

CAMBRIDGE
INTERNATIONAL EXAMINATIONS

JUNE 2003

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 70

SYLLABUS/COMPONENT: 0610/03

BIOLOGY
Paper 3 (Extended)



Page 1	Mark Scheme	Syllabus	Paper
	IGCSE EXAMINATIONS – JUNE 2003	0610	3

- 1 (a)** one mark for each part (drawn) and labelled correctly:
- renal artery;
 urethra;
 ureter;
 one mark for quality of drawing;
 MAX. 2 FOR LABELLING "STUMPS" ONLY **4**
- (b)** water;
 urea; Allow nitrogenous waste
 uric acid;
 salts or minerals or named salts; Allow vitamins
 hormones;
 Reject 'waste products unqual./ions unqual.' **max. 3**
- (c)**
- i. ref. to blood enters machine from patient AW;
(ONLY CREDIT ONCE)
 - ii. ref. to pump;
 - iii. blood passes along + dialysis tubing AW/visking tubing/cellulose
or cellophane tubing;
 - iv. ref. to tubing AW being semi-permeable/selectively permeable/
acting as a filter AW;
 - v. ref. to surrounding liquid;
 - vi. containing + some salts/glucose/no urea;
 - vii. ref. to fluid has same O. P. as blood;
 - viii. waste materials/excess materials + pass from blood;
 - ix. ref. to diffusion;
 - x. ref. to bubble trap/counter flow;
 - x. 'cleaned' blood returns + to patient's circulation/body AW;
(ONLY CREDIT ONCE) **max. 4**
- (d)**
- (i)** ref. to internal environment;
 maintained (at constant level)/regulated/balanced; **2**
 - (ii)** ref. to maintaining level of named substance in blood;
 method outlined, e.g. filtration/reabsorption/osmosis/diffusion; **2**
 - (iii)** suitable organ named;
 named substance levels maintained;
 ref. to mechanism for maintaining constant level; **3**
- max 18**

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- 2 (a) one mark for each column drawn and shaded correctly; 2
- (b) (i) 12 (%); 1
- (ii) AWARD 2 MARKS FOR CORRECT ANSWER, EVEN WITHOUT WORKING
 $50 + 12 + 13 + 6 + 7;$
 $= 88 (%);$ 2
- (c) **REJECT REF. TO FLUORINE ONCE** in (i), (ii) or (iii)
- (i) fluoride (in water) reduces (the number of) decayed teeth in children; 1
- (ii) add fluoride to the drinking water in town B;
advise children to use fluoride toothpaste;
use other suitable, named, source of fluoride; max 1
- (iii) i. ref. to side effects of too much fluoride, e.g. browning of tooth enamel or possible cancer risk;
ii. ref. to importance of personal choice/makes water impure;
iii. ref. to allergies to fluoride;
iv. ref. to cost of fluoridation;
v. ref. to treatment of whole population when not all benefit;
- Reject refs. to fluoride flavouring water/refs. to being bad for health/has side effects unqual. max 1
- max 8**

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- 3 (a) involves giving the organism two names;
ref. to genus and species; 2
- (b) (i) *Caulerpa* grows at twice their rate AW;
ref. to competition (for light/CO₂/space for attachment/other plausible factor AW); Reject refs. to O₂ 2
- (ii) ref. to primary consumer/(organism) that feeds on plants/producers; 1
- (iii) ref. to disease/predation or shortage of + food/herbivores/sea urchins;
resulting in death/migration AW; 2
- (c) ref. to chlorine being + dangerous/poisonous/damaging to other organisms/a pollutant; 1
- (d) (i) i. ref. to possible effects on local food chains or food webs AW;
ii. ref. to destabilization of the ecosystem;
iii. ref. to extinction (of other organisms);
iv. ref. to local fishing industry;
v. ref. to importance of conservation;
vi. ref. to possible use of local species for medicines;
vii. ref. to effects on biodiversity; max 2
- (ii) ref. to its ability to feed on *Caulerpa*; Reject ref. to pest unqual.
reduces competition between *Caulerpa* and local seaweeds;
reduces population of *Caulerpa*;
allows other species to grow again; max 2
- (iii) i. it may eat other seaweeds as well;
ii. causing their extinction AW;
iii. ref. to no natural predators of the sea slug present AW;
iv. ref. to unbalancing + food chains/webs/ecosystem;
v. ref. to introduction of disease; max 2
- max 14**

