

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the November 2004 question papers

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.

CIE is publishing the mark schemes for the November 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.

Grade thresholds taken for Syllabus 0610/03 (Biology) in the November 2004 examination.

	maximum mark available	minimum mark required for grade:			
		A	C	E	F
Component 3	80	52	39	26	21

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.

NOVEMBER 2004

INTERNATIONAL GCSE

MARK SCHEME

MAXIMUM MARK: 80

SYLLABUS/COMPONENT: 0610/03

**BIOLOGY
Paper 3 (Extended Theory)**

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- 1 (a) (i) (ANIMAL CELLS) B, C + (PLANT CELLS) A, D;
(ii) Ref. to (cell) wall/(sap) vacuole; ® chloroplast [1]

(b) **MARK COLUMNS INDEPENDENTLY**

CELL SPECIAL FEATURE	CELL FUNCTION
(A) ref. to chloroplasts /chlorophyll;	ref. to photosynthesis/ability to trap or absorb light/make starch AW;
(B) ref. to fibrils or fibres or protein strands/ability to contract AW; Ⓐ ref. to many mitochondria Ⓡ elastic	ref. to movement AW; Ⓐ to contract (if not already given) Ⓡ to relax unqualified Ⓡ elastic
(C) presence of cilia/hairs/ref to ciliated cell; Ⓐ ref. to many mitochondria Ⓡ has hair Ⓡ villi Ⓐ microvilli/brush border	ref. to movement of mucus/removal of bacteria or impurities or dust AW (from windpipe)/movement of egg (in oviduct); Ⓡ to trap bacteria Ⓐ absorption of glucose/amino acids (linked to microvilli or brush border)
(D) ref. to root hair/(long) extension AW/large surface area; Ⓐ ref. to hair-like extension Ⓐ ref. to many mitochondria Ⓡ large vacuole;	ref. to absorption of water or minerals/ref. to osmosis/ref. to diffusion + of oxygen or other named material/anchorage or support AW; Ⓐ ref. to large surface area (if not awarded under feature column)

ONLY AWARD MITOCHONDRIA AS A FEATURE ONCE

[8]

Total 10

2 (a) **DO NOT ACCEPT TERMS OTHER THAN 'LESS' OR 'MORE'**

	dairy products	cereals	meat, eggs, fish	sugar, sweets	vegetables, fruit
African diet contains	less	more	less	less	more

ALL NEED TO BE CORECT FOR THE MARK [1]

- (b) 1. cereals/sugar/sweets/vegetables/fruit;
2. dairy products/meat/eggs/fish/sweets; ® sugar unqual. [2]

- (c) (i) **ACCEPT CONVERSE ARGUMENTS**
ref. to less or not enough proteins in African diet + ref. to less meat/eggs/fish/dairy products AW; ® no protein
Ⓐ less calcium in diet + ref. to less dairy products [1]

- (ii) ref. to less or not enough vegetables/fruit; ® no vegetables/fruit
ref. to less vitamin C/ascorbic acid; ® less vitamins unqual. [2]

- (iii)
i. ref. to less or not enough vegetable/fruit/cereals;
® no vegetables/fruit
ii. ref. to less or not enough roughage/fibre/cellulose + present AW;
® no fibre
iii. gives bulk to food passing through gut AW;
iv. to help with peristalsis AW;
v. ref. to more meat + increases chance of colon cancer AW; **max. [3]**

Total 9

- 3 (a) (i) capillary drawn as double line + with correct links to artery and vein;
D ✓ arrow for direction of blood flow + correct;
® arrow if no capillary is drawn [2]

- (ii) liver; Ⓐ hepatic portal vein [1]

- (b) (i) glucose; Ⓐ sugars
amino acids;
minerals; Ⓐ named examples
vitamins; Ⓐ named examples ® vitamin A or D
carbon dioxide;
water;
max. [1]

- (ii) oxygen; [1]

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(c) presence of microvilli;
 one cell thick or ref. to (very) thin; ® thin cell wall
 large surface area;
 ref. to partially permeable AW;
 high respiration rate/ref. to active transport;
 Ⓐ presence of mitochondria in cells max. [2]

