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

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, which would have considered the acceptability of alternative answers.

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

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

CIE is publishing the mark schemes for the May/June 2010 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.

UNIVERSITY of CAMBRIDGE
International Examinations

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

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]

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 diffusion ;

(*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 diffusion ;

(*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** cilia ;
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]

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]

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)

8 Either

(a)
absorption / passes into ;
villus ;
capillary ;
blood plasma ;
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 ;
ureter ;
urine / sweat ;
bladder / urethra ; [7 max]

8 OR

(a)
cell / nuclear division ;
producing genetically identical 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]