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

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.

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CAMBRIDGE
International Examinations

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]

(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]

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]

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]

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]