CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2012 series

5090 BIOLOGY

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

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1 **(a)** **(i)** **A** kidney;
B ureter;
C urethra; [3]

(ii) **D** storage AW + urine; [1]

(b) **(i)** arrow shown leaving plasma;
arrow from moisture to alveolar air;
One arrow covering the entire journey = 1 mark [2]

(ii) removal + from body / organism;
waste;
of respiration / metabolism; [3]

(c) destroyed / broken down **AW**;
by liver;
products removed / reabsorbed; [max 2]

[Total: 11]

2 **(a)** **(i)** measure AW of;
acidity / alkalinity (A H^+ concentration); [2]

(ii) 48 – 52 + (arbitrary) units / %; [1]

(iii) stomach; [1]
optimum AW pH of the enzyme is (approx) 2;
acidic;
due to HC*l;* [max 2]

(b) in liver;
glucose;
to glycogen;
A other examples muscle / aa / protein; skin / glyc + f.a. / fat etc [3]

[Total: 9]

3 **(a)** oxygen 19 – 21% + 14 – 16%;
carbon dioxide 0.03 – 0.045% + 3 – 4.5%; [2]

(b) **(i)** (aerobic) respiration;
release energy;
from glucose;
for contraction;
lactic acid +ref. oxygen debt **AW**;
R produce AW energy
A give **AW**; [max 3]

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(ii) anaerobic (respiration);
less energy released;
(produces) lactic acid;
(muscle) becomes fatigued / tired / ref. cramp / pain; [max 2]

(c) rapid breathing mechanism / deeper breathing;
modified lung structure or described;
more (efficient) haemoglobin;
more efficient blood supply to organs / tissues or e.g.; larger heart;
more red blood cells;
faster heart rate / faster circulation of blood; [max 3]

[Total: 10]

4 **(a)** left + right sides of equation correct;
both boxes correct (chlorophyll + light);
A word or balanced equations
R a mixture of words / symbols [2]

(b) **(i)** water;
stem / shoot / plant / stomata* / lenticels*;
A any reasonable named plant part [2]

(ii) (stem) chloroplasts / chlorophyll;
photosynthesis (occurs);
intercellular spaces **AW;**
<u>diffuses;</u>
through gaps / holes / stoma* lenticels*;
Allow 2 max for answers explaining how oxygen in soln. in water forms bubbles on stem
* allow once only [max 3]

(c) little dissolved oxygen in water;
provision of oxygen + through photosynthesis;
needed for respiration;
remove carbon dioxide;
animals use plants for food / home / shelter from predators etc; [max 3]

[Total: 10]

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5 **(a)** one nucleus per cell in palisade v hypha – coenocytic / several nuclei;
separate cells each with wall v not separate cells;
large central vacuole v several small vacuoles;
stores starch v stores glycogen;
chloroplasts / chlorophyll present v absent;
walls are made of different materials (chitin for hypha); [max 3]

(b) $C_6H_{12}0_6 \rightarrow 2\ C_2H_5OH + 2C0_2$;
glucose / sucrose; → alcohol / ethanol + carbon dioxide;
A a word or chemical equation, 1 mark each side, but if chemical, must balance. [2]

(c) 25 – 40 °C; [1]

(d) **(i)** respiration;
R anaerobic / fermentation [1]

(ii) the oxygen has been used (up);
and no more can enter ;
the yeast starts to respire anaerobically; [max 2]

(iii) yeast has died;
depletion of substrate or named;
respiration / fermentation ceases; [max 1]

[Total: 10]

6 **(a)** within reach;
contains sucrose / sugar / carbohydrate;
contains amino acids;
in solution / water;
not lignified / is softer **AW**;
R starch / glucose / mineral ions
Ig nutrients [3]

(b) impaired growth **AW** / death;
amino acids used to make protein;
less / no new cytoplasm;
less sucrose or carbohydrate;
less glucose;
for use in respiration;
energy used;
for any named purpose;
may introduce viruses / disease;
damage to plant **AW;**
Ig wilting [max 7]

[Total: 10]

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7 **(a)** (mitosis) chromosome number maintained / diploid **AW**;
identical offspring / clones;
e.g. of where it occurs – plant or animal / in bacteria;
growth / repair;
asexual reproduction;
2 new cells produced;
(meiosis) chromosome number halved / haploid **AW**;
in gonads / testes / ovaries / anthers;
to produce gametes / sex cells;
any gamete correctly named;
sexual reproduction;
4 new cells produced;
R growth / repair of cells [max 5]

(b) correct parental blood groups identified (AB and O, **or** A and B);
(in text or diagram) parents' genotypes identified as AB and OO or AA and BB;
*correct gametes clearly identified for both parents;
*the word gametes correctly used;
genotype of offspring (AO + BO **or** AB) shown;
blood groups of offspring identified as Group A and B **or** AB;
*available with wrong genotypes, so long as they match [max 5]

[Total: 10]

8 **(a)** blood passes through heart twice;
lungs + to rest of body;
lower pressure in pulmonary circulation ORA;
correct ref oxygenated blood / deoxygenated blood; [max 3]

(b) water;
solvent / carries dissolved / in solution;
any two from:
for salts or ions / glucose /amino acids / vitamins / fat or fatty acids + glycerol;;
urea;
plasma or blood proteins or named;
hormones;
transport of blood cells / platelets;
heat;
carbon dioxide;
to service body cells / target organs; [max 7]

[Total: 10]

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9 (a) (i) *fusion / union;
*male and female nuclei;
(in) sperms / male gametes + ova / eggs / female gametes;
oviduct / Fallopian tube;

(ii) *fusion / union;
*male and female nuclei;
in pollen grain;
delivered by / from pollen tube;
to ovule;
an indication that the ovule is in the ovary (or shown on labelled diagram);
and that female gamete is in the ovule/ovary/embryo sac (or shown on labelled diagram);
accurate ref. to double fertilisation;
*only credit **once** in either **(i)** or **(ii)** fusion / union; male and female nuclei;

Ig ovum (for female gamete) [max 7]

(b) fewer or no new alleles / genes;
limited variation;
limited evolution / limited resistance to changes in the environment;
likelihood of appearance of inbred weaknesses AW / no hybrid vigour / decreased fertility AW;

[max 3]

[Total: 10]

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