;
 segmented / jointed, limbs / legs / appendages ;
 segmented body ; [max 1]
- (ii) three parts to the body / head + thorax + abdomen ;
A sections / **R** segments
 wings ; *ignore numbers of wings if given*
 6 / 3 pairs of, legs ; [max 2]
- (e) (i) stripes (on head and neck), become / are, horizontal (when feeding) ;
 less attractive to (tsetse), flies / insects ; **A** AW
A camouflage in grass ; [2]
- (ii) 1 ref to mutation and number of stripes ;
 2 ref to number of stripes and likelihood of being bitten ;
 3 ref to, disease / death ;
 4 survivors breed ;
 5 ref to offspring ; (fewer stripes = less / more stripes = more)
 6 passing on advantageous, alleles / genes (for more stripes) ;
 7 natural selection / survival of fittest ;
- R** artificial selection [max 3]
- [Total: 14]**

Page 7	Mark Scheme	Syllabus	Paper
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5 (a) *balanced diet*

provides, sufficient energy / energy for needs ;
 provides, molecules / materials, for metabolism / equivalent ; **A** substances
 provides, nutrients / named nutrients ; CPFVM H₂O fibre

A minimum of any three named nutrients

A contains (all the) food, groups / types / classes **R** 'substances'
 in correct / right, quantities / proportions / amounts ;

A adequate / sufficient **R** 'equal'

R 'balanced' as it is in the question

[max 2]

(b) (i) liver ;

[1]

(ii) glucose ; **R** if two compounds are given

[1]

(iii) aerobic ;

carbon dioxide / water / no lactic acid, produced ;

anaerobic = 0 for the whole of (iii)

[2]

(c) dissolved / in solution / soluble ;
in plasma ;

[2]

(d) *mark name and function independently*

*read the functions of **A** and **B** together before awarding marks*

part	name of part	function
A	glomerulus ; A knot of capillaries R capillaries	filtration / filtering (blood) ; A increase in (blood) pressure / ref to high pressure A 'substances forced out' R diffusion
B	capsule ; R cup	collects filtrate / allows filtration ;
C	tubule ; <i>distal is neutral</i> R nephron / tube	(selective) <u>reabsorption</u> ; reabsorbs, water / glucose / salts / minerals / ions / amino acids ; <i>ignore</i> nutrients A description of reabsorption, e.g. active uptake of glucose absorption back into blood
D	collecting duct ;	(re)absorbs water / passes urine to pelvis <i>or</i> ureter ; R urea unless with water A waste substances

[8]

Page 8	Mark Scheme	Syllabus	Paper
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- (e) (i) *award two marks if correct answer (1699 / 1699.2 / 1700) is given*
award one mark if no answer or incorrect answer but correct working is shown

$$1.18 \times 60 \times 24 / 1.18 \times 1440$$

$$1699 / 1699.2 / 1700 \text{ (dm}^3\text{) ;;} \quad [2]$$

- (ii) *award two marks if*
- correct answer (0.1) is given*
 - allow ecf from (e)(i) – so check calculation*

if no answer or incorrect answer award one mark for dividing 1.7 by something and multiplied by 100

$$1.7 / 1700 \times 100$$

$$0.1 \text{ (} \% \text{) ;;} \quad [2]$$

[Total: 20]