UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

5090 BIOLOGY

5090/21 Paper 2 (Theory), maximum raw mark 80

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Abbreviations

Mark schemes will use these abbreviations:

- ; separates marking points
- / alternatives
- **R** reject
- **A** accept (for answers correctly cued by the question, or guidance for examiners)
- AW alternative wording (where responses vary more than usual)
- underline actual word given must be used by candidate (grammatical variants excepted)
- max indicates the maximum number of marks that can be given
- + statements on both sides of the + are needed for that mark

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Section A

1 (a) (i) sun / light ; [1]

(ii) chemical (**R** potential unqualified) ; [1]

(b) (i) respiration ; [1]

(ii) *any three from* : muscle contraction / movement, impulses,
temperature maintenance / (body) heat, cell division / growth,
metabolic or anabolic reactions / building up molecules,
active transport, ATP production, kidney function,
(**R** excretion / digestion / reproduction) ;;; [3]

(c) (i) grass / vegetation → ox → tick
(**A** producer) ↓ ↓ (arrows must be as shown) ; [1]
oxpecker (**A** recognisable names)

(ii) energy loss along the chain ;
last organism receives least energy ;
need large number of ticks to supply required energy ;
ticks would be in danger of extinction / effect on ecosystem ;
ref. size or mass / very small ticks / large oxpeckers ; [3 max]

2 (a) lower volume / less urine ;
less water / more concentrated ;
correct ref. to fewer nitrogenous compounds / salts to be removed ;
kidneys reabsorb more water ;
to keep blood concentration constant ; [4 max]

(b) sweating inhibited / AW ;
loss of ability to regulate temperature effectively ;
body would overheat / AW ORA ;
effect on metabolism / enzymes ; [3 max]

(c) kills / AW, bacteria (**R** germs) ;
responsible for decomposition / breakdown ;
of nitrogenous compounds / waste products ;
can be used all over body / does not block sweat ducts ;
temperature regulation not affected ; [3 max]

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3 **(a)** (factors) – *any 2 from*: humidity / AW, temperature / heat, light, wind, amount of water in soil AW ;; [2]

(explanations): *(dry air ORA)* ref. concentration gradient ;
faster rate of evaporation / transpiration ;
faster rate of <u>diffusion</u> ;

(*higher temperature ORA*) faster rate of evaporation ;
faster molecular movement / ref. energy ;

(*bright light ORA*) stomata open ;
allows greater volume of vapour to be lost / AW ;

(*moving air ORA*) blows away water / vapour / moisture;
increases concentration gradient ;
faster rate of <u>diffusion</u> ;

(*soil water*) less water uptake ;
stomata close / AW ;
stops water loss ; [3 max]

(b) warms up more quickly at first / like glasshouse ;
humidity increases ;
becomes a limiting factor or described / less transpiration ; [2 max]

(c) water comes from the soil (not plant) ;
carried in xylem / xylem just hollow tubes ;
contains only dissolved salts / metabolites carried in phloem ;
poison remains in cells ;
it is only water that evaporates during transpiration ; [3 max]

4 **(a)** **(i)** **D** <u>cilia</u> ;
E goblet (cell) / mucus (-producing cell) / gland (cell) ; [2]

(ii) ref. beating / AW ;
moving mucus + towards throat / upwards / away from lungs ;
containing germs / dirt ; [2]

(b) **(i)** Fig. 4.1(b) + Fig. 4.2(a) (**A** in either order) ; [1]

(ii) carcinogenic / AW ;
tar + impervious to gases ;
emphysema / break down of alveoli walls ;
reduced surface area ;
less O_2 absorption / to red blood cells / body cells ;
named affected organ (e.g. extremities / brain / heart) ;
effect on (named) organ ;
tiredness / shortness of breath ; [5 max]

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5 **(a)** root hair ; [1]

(b) **(i)** magnesium / nitrates* ;

(ii) nitrates* (*once only) ; [2]

(c) **(i)** active transport / uptake ;
requires energy ;
from respiration / mitochondria ;
ref. living / cell + membrane ;
*ref. (against) concentration gradient ; [3 max]

(ii) *ref. concentration gradient ;
diffusion ;
cellulose / cell wall ;
fully permeable ;
direct pathway to xylem / no barrier ; [4 max]
[* = allow once only in **(i)** or **(ii)**]

[Total: 50]

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Section B

6 **(a)** pollen from anthers to stigma ; (1)
(self) of same flower ;
or flowers on same plant ;
(cross) different plant ; (3 max)
same species ; [4]

(b) germination ;
pollen tube ;
digests or description / grows ;
down style ;
enters ovary ;
ovule ;
fertilisation / fusion ;
nuclei ;
seed + ovary (wall) / pericarp = fruit ;
ref. falling petals / sepals ; [6 max]

7 **(a)** (cerebrum) conscious thought ;
memory ;
intelligence ;
learning ;
sight ;
speech ;
hearing ;
sensation (e.g. touch / taste / smell) ;
voluntary action (or named e.g. arm movement) ; [5 max]

(b) (cerebellum) the main centre of co-ordination / fine movement ;
posture / muscle tone ;
balance ;
instinct ; [2 max]

(c) ref. maintenance of constant internal environment / homeostasis ;
detects changes in* ;
any two from :
blood concentration, in (blood) temperature,
CO_2 concentration in blood, ;;
control of blood pressure ;
triggers appropriate response / AW* ; [3 max]
(* **A** controls / regulates for ONE mark)

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8 Either

(a) absorption / passes into ;
<u>villus</u> ;
capillary ;
blood <u>plasma</u> ;
in solution ;
(hepatic) portal vein ; [3 max]

(b) made into protein or named ;
deamination or described ;
carbohydrate production / glucose ;
ref. respiration / loss as CO_2 ;
storage as glycogen ;
urea ;
hepatic vein ;
renal artery ;
kidney ;
<u>ureter</u> ;
urine / sweat ;
bladder / <u>urethra</u> ; [7 max]

8 OR

(a) cell / nuclear division ;
producing <u>genetically identical</u> cells/ nuclei ;
maintaining chromosome number ; [2 max]

(b) growth ;
repair / replacement of cells / tissues ;
asexual / vegetative reproduction / cloning ; [2 max]

(c) in sexual reproduction ;
gametes ;
produced by reduction division / meiosis ;
have half the number of chromosome / haploid ;
fertilisation ;
fusion of nuclei / gametes ;
restoration of chromosome number / diploid ;
ref. asexual reproduction ;
mitosis ; [6 max]

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