UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2012 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) (i) photosynthesis; [1]

(ii) starch stays inside cell / glucose can move R glucose used up;
does not lower water potential inside cell;
prevents water gain by cells;
correct ref. osmosis / diffusion; [2]

(b) correct ref. active site;

substrate;
perfect fit / complementary shape / specificity;
products / named suitable product / small molecules;
products leave + active site / enzyme re-useable / unchanged; [3]

(c) respiration;
root (cells / hairs);
increased uptake of ions;
by active transport;
ref. energy requirement of active transport;
(increased) chlorophyll production + magnesium;
(increased) photosynthesis (since more chlorophyll);
(increased) amino acid / protein production + nitrates; [4]

[Total: 10]

2 (a) ref. presence / absence hyphae / mycelium;
ref. reproduction by spores / sporangia / absence of spores / sporangia;
ref. cell wall composition;
ref prokaryote / eukaryote OR no true nucleus / true nuclei AW;
unicellular / multicellular;
reasonable size ref.;
vacuole / no vacuole; [3]

(b) decay / decomposition / rot(ting) / putrefaction; [1]

(c) (i) mitosis / mitotic /; [1]

(ii) one parent;

same / no new combination of genes / alleles; [2]

(d) oxygen / $6O_2$ + carbon dioxide / $6CO_2$ + water / $6H_2O$; [1]

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(e) (i) digestion / chemical breakdown qualified (increases);

correct ref. enzymes;

rate of reaction/respiration increases;

more / faster reproduction microorganism(s); [2]

(ii) (*any two from*)
drying, freezing, cooling, pickling, jamming, vacuum packing, chemical (preservatives) or any named, canning, radiation,;; [2]

[Total: 12]

3 (a) nucleus / chromosomes; [1]

(b) (i) Dd + Dd;

correctly shown gametes;

correctly drawn and completed punnett square or gamete linkage; [3]

(ii) phenotype ratio correctly expressed and identified
(A. ratio / percentage / words); [1]

(c) duodenum / small intestine; [1]

(d) reduction in enzymes / pancreatic juice entering duodenum;
correct ref. to (reduced) bile action;
less digestion / emulsification AW;
especially of fats;
fewer molecules to absorb / less absorption qualified;
and use for assimilation into larger molecules;
used in growth;
ref. less fat stored /AW; [4]

[Total: 10]

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4 **(a)** rays continue parallel until hit cornea;
rays converge at cornea;
rays converge at lens;
meet before retina + continue to hit retina; [3]

(b) **(i)** narrows / decreases in size or diameter / constricts (R contracts); [1]

(ii) iris + muscles;
circular + contract; [2]

(c) **(i)** fast / rapid / quick;

reaction / response + (to) stimulus;

automatic / involuntary / no involvement of conscious thought AW; / cannot be controlled
R no involvement of brain [2]

(ii) too much light allowed to enter AW;
damage to retina / rods / cones / light-sensitive cells; [2]

[Total: 10]

5 **(a)** **B** incisor;

cutting / biting / nibbling R holding; [2]

C molar (R pre-molar / wisdom);

grinding / crushing / chewing R shearing; [2]

(b) **(i)** carbon + hydrogen + oxygen (A C H O); [1]

(ii) (person) **E**; [1]
(more frequent meals) allows more sugar build up on teeth;
no brushing to remove bacteria / sugar / plaque;
more acid contact with teeth;
ref. toothpaste is alkaline;
ref no / less neutralisation of acid; [2]

[Total: 8]

[Total: 50]

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Section B

6 **(a)** transport sucrose / sugar / amino acids (R glucose / food);
in solution;
ref. direction of movement (A around the plant); [2]

(b) osmosis;
through cell membrane;
of root hair;
ref. movement from cell to cell;
ref. movement through or between cell walls;
enters xylem;
transpiration pull / stream / capillarity / molecular cohesion / root pressure;
evaporation / ref. water vapour;
from mesophyll cells / into air spaces;
ref. water potential gradient;
<u>diffusion</u>;
through stomata; [8]

[Total: 10]

7 **(a)** **(i)** carries urine (R just urea) in male and female;
carries semen / sperms / gametes AW in male; [2]

(ii) ref. size <u>comparison</u>;
ref. qualified numbers <u>comparison</u>;
ref. mobility <u>comparison</u>; [3]

(b) (*advantages*)
only needs to be undergone once AW (e.g. less trouble);
high reliability / effectiveness AW; [2]

(*disadvantages*)
does not protect against sexually transmitted diseases;
ref. risks of surgery / anaesthetic;
not a temporary solution;
difficult / expensive to reverse;
need access to medical services AW; [4 max]

[Total: 10]

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Section C

8 (a) ref. use of manures / compost;
prevent animal sewage entering water source;
prevention of run-off from fields;
any ref. controlled use of fertilizers / nitrates or other named;
example of control method (e.g. only on growing crops, not when rain forecast, no disposal of waste into water sources, use crop rotation);
use degradable pesticides;
use biological pest control;
grow crops genetically modified to be pest resistant; [5]

(b) making (scarce) resources last longer;
paper + reduction in deforestation;
glass / metal + requires less energy than new production;
plastics + reduction in fossil fuel use;
reduces need for waste disposal / landfill;
ref. non-biodegradability of plastics / glass;

specific e.g. of reuse (as a method of recycling)
(carrier bags, glass bottles, paper, clothes);

ref. to composting / producing animal feed from food waste
+ a valid reason; [5]

[Total: 10]

9 (a) diaphragm + relaxes;
and moves up / assumes domed shape;
intercostal (if named must be external) <u>muscles</u> relax / internal intercostal muscles contract;
ribs move down / inwards;
<u>volume</u> of thorax / lungs / chest cavity decreases;
pressure in thorax increases; [5]

(b) nitrogen unchanged (A percentage if given 78 – 80%);
(A. 79% in air breathed in + reduced percentage in air breathed out)
not used / produced (in the body / cells / metabolism);
oxygen reduces (A %s from 19 /20 / 21% to 16% +/–);
carbon dioxide increases (A %s - from 0.03 / 0.04% to 4%);
correct ref. <u>aerobic</u> respiration / O_2 / CO_2 diffuse into / out of blood;

ref. water vapour comparison + explanation;
(R waste product of respiration)

ref. temperature comparison + explanation;

ref. comparison of cleanliness of air; [5]

[Total: 10]

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