(d) (i) lacteal; [1]

(ii)
 i. ref. to (absorption of) fatty acids;
 ii. ref. to (absorption of) glycerol;
 iii. ref. to (absorption of) fat/fat droplets/lipids;
 iv. ref. to (absorption of) fat-soluble vitamins;
 v. ref. to absorption into + lymphatic system/lymph/lymph vessel;
 ® refs. to lacteal max. [2]

(e) i. ref. to lymph + glands/nodes;
 ii. ref. to production of white blood cells/lymphocytes;
 iii. ref. to role of lymphocytes - producing antibodies/antitoxins;
 iv. antibodies+ fight or kill or destroy bacteria or microbes/neutralise
 bacteria or toxins AW; ® germs ® disease
 v. ref. to return of tissue fluid AW/transport of fats + to blood
 stream AW; ® refs. to transport of fats/tissue fluid
 unqualified
 vi. ref. to prevention of oedema AW/draining of tissue fluid AW;
 vii. ref. to transport of white blood cells; max. [3]

Total 13

4. (a) i. mosquitoes/ticks/fleas are carriers/vectors; ® arthropods unqual. ®
 transmitted by
 ii. mosquito feeds on blood of infected bird/mammal;
 ii. infected mosquito feeds on human/bird/mammal + passes
 on infection AW max. [2]

(b) **TREAT ANSWER AS A LIST – MARK FIRST TWO RESPONSES**
 i ref. to raw materials/water/DNA/RNA/nucleic acid + available;
 ® food ® oxygen
 ii ref. to suitable temperature/warm;
 iii ref. to cells present; ® r e d blood cells
 iv blood provides transport (to cells) AW; max. [2]

(c) ref. to travelling (large) distances/from place to place/migrate/fly;
 Ⓐ ref. to export of birds [1]

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- (d) i. ref. to some pesticides/DDT + kill indiscriminately/non-specific/kill useful insects AW; ® harms insects
 ii. ref. to some pesticides/DDT + are non-biodegradable/remain in environment for a long time AW; ® refs to atmosphere
 iii. ref. to soil/land/water/river/lake + pollution;
 ® refs to eutrophication
 iv. ref. to cause deformed babies;
 v. ref. to accumulates in fat/stored in fat;
 vi. ref. to bioaccumulation in food chains AW;
 vii. ref. to effect on animals at top of food chain;
 viii. ref. to disruption of food chains; max. [3]

- (e) i. ref. to exoskeleton or cuticle;
 ii. ref. to bilateral symmetry;
 iii. ref. to segmented body;
 iv. ref. to jointed limbs;
 v. ref. to pairs of appendages AW/paired limbs/3 or more pairs of limbs;
 ® wings/compound eyes/antennae/2 or 3 parts to body max.
max. [2]

- (f) i. each organism has two names/ref. to genus and species;
 ii. genus = Culex
 iii. trivial/species names = picipiens;
 iii. ref. to use of Latin for name/name in italics/name underlined; max. [3]

Total 13

- 5 (a) (i) **NO MARKS FOR REFS. TO PHOTOTROPISM**
positive; (only award if linked to geotropism)
geotropism; (can award, even if linked to 'negative') [2]

- (ii)
 i. ref. to auxin;
 ii. produced (near) tip of root AW;
 iii. ref. to diffusion to other parts of root;
 iv. collects on/moves to + lower side of root AW; ® ref. to effect of gravity
 v. slows down cell growth on lower side;
 vi. resulting in differential growth rate AW; max. [3]

- (iii) to obtain water;
 to obtain minerals/named minerals/salts/nutrients/® food
 ref. to anchorage/stability AW; max. [2]

