

**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

International General Certificate of Secondary Education

**MARK SCHEME for the June 2005 question paper**

**0610 BIOLOGY**

**0610/03**

**Paper 3 (Extended Theory), 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*.

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

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**Grade thresholds** for Syllabus 0610/03 (Biology) in the June 2005 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 3	80	54	34	22	16

The threshold (minimum mark) for B is set halfway between those for Grades A and C.  
The threshold (minimum mark) for D is set halfway between those for Grades C and E.  
The threshold (minimum mark) for G is set as many marks below the F threshold as the E threshold is above it.

Grade A\* does not exist at the level of an individual component.



**JUNE 2005**

**IGCSE**

**MARK SCHEME**

**MAXIMUM MARK: 80**

**SYLLABUS/COMPONENT: 0610/03**

**BIOLOGY  
Paper 3 (Extended Theory)**



Page 1	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2005	0610	3

- 1 (a) ref. to size/age/species of plant;  
light; (R) sun unqual.  
carbon dioxide; (R) air unqual. (R) oxygen  
temperature/heat/warmth;  
soil type AW;  
pH (of soil);  
spacing of plants AW; (A) other plausible answers **max. [3]**
- (b)(i) **(description) max. 2**
- ref. to reduced growth/stunted growth/plant shorter or smaller AW;
  - upper leaves pale green + bottom leaves yellow/dead or surface area smaller;
  - stem thin(ner); (R) feeble/weak unqual.
  - roots small(er) AW;
- (explanation)**
- to form + proteins/amino acids/other viable example of use of nitrate;
  - ref. to lack of chlorophyll/chlorophyll is a protein; **max. [4]**
- (ii) **(description)**  
(lower) leaves pale green + yellow/(upper) leaves paler than normal;
- (explanation)**  
magnesium needed to form + chlorophyll/chloroplasts/  
photosynthesis (or description) will be reduced AW; **[2]**
- (c)(i)
- ref. to use of nitrate by (previous) crop AW/weeds or crop eaten by animals;
  - ref. to nitrate changed to protein in crop AW;
  - ref. to action of denitrifying bacteria/waterlogging of soil;
  - ref. to leaching; (A) washed away **max. [2]**
- (ii)
- addition of + manure/compost/sewage sludge;
  - addition of fertiliser/named nitrogen-based fertiliser;(R) nitrates unqual
  - ref. to growth of + leguminous AW plants/suitable named plants e.g. clover, peas, beans; (R) crop rotation unqual.
  - leave fallow and plough in/plough in dead plants ;
  - improve soil drainage/aerate soil AW; **max. [2]**

Page 2	Mark Scheme	Syllabus	Paper
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(d)

(leguminous plants)

(insectivorous plants)

- ref. to leguminous plants AW/presence of nodules; (R) nodes
- ref. to nitrogen-fixing bacteria;
- ref. to conversion of nitrogen into ammonium salts/nitrates;
- made available to plant AW/to provide amino acids;

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- ref. to insects/insectivorous plants;
- ref. to enzymes;
- ref. to digestion AW of proteins;
- to provide amino acids/amino acids absorbed;

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- ref. to use of active transport/active uptake;
- presence of more/lots of + mitochondria/respiration;
- (absorption) against concentration gradient AW;

**max. [3]**

.....  
**Total: 16**  
 .....

- 2 (a) (A) ciliary (muscle/body);  
 (B) pupil + becomes smaller/constricts; (R) narrower  
 (R) controls amount of light entering  
 (A) less light enters eye (A) makes iris larger/width increases [2]

- (b)(i) (voluntary)  
 can be controlled (by will)/involves a decision or thought/not automatic;  
 (A) control by brain (R) conscious (R) knowingly  
 (antagonistic)  
 ref. to opposing/working against each other/one contracts while the other relaxes AW; [2]

- (ii) CHECK FOR ARROWS OR ANNOTATIONS ON FIG. 2.1  
 ref. to eye ball pulled to the right AW; (A) clockwise (R) up  
 (A) outwards/towards muscle C [1]

