UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

0653 COMBINED SCIENCE

0653/32 Paper 3 (Extended 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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1 **(a)** **(i)** carbon dioxide ; [1]

(ii) (there is not enough evidence) result shows that:
carbonate present ;
but not calcium / need to show it is calcium carbonate ; [2]

(b) **(i)** carbon dioxide dissolves in / reacts with (sea)water / rain ;
makes water more acidic / less alkaline;
non-metal oxides are acidic ; [max 2]

(ii) accept any reasonable attempt at a scientific answer:
e.g. calcium carbonate may react with more acidic water / lower pH makes it more difficult for coral to extract ions from sea / coral (polyps) does not survive in more acidic water ; [1]

[Total: 6]

2 **(a)** glucose + oxygen → carbon dioxide + water ;
(2 marks for all correct, one mark if any mistake) [2]

(b) in the blood / in an artery / in a capillary ;
combined with haemoglobin / as oxyhaemoglobin ;
in red blood cells ; [max 2]

(c) **(i)** evaporation ;
(evaporation) takes heat from body ; [2]

(ii) (assume answer refers to not drinking fluid unless otherwise stated)
rose higher ;
rose faster ;
use of comparative figures, e.g. 40.0 ºC and 38.7 ºC ; [max 2]

(iii) less sweat produced when no fluids drunk / or reverse argument ;
to maintain water content of body / ref. to homeostasis ; [2]

[Total: 10]

3 **(a)** traps layer of air ;
(air is a good) insulator ; [2]

(b) does not deplete fossil fuel reserves / non-renewable ;
idea that dung is carbon neutral / renewable ;
kerosene is a hydrocarbon fuel ; [max 2]

(c) (i) allow 20 – 100 Hz ; [1]

(ii) vibration passes ;
from particle to particle ;
reference to rarefaction and compression / diagram ;
a series of (compressions and rarefactions) / diagram ; [max 2]

[Total: 7]

4 (a) iron ; [1]

(b) (i) $SnO_2 + 2C \rightarrow Sn + 2CO$;; (symbols and balanced) [2]

(ii) aluminium more reactive than carbon ;
tin less reactive than carbon ;
A*l* more strongly bonded to oxygen ; [max 2]
(allow max 1 for the simple statement: aluminium is more reactive)

(iii) reference to use of carbon electrodes ;
aluminium oxide is melted / dissolved in cryolite ;
aluminium ions are positive / are cations ;
ions attracted move to negative electrode / cathode ;
ions gain electrons from / are discharged at negative electrode ; [max 3]

(c) (i) 64 + 56 + 32 × 2 / 184 ; [1]
(allow 183.5)

(ii) 7.80 × 0.89 = 6.9(42) g (unit required) ; [1]

[Total: 10]

5 (a) (i) **X –** stigma ;
Y – anther / stamen ; [2]

(ii) stigma, feathery / outside flower / large surface area ;
stamen, dangling / outside flower ;
no petals ; (allow small petals) [max 2]

(iii) (assume answer refers to sexual reproduction unless otherwise stated)
involves gametes ;
involves fertilisation ;
zygote produced ;
offspring genetically different / not clones ; [max 2]

(b) acid rain ;
caused when nitrogen oxides, react with / dissolve in, (rain) water ;
damages plants ;
damages aquatic animals ; [max 3]

[Total: 9]

6 **(a)** group of cells ;
carrying out a particular or specific function / are similar cells ; [2]

(b) **(i)** proteins ;
amino acids ; [2]

(ii) diffusion ;
ref to concentration gradient / from high concentration to low concentration ; [2]

(c) (assume answer refers to animal cells unless otherwise stated)
look at cells (as opposed to whole organism) ;
no cell walls ;
no large vacuoles ;
no chloroplasts ; [max 2]

[Total: 8]

7 **(a)** **(i)** switch 1 and switch 2 ; [1]

(ii) voltmeter in parallel and ammeter in series ; [1]

(b) **(i)** to reduce energy losses ; [1]

(ii) Vp ÷ Vs = Np ÷ Ns ;
5 000 ÷ 400 000 = 10 000 ÷ Ns / (Ns=) 800 000 (turns) ; [2]
(1 mark for formula and 1 mark for substitution and answer)

(iii) ref. to alternating or changing voltage or current ;
(in primary coil) produces alternating or changing magnetic field ;
reference to alternating or changing magnetic field in core ;
induces (alternating) voltage in secondary coil ;
idea that size of voltage change depends on (ratio of) turns ; [max 3]

[Total: 8]

8 **(a)** **(i)** formed as fossil fuel / decomposition of organic matter / from digestive systems of ruminants / sources related to volcanism ; [1]

(ii) 8 ;
four covalent bonds means four pairs of electrons ;
(correct bonding diagram alone gains both marks) [2]

(b) (i) fractional distillation / fractionation ; [1]

(ii) the larger / heavier / greater surface area of / greater number of atoms in molecules ;
the higher the boiling point ;
OR
unsaturation ;
lowers boiling point (for similar molecular size) ; [max 2]

(iii) (shake liquid with) bromine / potassium manganate(VII) ;
mixture goes colourless if liquid is **D** ;
because **D** is unsaturated ; [3]
(or reverse argument for **A**)

[Total: 9]

9 (a) (force =) mass × acceleration ;
acceleration = 1 200 000 / 400 000 ;
= 3 m / s^2 ; [3]

(b) (i) to stop potato snacks oxidizing / reacting ; [1]

(ii) pressure inside packet is greater than airplane pressure ; [1]

(c) (i) speed has magnitude only / velocity has magnitude and direction ; [1]

(ii) **A** to **B** / **C** to **D** ; [1]

(iii) (no) not a straight line ; [1]

(iv) **C** ; [1]

(v) 50 m / s ; [1]

(vi) the faster the skydiver travels the greater the air resistance ;
eventually the air resistance balances the gravitational force ; [2]

(vii) parachute increases air resistance ; [1]

[Total: 13]