UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

5090 BIOLOGY

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

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UNIVERSITY of CAMBRIDGE
International Examinations

Section A

1 **(a)** filament correctly labelled;
sepal correctly labelled; [2]
(A on either Fig.)

(b) Any two from: large petals, smell, nectar(y), colour (I pollen);; [2]

(c) **(i)** anthers + statement relevant to the process;
stigma + statement relevant to the process;
ripen at different times;
(therefore) no transfer of pollen within the flower; [max. 4]

(ii) insect / bee lands (sits / flower);
reaches for / to get the nectar;
hits stamens / anthers;
pollen onto its back AW / carries pollen / ref. flower of same species;
hits style / stigma;
stigma collects pollen from bee's back;
correct ref. older / younger flowers / ref. cross pollination / to other flower; [max. 5]

[Total: 13]

2 **(a)** water; [1]

(b) cell walls / cellulose / undigested grass; [1]

(c) protein (A in how it is converted);
decomposition AW (A digests);
by bacteria / fungi / saprotrophs (or named);
to amino acids;
to ammonia/um (salts);
nitrites ;
nitrification ; [7]

(d) larger range of / more ions AW / more water;
urea / nitrogenous – or named;
easier / quicker to convert to nitrate AW; [max. 2]

[Total: 11]

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3 **(a)** C – oesophagus / gullet;
D – rectum; [2]

(b) **(i)** line to duodenum beyond entrance of pancreatic duct; [1]
(and before the point at which it crosses the colon)

(ii) lipase / enzyme for fat digestion;
not present until then / not present + in mouth / stomach;
released from pancreas / duodenal walls / in intestinal juice;
bile (salts);
released from gall bladder / bile duct / liver;
ref. correct pH / emulsification AW; [max. 4]

(c) wall protected by mucus;
wall (or stomach) made of protein;
protease / enzyme digests stomach wall ;
acid in contact with wall; [max. 2]

[Total: 9]

4 **(a)** incomplete / codominance; [1]

(b) child 6;
ref. to the group O parent unable to supply the I^A allele / there is no I^A in either parent AW; [2]

(c) I^BI^O × I^BI^O;

I^B, I^O, I^B, I^O;

I^BI^B I^BI^O I^OI^O;

group B group O; [4]
(failure to use prefix I, penalise first mark only. Allow gametes and genotypes of children if correct for wrong parents)

[Total: 7]

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5 **(a)** 15 cm^3 per hour; [1]

(b) **(i)** root hair (cells); [1]
guard cells (Ignore mesophyll) (R stomatal cells); [1]

(c) **(i)** any 3 from: solvent, transport medium, turgidity AW,
medium for enzyme action AW, hydrolysis / reactant AW,
elongation (R growth unqualified);;; [3]

(ii) (in either order) photosynthesis;
cooling / transpiration / any from **(i)** not mentioned; [2]

(d) loss of turgor AW;
wilting;
closing of stomata;
more transpiration / water loss than uptake / ref. overheating; [max. 2]

[Total: 10]

[Total for Section A: 50]

Section B

6 **(a)** made of DNA;
carries genes;
responsible for characteristics AW (A traits / enzymes);
(A named character or condition – e.g. eye colour / Down's syndrome)
passed from one generation to the next AW ;
during reproduction / ref. fertilisation;
correct ref. to chromosomes during cell (nuclear) division ;
sexual + variation / asexual + no variation; [max. 5]

(b) each person has unique set of genes AW;
genes make proteins;
therefore proteins different in different people;
relatives share genes / have common genes;
relatives have similar proteins;
relatives have similar tissues;
blood groups / types must be the same;
white blood cells / lymphocytes;
make antibodies;
against foreign protein / antigens;
greater chance of rejection AW if not related / less chance if related; [max. 5]

[Total: 10]

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7 **(a)** receptor or correct e.g.;
(converts) stimulus;
to impulse / electric pulse;
sensory + neurone / nerve fibre or cell;
synapse;
CNS / spinal cord (R brain);
(N.b. If brain directs the response i.e. any idea of a decision being made – stop marking)
relay neurone;
motor neurone;
flexor or named muscle;
effector; [max. 7]

(b) adrenaline;
in blood to heart;
defence mechanism / fright / prepare for action – or described;
(e.g. muscular action)
faster circulation of blood / faster delivery of O_2 or glucose; [max. 3]

[Total: 10]

8E **(a)** Photosynthesis is a process requires several (factors) AW;
the one in the shortest supply;
controls the rate at which the process occurs;
even though others are plentiful;
2 marks for three factors mentioned (CO_2, water, light, temp.);; (one for two mentioned)
(Accept points on an annotated graph / equation); [max. 5]

(b) (in the dark) from atmosphere / environment;
by diffusion (anywhere);
through intercellular spaces / stomata / mesophyll ;
(in the light) from photosynthesis;
in cell / chloroplasts;
ref. leaves / stems;
(at all times) from the soil;
via the roots; [max. 5]

[Total: 10]

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8O (a) a unit of life;
can undergo / are formed by division;
means of transferring genetic information;
often incapable of independent existence;
can be modified to do many different jobs / e.g. of two different cells;
nucleus + cytoplasm + membrane;
ref. to their significance in any metabolic process; [max. 3]
(R just a list of metabolic processes)

(b) muscle tissue;
in artery walls;
to maintain blood pressure;
continual contraction in heart / pumping / beating;
to keep blood moving AW;
nerve / nervous tissue;
in heart to control rate (or any correct ref.);
blood as a tissue;
transport medium / any e.g. of transportation;
epithelial tissue AW;
to reduce damage to b.v. walls;
any two *organs identified* (heart, artery / vein / or named);;
blood vessel are tubes for blood; [max. 7]

[Total: 10]

[Total for Section B = 30]

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