- (iii) ref. to contraction AW of muscle D + relaxation of muscle C;  
 D pulls on eyeball AW;  
 C is antagonistic to D; [max. 2]

- (c) 2 MARKS FOR CORRECT ORDER  
 1 MARK FOR TWO INCORRECT

cornea aqueous humour pupil lens vitreous humour; ; [2]

- (d)

	type of light detected	distribution in the retina
rods	ref. to shades of grey/ dim light/black and white/low light intensity; (A) night/dark/white	ref. to spread over (retina); (A) more concentrated on margins (R) on sides unqual.
cones	ref. to colour/bright light/ high light intensity/day(light); (A) single named colour	ref. to in fovea/yellow spot;

[4]

.....  
**Total: 13**  
 .....

Page 4	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2005	0610	3

3 (a) CAN AWARD ROLE WITHOUT CORRECT NAME  
CAN ACCEPT RIB CAGE IN B AND V.V.

part	name	role in breathing in
A ↑ ↓	ribs; Ⓐ rib cage	prevent collapse of thoracic cavity or lungs AW (as a result of pressure changes) AW/ ref. to attachment of muscles/ move up to + increase volume/decrease pressure; R space
B	intercostal muscle;	contracts + to move ribcage up or out/to increase volume of chest cavity or lungs AW/decrease pressure; Ⓐ refs to internal intercostals
C	diaphragm ;	contracts/moves downwards + to increase volume of chest cavity AW/decrease pressure ; Ⓐ ref. to 'space'

max. [6]

(b)(i)

- ref. to cilia + beat/move AW; Ⓐ refs to hairs Ⓐ cilia trap germs
- to move dust/mucus + up or out (of bronchus);
- ref. to secretion/production + of mucus;
- ref. to sticky nature AW;
- to trap + dust/bacteria; (linked to mucus)

max. [4]

(ii) NO MARK FOR AFFECT WITHOUT CORRECT NAMED SUBSTANCE  
1 MARK FOR THE SUBSTANCE, 1 MARK FOR EFFECT

Ⓐ carbon monoxide

- nicotine;
- cilia + become paralysed/stop working AW ; Ⓐ killed
- cilia unable to remove mucus from + bronchi/airways AW;
- cell lining AW can be infected by trapped microbes;

- tar;
- ref. to cells become cancerous AW;
- increased production of mucus;
- cilia + become paralysed/stop working AW; Ⓐ killed

- carbon particles;
- increased production of mucus;

max. [2]

.....  
Total: [12]  
.....

- 4 (a)(i) 1.
- slows down air movement/reduces wind effect AW;
  - ref. to transpired water vapour trapped inside curled leaf AW;
  - ref. to diffusion gradient reduced/humidity increased inside curled leaf;
  - prevents water loss/less + transpiration/water loss/evaporation;
  - reduces surface area + exposed AW; **max. [2]**
2.  
prevents evaporation/loss + of water from leaf; (R) waterproof unqual.  
reflects radiant light/reduces heating effect of sun AW; **max. [1]**
- (ii) 1.  
better access AW to + water/mineral salts; (R) goes deeper unqual.  
larger surface area for absorption; (R) anchorage **max. [1]**
- 2.
- ref. to storage of water;
  - ref. to small surface area to volume AW;
  - less water loss/less transpiration;
  - ref. to ability to photosynthesise; **max. [2]**
- (b)
- less surface area;
  - less light absorbed;
  - less stomata;
  - less absorption of carbon dioxide;
  - less transpiration;
  - less movement of minerals/water + from roots;
  - less chlorophyll/chloroplasts;
  - less photosynthesis; (A) description **max. [2]**

(c)(i)(ii) MARK COLUMNS INDEPENDENTLY

description of process	name of process	variable that, if increased, would speed up the process
absorption of water from the soil	osmosis; (A) diffusion	concentration of minerals in root hairs/ water in soil/temperature/transpiration (or any factor that increases it)/number of root hairs;;
using water to form glucose	photosynthesis;	light/conc. of carbon dioxide/temperature/water/chlorophyll/ chloroplasts;
movement of water vapour out of leaves	transpiration; (A) diffusion (A) evaporation	temperature/wind speed/ dryness of air/number of size of stomata; (A) ref. to light/heat (R) refs. to humidity

[6]

.....  
**Total [14]**  
.....



