UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

0653 COMBINED SCIENCE

0653/21 Paper 21 (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 must be read in conjunction with the question papers and the report on the examination.

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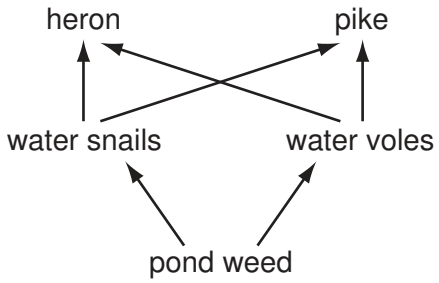
1 **(a)** community ;
population ;
ecosystem ; [3]

(b) all five organisms included and no others ;
arrows between them going the right way ;
all links present and correct (allow one missing arrow, or heron / pike feeding on only one species) ;



[3]

(c) no food (for primary consumers) ;
no oxygen ; [2]

(d) **(i)** **C** ;
B ;
E ; [3]

(ii) no cell wall / no part **A** ;
no chloroplasts / no part **B** ;
no (large) vacuole / no part **F** ;
not rectangular ; [max 2]

[Total: 13]

2 **(a)** Geiger counter / Geiger (Müller) tube / scintillation counter / spark chamber / cloud chamber / photographic film ; [1]

(b) burns ;
eye damage / cataracts ;
cancer ;
mutation (of cells) / damage to DNA ;
radiation sickness ; [max 2]

(c) (i)

	alpha	beta	gamma
most penetrating			✓
most ionising	✓		

;; [2]

(ii) alpha ;
gamma ; [2]

[Total: 7]

3 (a) (i) (good) conductor of electricity / (good) conductor of heat / greater density / lustrous / sonorous / malleable / ductile / high melting point ; [1]

(ii) sodium is too reactive / very little strength ; [1]

(b) (i) (it is balanced)
idea of same number on both sides ;
of atoms of each element / numbers stated ; [2]

(ii) Fe_2O_3 ;
reduction is loss of oxygen / O removed from Fe_2O_3 ; [2]

(c) (i) ionic/electrovalent ; [1]

(ii) solution/compound in <u>liquid</u> form which, conducts electricity / contains free ions ; [1]

(iii) electrical ; [1]

(iv) any Group 1 or Group 2 metal / zinc ; [1]
[allow copper]

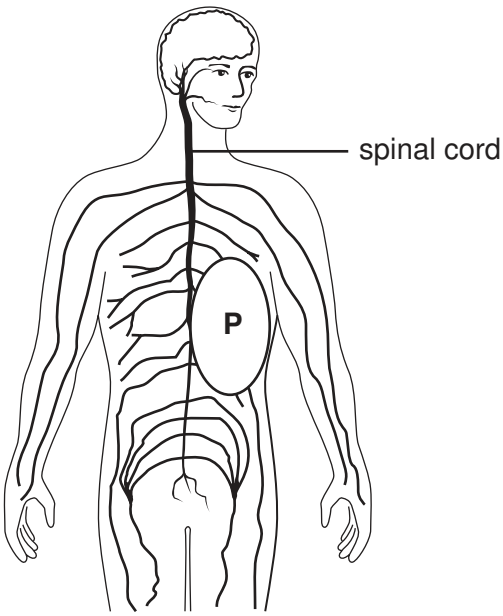
[Total: 10]

4 (a) (i) brain labelled ; [1]

(ii) nerves / nerve cells / neurones ;
effectors / muscles / glands ; [2]

(b) endocrine ; [1]

(c) **(i)** **P** written within area shown ;



[1]

(ii) insulin ; [1]

(iii) liver / muscles ; [1]

(iv) ref. to respiration ;
no energy (for cells) ;
other correct, e.g. hypoglycaemic shock ; [max 2]

[Total: 9]

5 **(a)** vibration of (water) particles / discussion of compressions and rarefactions ; [1]

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

(ii) (distance =) speed × time ;
= 1500 × 0.5 = 750 (m) ; [2]

(c) **(i)** measuring cylinder / graduated beaker ; [1]

(ii) balance / scales ; [1]

(iii) mass / volume ; [1]

[Total: 7]

6 **(a)** **(i)** **Y** ; [1]

(ii) **X** – bromine
Y – iodine / astatine
Z – fluorine / chlorine (all correct = 2 marks, two or one correct = 1 mark) ;; [2]

(b) **(i)** all correct for 1 protons, neutrons, electrons ; [1]

(ii) 10 ; [1]

(iii) only protons and neutrons have mass / electrons have no mass ; [1]

(c) chlorine solution kills bacteria ;
may help to prevent disease / other acceptable benefit ;
removes stains more easily / reference to bleaching ; [max 2]

[Total: 8]

7 **(a)** 36 ; [1]

(b) warm air less dense than cold ;
warm air near the ground (in open field) rises ;
warm air cannot get out of the glasshouses ; [max 2]

(c) too hot (in glasshouse **A**) ;
ref. to pollination (by bees);
less pollination in glasshouse **A** ;
so <u>fewer</u> tomatoes produced ; [max 2]

(d) carbon dioxide (concentration) ;
wind ;
water supply / humidity;
pests / pesticides / animals ;
weeds ;
soil / availability of minerals ;
light ; [max 2]

[Total: 7]

8 **(a)** **(i)** 22 – 20 % ;
78 – 80 % ; [2]

(ii) carbon dioxide / water vapour / any noble gas ; [1]

(b) **(i)** SO_2 ; [1]

(ii) leads to acid rain ;
which may damage buildings / harm aquatic ecosystems / organisms ;
breathing the gas may cause respiratory distress / detail ; [max 2]

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

(ii) O = C = O
2 × O bonded to central C ;
by double bonds ; [2]
(so 2 × C bonded to central O by double bonds scores 1 mark)

[Total: 9]

9 **(a)** **(i)** **B** – **C** ; [1]

(ii) 5 s ; [1]
(allow 4.8 – 5)

(b) **(i)** (work done =) force × distance ;
= 250 × 10 = 2500 J ; [2]

(ii) kinetic / movement ;
heat / sound ; [2]

(c) **(i)** series ; [1]

(ii) 8 (ohms) ; [1]

(d) larger (turning force) / moment ; [2]
because distance is larger/moment = F × d ;

[Total: 10]