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

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UNIVERSITY of CAMBRIDGE
International Examinations

1 **(a)** **(i)** carbon dioxide ; [1]

(ii) HCl ; [1]

(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 ; [2]

(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 ; [2]

(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 melted 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 ; [2]

(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 ; [1]

(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]