CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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CAMBRIDGE
International Examinations

1 **(a)** **(i)** nucleus; [1]

(ii) **B** ;
sum of protons and neutrons is 16 ; [2]

(iii) numbers of protons and electrons are the same ;
protons positive electrons negative ;
charges (of protons and electrons) cancel ; [max 2]

(b) **(i)** covalent ; [1]

(ii) helium is inert / unreactive / no need to bond (to become stable) ;
reference to complete outer shell ; [max 1]

(c) pop (test) indicates hydrogen (given off) ;
zinc displaces hydrogen / zinc reacts with hydrochloric acid to produce hydrogen ;
zinc more reactive than hydrogen ; [max 2]

[Total: 9]

2 **(a)** **(i)** gravity ; [1]

(ii) gravitational / potential / gravitational potential ;
kinetic ; [2]

(b) **(i)** **E** ; [1]

(ii) **B** ; [1]

(c) turbine ;
generator ; [2]

[Total: 7]

3 (a)

	producer	consumer	carnivore	herbivore
heron		×	×	
water snail		×		×
yellow water lily	×			

1 mark per correct row ;;; [3]

(b) (i) eutrophication ;
increased growth of algae ;
reduction of (dissolved) oxygen ;
reference to toxins / named toxin ; [max 2]

(ii) reference to greenhouse gas ;
traps heat ;
global warming / climate change ;
reference to consequence of global warming (e.g. sea level rise, more extremes of weather, change in habitats of living organisms) ; [max 2]

[Total: 7]

4 (a) (i) chain of two carbon atoms joined by single bond ;
only six hydrogen atoms correctly bonded to carbon ; [2]

(ii) methane ; [1]

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

(ii) carbon dioxide ;
water (ignore vapour) ; [2]

(c) (i) too reactive / compounds much more stable ; [1]

(ii) electrons are transferred ;
sodium atoms lose (one) electron / outer shell electron / become 2.8 / become positively charged ;
chlorine atoms gain (one) electron / complete outer shell / become 2.8.8 / become negatively charged ; [max 2]

[Total: 9]

5 **(a)** calcium ; [1]

(b) water ; [1]

(c) they contain protein ; [1]

(d) orange / brown ;
it does not contain starch / substances from animals do not contain starch / the only carbohydrate is sugar / lactose ; [2]

(e) protein, fat and carbohydrate ; [1]

(f) has more calcium ;
for, teeth / bones ;
OR
has more protein ;
for, growth / repair / other specific function of protein ; [max 2]

[Total: 8]

6 **(a)** **(i)** worker **Y** (no mark)
same force but bigger distance;
work is force × distance and distance is bigger ; [max1]

(ii) joules ; [1]

(iii) 5000 (g) ; [1]

(iv) density = mass/volume ;
= 5000/5500 = 0.91 (g / cm^3) ; [2]

(b) **(i)** use of graph / working ;
288 (m) ; [2]

(ii) 240 (s) ; [1]

(iii) boy **C** ;
line on graph goes down etc. (so speed was changing) ; [2]

[Total: 10]

7 **(a)** 4 ; [1]

(b) carbon dioxide ;
produces an acid(ic solution) / lowers pH ; [2]

(c) **(i)** decrease ;
of 7 (°C) ; [2]
(–7 gains 2 marks)

(ii) endothermic ; [1]

(d) lowers reaction rate ;
increases reaction rate ; [2]

[Total: 8]

8 **(a)** **A**: trachea ;
B: broncholi / bronchiole ; [2]

(b) **(i)**

gas	percentage in inspired air	percentage in expired air
nitrogen	78	**78**
oxygen	21	17
carbon dioxide	0.04	4
noble gases	1	**1**

both for 1 mark; [1]

(ii) argon / neon / xenon / krypton / radon ; [1]

(iii) respiration ;
uses oxygen and produces carbon dioxide ;
oxygen diffuses into blood and carbon dioxide diffuses from the blood ; [max 2]

(iv) limewater / hydrogencarbonate indicator ;
method bubbles / mixes both types of air through the indicator ;
reference to comparison of time taken for indicator to change colour ; [3]

(c) (i) reference to energy / work ;
more energy used / more work done per unit time ; [2]

(ii) increased ;
use of comparative figures (e.g. 0.5 dm^3 when no power output, 2.8 dm^3 at 225 W) ;
reference to change of gradient at 50 W ; [max 2]

(iii) faster / more breaths per minute ; [1]

[Total: 14]

9 (a) current ;
current ; [2]

(b) most / greater the two symbols correct ;
all five symbols correct ;
ammeter in series and voltmeter in parallel ;
everything else correct ; [4]

(c) metals expand when hot / contract when cold ;
cables could snap / become too tight and damage pylons ;
if put up tight in summer ; [max 2]

[Total: 8]