Page 4	Mark Scheme	Syllabus	Paper
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- 4 (a) (i) (SIMILARITIES)**
- i. ref. to exoskeleton;
 - ii. ref. to jointed limbs AW;
 - iii. no backbone/ref. to invertebrate;
 - iv. both have segmented body;
 - v. both members of the arthropod group;
- Accept ref. to stages of development, e.g. ecdysis/instars **max 3**

(ii) (DIFFERENCES)

1 MARK FOR TABLE, MAX. 4 FOR DIFFERENCES

- i. table format with suitable headings;
 - ii. insects have 3 pairs of legs + arachnids have 4 pairs;
 - iii. insects have wings + arachnids do not; Allow refs to ability to fly
 - iv. insects have antennae + arachnids do not;
 - v. insects have compound eyes + arachnids do not/ref. to simple eyes;
 - vi. insects have 3 parts to the body + arachnids have 2 parts;
 - vii. arachnids have chelicerae/pincer-like jaws + insects do not;
 - viii. arachnids spin webs + insects do not; Allow insects can be social + arachnids are not AW;
- max 5**

- (b)**
- i. named insect;
 - ii. ref. to variation AW;
 - iii. due to sexual reproduction/mating;
 - iv. ref. to mutation;
 - v. variation/mutation + leads to differential survival AW;
 - vi. suggestion for environmental change, e.g. temperature, food available;
 - vii. suggested change to insect, e.g. thicker cuticle, larger wings;
 - viii. ref. to benefit of change to the organism;
 - ix. ref. to survival of fittest/natural selection;
 - x. favoured genes passed on to next generation AW;
- max 7**

max 15

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- 5 (a) ACCEPT OTHER PLAUSIBLE ANSWERS
- i. ref. to unsuitable climate/temperature/rainfall/ref. to pollution;
 - ii. ref. to natural disasters, e.g. flooding/drought;
 - iii. water used for other purposes/diversion of rivers/building dams/poor irrigation;
 - iv. so plants are killed/poor germination/no food for animals; (linked to i. or ii. or iii.)
 - v. next year's seeds eaten through need for food;
 - vi. poor soil/lack of inorganic ions or fertiliser;
 - vii. so plants do not grow well; (linked to vi.)
 - viii. ref. to desertification/poor or thin soil;
 - ix. due to + deforestation/slash and burn; (linked to viii.)
 - x. ref. to lack of money + to buy seeds/fertiliser/pesticides/machinery/import food;
 - xi. ref. to war/farm redistribution;
 - xii. so there is no-one to harvest crops/too dangerous to tend crops/no experienced farmers AW; (linked to xi.)
 - xiii. ref. to urbanisation AW;
 - xiv. so there are fewer people to work the land/less land to grow crops on; (linked to xiii.)
 - xv. ref. to increasing population requiring food;
 - xvi. ref. to growth of + cash crops/monoculture/food for export (not suitable for local diet);
 - xvii. ref. to selling of food reserves to + settle national debt/maintain economy;
 - xviii. ref. to pest damage/disease (in crops or stored food);
 - xix. heat causes fresh produce to rot quickly AW;
 - xx. lack of suitable land to farm/ref. to overgrazing;
 - xxi. farmers poorly educated;
 - xxii. forests destroyed + so nothing to hunt/no food to collect;
 - xxiii. ref. to outmoded farm practices;
 - xxiv. ref. to poor transport/distribution;
- max 10**

- (b)
- i. ref. to auxin;
 - ii. sprayed onto e.g. tomato flowers to induce fruit production;
 - iii. happens even if pollination has not occurred;
 - iv. ref. to use of auxins in + weedkiller/herbicide;
 - v. so crops have less competition;
 - vi. ref. to effect (only) on broad leaved plants (so monocot crops unaffected);
 - vii. ref. to use of hormones (e.g. cytokinin) in tissue culture;
 - viii. to promote root and shoot formation/form a callus;
 - ix. ref. to BST (bovine somatotropin);
 - x. used with cattle to increase milk production (linked to ix)
 - xi. ref. to growth hormone/testosterone;
 - xii. used to increase meat production;
 - xiii. ref. to production of seedless fruit;
 - xiv. ref. to promotion of seed germination;
 - xv. ref. to production of short plants (to resist wind damage);
 - xvi. ref. to delaying fruit production/ripening;
 - xvii. ref. to increasing fruit yield AW;
- max 5**