Page 6	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2005	0610	3

- 5 (a)(i) meiosis; (A) reduction division [1]
- (ii) ref. to half the number of chromosomes/haploid; (A) v.v has 23 chromosomes;  
 (A) only contains one sex chromosome AW  
 ref. to presence of tail/ability to move; (R) refs to shape  
 (A) less cytoplasm/less food stores AW max. [1]
- (iii) zygote; (A) diploid (R) embryo [1]
- (iv) ref. to sperm cell that fertilises it must be carrying an X (chromosome);  
 ref. to fertilised egg cell contains XX;  
 (A) egg cell had not been fertilised by a Y sperm AW [1]
- (b)(i) ovary; (A) follicle [1]
- (ii) oviduct/fallopian tube; [1]
- (iii) uterus; (A) womb [1]
- (c) (amniotic fluid)
- protects fetus from physical damage/cushions; (R) protects unqual.
  - acts as shock absorber AW ; (R) prevents shock unqual.  
 (R) supports unqual.
  - prevents unequal pressures from acting on fetus/maintains constant environment/allows free movement;
  - protects fetus from temperature fluctuations AW; (R) insulates unqual.
  - protects fetus from drying out AW;
  - ref. to absorbs + excretory material/urine from fetus; max. [1]
- (amniotic sac)
- secretes/produces + amniotic fluid;
  - encloses/contains + amniotic fluid AW; max. [1]
- (d)(i) IGNORE REFS TO NUTRIENTS/FOOD
- ref. to exchange of up to two named materials e.g. oxygen/glucose/water/amino acids/antibodies/urea/carbon dioxide; ;  
 (A) other correct materials (R) protein
  - ref. to physical attachment between fetus and uterus/mother;
  - ref. to prevention of blood mixing/allows blood systems to be close AW;
  - ref. to protection from mother's (high) blood pressure;
  - ref. to protective role in preventing the entry of some pathogens AW;  
 (R) germs/disease max. [4]
- (ii) ref. to secretion of progesterone; (ignore oestrogen refs.)  
 to keep lining of uterus thick/prevents menstruation/to prevent breakdown of uterus lining;  
 (A) prevents uterine muscle contracting [2]

.....  
**Total 15**  
 .....

Page 7	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2005	0610	3

- 6 (a) ref. to presence of feathers; (R) wings  
ref. to presence of beak; (A) bill [2]
- (b)(i) each organism is given two names/ref. to genus and species/trivial;  
suitable example (*Oxyura jamaicensis* or *Oxyura leucocephala*); [2]
- (ii) cross-mating results in a fertile + duck/variety/offspring/sub-species/  
new species;  
they both belong to the + same genus/genus *Oxyura*;  
they are attracted to each other AW; max. [2]
- (c)(i) they also exist in America; (R) they exist in Spain  
(R) refs to other parts of the world unequal. [1]
- (ii)
- ref. to hunting/more predators;
  - ref. to destruction of habitat;
  - ref. to pollution;
  - ref. to disease;
  - ref. to loss of food/more competition for food or other named factor;
  - ref. to change in climate/sudden change in environment;
  - ref. to very small population; max. [1]
- (d)
- food chains only show one source of food for each level in a food chain AW;
  - ref. to two different organisms at secondary consumer level AW;
  - ref. to no information about link between seeds and insect larvae AW;
  - Ruddy duck feeds + as herbivore and carnivore/at two different levels/ as an omnivore AW/has two different sources of food;
  - Ruddy ducks have two different predators AW;
  - A is a straight line/a food web is a network AW; max. [2]

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**Total 10**  
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