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- (b) (i) ref. to control;
ref. to acting as a comparison;
ref. to no effect of gravity AW/gravity is constantly changing AW;
max. [1]
- (ii) ref. to light will be another variable;
root will respond to light as well as gravity AW; to keep conditions
uniform AW;
max. [1]
- (c) i. plumules/leaves in dark will lack chlorophyll/be more
yellow/pale/white/etiolated;
- ii. plumules/stem in dark + will be longer/thinner/weaker/have longer
internodes/grow faster; (A) etiolated if not already given
- iii. leaves in dark will be undeveloped/smaller;
- iv. plumules in light will bend towards light; max. [2]

Total 11

- 6 (a) feeding/nutrition;
excreting; (A) urinating (R) defaecating
responding to stimuli/sensitivity/irritability breathing;
(A) reproduction + laying eggs
(R) grow max. [2]
- (b) temperature of lizard drops AW;
ref. to relationship being directly proportional;
from 20° to 10°/drops 10°; max. [2]

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**(c) MAX. 3 PER MECHANISM
ANY TWO MECHANISMS FROM:**

MAX. 2 IF REF. TO CAPILLARIES/VEINS

- i. ref. to vasoconstriction/description of process;
Ⓡ refs to movement of blood vessels
- ii. no or less blood near skin surface/blood insulated below fat AW;
- iii. so less heat + lost/radiated from skin (surface); Ⓡ no heat lost

- iv. ref. to hairs becoming erect AW; Ⓡ ref. to presence of hairs unequal.
- v. due to erector muscles + contracting;
- vi. hairs trap layer of air;
- vii. air acts as insulator/ref. to poor conductor AW;

- viii. ref. to shivering;
- ix. muscles contract uncontrollably AW;
- x. heat generated through respiration (in muscles);

- xi. sweat production slows down; Ⓜ stops;
- xii. less water evaporates from skin (surface);
- xiii. so heat lost by evaporation is reduced/more heat retained AW;

- xiv. ref. to liver;
- xv. ref. to conversion AW of glycogen to glucose;
- xvi. ref. to adrenaline;
- xvii. ref. to increase in + metabolic rate/rate of respiration;
- xviii. more heat (energy) produced;

- xix. ref. to increase in exercise/movement;
- x. ref. to increase in rate of respiration;
- xxi. ref. to some heat produced AW; **max. [6]**

- (d)**
- i. less respiration/metabolic reactions slow down AW;
 - ii. respiration controlled by enzymes;
 - ii. enzymes work more slowly as temperature drops AW;
 - vi. less energy + released/available; **max. [2]**

Total 12

7 (a) (i) A + E; (both needed for the mark) [1]

- (ii)**
- i. improved + health facilities/more doctors/housing/medicine/
immunisation AW/eradication of disease/less diseases;
 - ii. more/better + food supplies AW;
 - iii. better health education;
 - iv. cleaner water supplies/better sanitation;
 - v. ref. to (better) control of disease vectors AW;
Ⓜ ref. to use of insecticides
 - vi. less wars; **max. [2]**

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(b) **ONLY AWARD EXPLANATION MARK IF COUNTRY IS CORRECT**
 (country) B;
 ref. to the biggest drop in life expectancy/from 59 to 39/drops by 20;
 Ⓐ has the lowest life expectancy [2]

(c) (i) HIV + is a virus/is not a bacterium;
 antibiotics only are only effective against bacterial diseases AW;
 Ⓐ converse statement [2]

(ii) sheath/condom/femidom;
 ref. to no transfer of body fluids (between penis and vagina) AW;
 Ⓐ stops mixing of body fluids AW Ⓑ refs to sperm unqualified [2]

(iii) **ANY ONE DESCRIPTION FROM:**

- i. ref. to injection (of drugs)/use of sharp instrument AW;
- ii. ref. to sharing needles + between infected and non-infected people;
- iii. ref. to contamination on needle AW; Ⓐ unsterilised/dirty

- iv. ref. to blood transfusion/surgical operation;
- v. ref. to contaminated blood/contaminated equipment;
- vi. ref. to lack of screening (of blood or donors);

- vii. passed from mother to fetus AW;
- viii. via placenta/breast milk;
- ix. ref. to contamination during birth process AW;

max. [3]

Total 12