UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

5090 BIOLOGY

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

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Section A

1 **(a)** small plant/alga/phytoplankton; [1]

(b) 20; [1]

(c) small plants/animals absorb/contain mercury;
eaten by small fish
(Only mark available if no ref to mercury in the answer);
(mercury) passes from small fish to large fish;
each time many organisms eaten/higher organism gets large dose/intensifies, increases;
is not excreted;
cannot be broken down [* or in **(d)**];
stored in body AW; [max 5]

(d) fish form diet of fishermen;
concentration of mercury would be even higher in fishermen AW;
mercury poisonous/harmful/toxic AW R affects;
mercury affects nervous system/brain;
cannot be broken down [* or in **(c)**]; [max 2]

[Total: 9]

2 **(a)** moves towards plant/upwards;
as water is used for photosynthesis;
lost during transpiration/evaporation from leaves;
ref. transpiration pull; [max 3]

(b) **(i)** over period of time/gradually;
(bubble) slows down;
(might) stop; [max 2]

(ii) vapour builds up around/stays close to leaf;
cover prevents air current/wind reaching leaf;
increased humidity;
slower rate of water loss/transpiration/evaporation;
diffusion gradient less steep AW;
photosynthesis stops;
stomata close;
less water used by shoot; [max 6]

[Total: 11]

3 **(a)** fertilisation;
oviduct / Fallopian tube; [2]

(b) mitosis; [1]

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(c) any 2 *genetic* similarities
(e.g. sex/eye colour/blood groups/shape of ears/nose etc.)/same genes* once only/
R look alike/same age/same chromosomes;;
characters caused by genes only;
have both inherited identical/same genes* once only;
they both arise from the same zygote/one sperm + one egg; [max 4]

(d) any two *environmentally affected* characters (*e.g.* size/weight/hair colour)
R different traits unqualified/intelligence;;
ref. to <u>environment</u>/genes only partly responsible;
named relevant environmental factor e.g. amount of sun light/lack of food etc.; [4]

[Total: 11]

4 (a) (i) <u>pollination</u>; [1]

(ii) <u>insect</u> (or named);

any two from: large petals/stigma not feathery/stigma protected/
large or rough pollen grains
(If self pollination – no marks);; [3]
(If 'wind' given for (ii) – no mark, but allow 'no nectary' for *one* mark)
(If cross pollination/pollen transferred from anther to stigma given for (ii)
allow two reason marks A no anthers for a valid reason)

(b) pollen tube drawn down style and entering ovule;
through micropyle;
(female) nucleus drawn and labelled in ovule/embryo sac;
(male) nucleus shown in bottom half of pollen tube and labelled;
female and male nucleus identified correctly; [max 3]

(c) D, E, G (and H) – 3 for 2 marks, 2 for 1 mark;;
F;
I; [4]

[Total: 11]

5 (a) K – ileum/jejunum R small intestine;
L – colon/large intestine; [2]

(b) digestion or enzyme activity stops/amylase doesn't work;
pH incorrect/too acidic;
no suitable amylase produced;
in the stomach; [4]

(c) no starch;
all digested/only water absorption in colon; [2]

[Total: 8]

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Section B

6 **(a)** hepatic artery;
carries oxygen;
hormones/insulin/adrenalin;
hepatic portal vein;
from gut/villi/small intestine;
glucose (A with ref to artery) R refs glucose – glycogen;
amino acids (A with ref to artery);
hepatic vein;
removes carbon dioxide;
urea;
any named other product of the liver; [max 8]

(b) thin walls/one cell thick;
allow diffusion;
short distance (to diffuse)/close to cells;
of urea/salts etc. into kidneys;
of carbon dioxide into alveoli/lungs;
oxygen to excretory tissues; [max 2]

[Total: 10]

7 **(a)** carbon dioxide A on equation;
combines with water A on equation;
during photosynthesis;
to make named carbohydrate/protein;
eaten by/passed to consumers/animals;

<u>respiration</u>;
in any 2 *named* groups of different types of organism;
releases carbon dioxide A with ref to combustion;
leaves decomposed/decay/ refs to methane/fossil fuels
A refs to decomposition in animals/faeces etc if phs mark scored; [max 7]

(b) another named requirement (CO_2/temperature);
in short supply AW;
use of syllabus term <u>limiting factor</u>; [3]

[Total: 10]

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Section C

8 **(a)** selectively permeable AW;
osmosis/diffusion;
active transport;
against conc. gradient;
uses energy;
only required substances enter/controls passage of substances;
manufactured substances exported A named examples;
holds/forms boundary for cytoplasm; [max 5]

(b) water enters;
osmosis/diffusion;
ref. concentration gradient/more concentrated cell sap;
pressure within cell/turgor;
cell wall tough/flexible/made of cellulose;
prevents cell bursting/membrane tearing;
supplies support to plant/stem/leaves;
gives shape/rigidity/support to <u>cell</u>; [max 5]

[Total: 10]

9 **(a)** <u>impulses</u> anywhere;
Accept specific examples for next 6 mps
(sensory) from sense organ/receptor;
to CNS/spinal cord/brain;
(relay) within CNS;
connecting sensory to motor neurones;
(motor) from CNS/spinal cord/brain;
to effector/muscle/gland; [max 5]

(b) sound + stimulus;
ears AW;
one correct reference to a neurone;
<u>brain</u>;
gland/adrenal/suprarenal;
adrenaline/epinephrine;
blood;
heart <u>muscles</u>;
ref. fight/flight/fright etc. response – or described; [max 5]

[Total: 10]

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