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

0653/23 Paper 2 (Core 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 ;

(ii) HC*l* ;

(iii) reaction has stopped ;
acid has been used up / owtte ; [2]

(iv) calcium ; [1]

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

(ii) accept any reasonable science based idea:
e.g. calcium carbonate may react with more acidic water / lower pH makes it more difficult for coral to extract ions from sea / coral organism does not survive in more acidic water / enzymes (in coral) denatured / ref. to global warming ; [max 1]

[Total: 8]

2 **(a)** **(i)** air resistance / friction / drag ; [1]

(ii) equal and opposite / cancel each other out ; [1]

(iii) constant speed ;
(allow constant velocity) [1]

(b) distance = speed × time ;
= 80 × 3600 = 288 000 m ; [2]

(c) **(i)** mutations / damage DNA ;
cause cancer ;
kills cells ;
radiation burns ;
radiation sickness ; [max 2]

(ii) (granite) rocks ; [1]

(d) name ;
appropriate use ; [2]

[Total: 10]

3 **(a)** glucose ;
water + carbon dioxide ;

(b) in the blood / in an artery / in a capillary ;
ref. to haemoglobin ;
in red blood cells ; [max 2]

(c) **(i)** 0.4 dm^3 ; [1]

(ii) (assume answer refers to fast run unless otherwise stated)
more (oxygen used per minute) ;
increases more rapidly ;
0.9 dm^3 more ; [max 2]

(iii) more energy used when running faster ;
muscles working harder ;
therefore more respiration ; [max 2]

(d) breakdown of walls of alveoli / reduction of surface area ; [1]

[Total: 10]

4 **(a)** **(i)** switches 1 and 2 / both ; [1]

(ii) voltmeter in parallel and ammeter in series ;
everything else unchanged ; [2]

(b) **(i)** coal / oil / gas ; [1]

(ii) to reduce energy losses ; [1]

(iii) (5000 / 400 000 = 10 000 / Ns, so Ns =) 800 000 (turns) ; [1]

(iv) voltage needs to be lower ;
for safety ; [2]

[Total: 8]

5 (a) (i) attract insects ;
produce, pollen / male gametes / male sex cells ;

(ii) ovule ;
ovary ; [2]

(b)

statement	asexual reproduction	sexual reproduction
gametes are involved	×	✓
new individuals are produced	✓	✓
a zygote is produced	×	✓
offspring are genetically identical	✓	×

one mark for each correct row
(do not allow for anything where it is not clear whether it is a tick or a cross) [3]

[Total: 7]

6 (a) (i) 89 (%) ; [1]

(ii) metals are <u>melted</u> together ; [1]

(iii) iron ; [1]

(iv) unreactive ;
strong / hard / not easily bent or deformed ;
malleable ; [max 2]

(b) (i) tin oxide + carbon → tin + carbon monoxide ; [1]

(ii) carbon ;
gains / bonds with oxygen ; [2]

(c) (i) negative electrode ;
compound in liquid form / solution / molten ;
which conducts a current / contains free ions ; [3]

(ii) group number = outer electrons / A*l* is in Group 3 ; [1]

[Total: 12]

7 **(a)** work = force × distance ;
= 100 × 2000 = 200 000 J ;

(b) **(i)** kinetic / movement ; [1]

(ii) heat / sound ; [1]

(iii) surroundings ; [1]

(c) **(i)** 40 kg ; [1]

(ii) volume = mass / density ;
= 40 / 1020 = 0.04 m^3 ; [2]

[Total: 8]

8 **(a)** **(i)** digestion ; [1]

(ii) so, nutrients / molecules, can be <u>absorbed</u> ; [1]

(iii) proteins ;
oxygen ;
denatured ; [3]

(b) **(i)** the number of different, species / types of organisms ; [1]

(ii) affect, food chains / food webs ;
predators of frogs may reduce in numbers ;
insects / prey of frogs, may increase in numbers ; [max 2]

[Total: 8]

9 (a) (i) formed as fossil fuel / decay of organic matter / digestive system of ruminants / vulcanism ;

(ii) H only other symbol ;
H × 4 bonded to central C with all single bonds ; [2]

(iii) (carbon dioxide)
global warming / (runaway) greenhouse effect ;
detail of mechanism e.g. reflects heat back to Earth ;
causing climate change / or example of ; [max 2]

(carbon monoxide)
toxic (to humans) ; [max 1]

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

(ii) the greater the molecular mass ;
the higher the boiling point ;
use of the data e.g. $C_{12}H_{26}$ most massive and has highest boiling point ; [max 2]

[Total: 9]