UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2011 question paper

for the guidance of teachers

5125 SCIENCE (PHYSICS AND BIOLOGY)

5125/04 Paper 4 (Theory – Biology), maximum raw mark 65

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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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UNIVERSITY of CAMBRIDGE
International Examinations

Section A

1 **(a)** any two correct substances for one mark each
with correct explanation of why essential for second mark for each: e.g.
carbon dioxide; carry away waste product of respiration/carry to lungs;
glucose/amino acids/glycerol/fatty acids/food molecules; carry to cells;
urea; carry to kidneys;
vitamins; carry to cells [4]

(b) white blood cell/phagocyte (1)
engulf bacteria / produce antibodies / build up immunity (1) [2]

(c) any two of the following for two marks each:
contain haemoglobin – combines with oxygen;
biconcave shape – increases surface area;
no nucleus – more room for haemoglobin/oxygen;
very small – travel through capillaries [4]

[Total: 10]

2 **(a)** externally administered substance (1)
which modifies/affects chemical reactions in the body (1) [2]

(b) **(i)** × 5 / five times [1]

(ii) increase in risk decreases as concentration falls below 0.08% (1)
so a lower limit would decrease the risk (1) [2]

(c) **(i)** alcohol slows down reactions / alcohol increases reaction time (1)
so driver may not react quickly enough to a dangerous situation (1)
OR
alcohol reduces inhibitions (1)
so driver becomes reckless (1) [2]

(ii) any two recognised harmful effects and associated problems of drinking alcohol for one mark each, e.g. addiction, reduced self control, withdrawal symptoms, crime, promiscuity, venereal infection, family/financial problems, liver damage [2]

[Total: 9]

3 **(a)** **(i)** the sun [1]

(ii) 100 × 20/1000 (1)
= 2% (1) [2]

(b) **(i)** glucose + oxygen → carbon dioxide + water [1]

(ii) heat is produced during reaction (1)
this heat is released into the air (1) [2]

(iii) any two for one mark each from:
movement;
reactions/named reaction (e.g. digestion) in body;
in faeces/undigested food
decomposition [2]

[Total: 8]

4 **(a)** **(i)** all points correct (within half small square) = 2 marks; one error = 1 mark [2]

(ii) smooth curve passing within half small square of all points [1]

(b) any two for one mark each from:
volume of solution;
mass/concentration of sugar;
mass of yeast [2]

(c) rate of reaction increases with increase in temperature (1)
enzyme has optimum temperature / enzyme activity falls at higher temperature (1)
enzyme is denatured/destroyed at high temperature (1) [3]

(d) glucose → carbon dioxide + ethanol [1]

[Total: 9]

5 **(a)** genotype e.g. Gg shows which alleles are present (1)
phenotypes shows how the alleles are expressed e.g. does not have cystic fibrosis (1)
(accept any example from diagram, but expression must match allele pair) [2]

(b) both parents without the disease have a child with the disease (1); so both parents must have genotype Gg carrying a recessive gene for the disease (1)
or
one parent has the disease and one does not, and they have a child without the disease (1); so this child must have genotype Gg carrying a recessive gene for the disease (1) [2]

(c) the grandparents do not have the disorder and one child has it but the other does not (1)
for one of their children to inherit both recessive alleles both grandparents must have this allele (1) [2]

(d) Yasmin's father shown as Gg (1)
children shown as GG, Gg, Gg, gg (1)
chance = ¼ / 1 in 4 / 0.25 / 25% (1) [3]

[Total: 9]

Section B

6 **(a)** pollen from anther (1)
lands on/is transferred to stigma (1)
pollen grows tube which passes into ovary (1)
male nucleus travels down pollen tube (1)
and combines with nucleus of egg cell/ovum (1) [5]

(b) daughter plants need to grow away from parent plant (1)
to avoid competition (for resources) (1)
to colonise new areas (1)
wind dispersal has advantage of wind blowing most of time/does not have to wait for animals to pass by (1)
animal dispersal has advantage of giving more chance of seeds falling on land/in place where they can grow (1) [5]

[Total: 10]

7 **(a)** loss of water vapour through stomata (1)

plus any three for one mark each from:
evaporation of water cools plants;
transpiration pull draws water up plant stem;
so that all cells can obtain water needed to stay turgid;
to carry nutrients to each cell [4]

(b) any suitable method e.g. weighing plants before and after or use of a photometer (1)
need to take measurements at a range of at least three different temperatures (1)
description of how measurements are to be taken (1)
need to keep at least one other named factor constant e.g. size of plant/leaf (1)
need to measure time for each temperature (1)
idea of calculation of rate from results (1) [6]

[Total: 10]

8 **(a)** one sensible idea each about age, sex and activity: e.g.
young people are growing and therefore need more energy (1)
males have more muscle that requires more food for respiration (1)
the more active a person is the more food they need for respiration (1)

plus:
excessive intake may lead to obesity (1)
that can results in diabetes/heart attack (1) [5]

(b) any three, for one mark each, from: vitamins; minerals; fibre, water;

any two (but must match examples already given) for one mark each from:
vitamins – named vitamin and correct deficiency disease;
minerals – named mineral and correct effect of deficiency;
fibre – constipation
water – correct idea e.g. blood cannot carry nutrients / sweat cannot cool body [5]

[Total: 10]