max 15

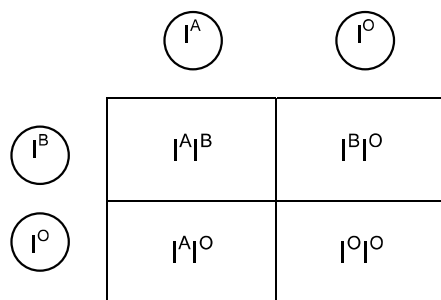
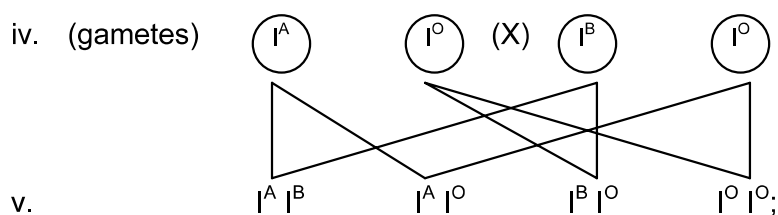
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- 6 (a) i. ref. to a pair of alleles; Reject gene ref. once
 ii. in which one is not dominant over the other AW;
 Reject both dominant; Allow both equally dominant
 iii. so both alleles have an effect in phenotype/heterozygous organism AW;

3

(b) ACCEPT PUNNETT SQUARE
 IF LINES ARE USED TO LINK GAMETES AND F1, THEY **MUST** BE CORRECT

- i. mother = $I^A I^O$; Allow AO, $I^A i$
 ii. father = $I^B I^O$;
 iii. (parents) $I^A I^O$ X $I^B I^O$;



- vi. $I^O I^O$ = baby with blood group;

6

- (c) (i) i. blood may + clump/clot/coagulate/agglutinate;
 ii. due to presence of antigens on (the surface of) blood cells;
 iii. and different antibodies present in other blood AW;
 iv. ref. to no clumping if donor blood group is group O; **max 3**
- (ii) i. placenta keeps the blood of mother and fetus separate AW;
 ii. since the blood types could be different AW;
 iii. but allows exchange of materials between mother and fetus AW;

3

max 15

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7 (a) MARK FIRST FIVE PARTS AND FUNCTIONS GIVEN ANY FIVE FROM:

- i. penis + to insert sperm/semen + into vagina AW/ref. to erectile tissue;
- ii. urethra + to pass sperm/semen + through penis;
Allow ref. to penis/ urethra + urine once;
- iii. testis + to make sperm/testosterone;
- iv. vas deferens/sperm duct + pass sperm from testis to urethra;
- v. epididymis + to store/mature/move + sperm;
- vi. scrotum + contain testes/to keep testes at lower temperature than that of body AW;
- vii. prostate gland/seminal vesicles/cowper's gland + to produce seminal fluid AW;

5

- (b) (i)
- i. ref. to swimming;
 - ii. using tail;
 - iii. ref. to passing through cervix;
 - iv. ref. to passing through uterus/womb;
 - v. enter an oviduct/fallopian tube;
 - vi. ref. to chemical sensor AW;
 - vii. ref. to mitochondria + energy;

max 4

- (ii)
- i. ref. to zona pellucida;
 - ii. sperm penetrates egg membrane;
 - iii. ref. to use of enzymes/acrosome;
 - iv. head of sperm enters egg;
 - v. sperm nucleus and egg nucleus fuse;
 - vi. ref. to formation of zygote;

max 3

- (c)
- i. ref. to use of condom/femidom (during sexual intercourse);
 - ii. ref. to abstinence from sexual intercourse;
 - iii. ref. to screening of blood for transfusions/blood checked for HIV;
 - iv. ref. to use of sterile needles (for injecting drugs)/don't share needles;
Reject refs to clean needles;
 - v. ref. to maintaining one partner/not sleeping around;
 - vi. ref. to health education;
 - vii. avoiding contact with blood + example;

max 3

max 15