UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

0653 COMBINED SCIENCE

0653/21 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)** carbon dioxide + water ;
glucose / starch / sugar / carbohydrate + oxygen ; [2]

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

(ii) label to a chloroplast ; [1]

(c) **(i)** **B**, **D**, **C**, **E**, **A** ; ; ;
all five correct for 3 marks
any four in correct sequence 2 marks
any three in correct sequence 1 mark [3]

(ii) area covered by paper shown on diagram ;
orange-brown where paper was, blue-black elsewhere ; [2]

[Total: 9]

2 **(a)** lighted splint / flame ;
pops; [2]

(b) **(i)** **Z** ;
copper does not react with dilute acids / is not reactive enough / is unreactive ; [2]

(ii) higher acid concentration ;
higher (acid) temperature ;
use more finely powdered metal ; *ignore* increase surface area of metal
swirl / shake, (the mixture) ; [max 2]

(c) **(i)** H_2SO_4 ; [1]

(ii) acid used up / owtte ; [1]

[Total: 8]

3 (a) (i) (gravitational) potential energy ; [1]

(ii) (KE) changed into ;
sound / heat energy / KE of water ; [2]

(b) (i) 2.3 s ± 0.1 s ; [1]

(ii) speed is, increasing / changing / going faster ; [1]

(c) (i) Geiger counter / Geiger-Müller tube / GM tube / photographic film / other valid answer ; [1]

(ii) causes ionisation inside cells (not 'ionise cells') / damages cells / kills cells / mutation / damages DNA / radiation sickness / radiation burns / burns skin / cancer ; [1]

[Total: 7]

4 (a) (i) copper / oxygen, is an element **and** copper oxide is a compound ;
element contains one type of atom **and** compound contains two (or more) types of atom, bonded / joined / combined ;
element found in Periodic Table **and** compound not ; [max 2]

(ii) (definition) e.g. oxidation refers to reaction with / bonding with oxygen ;
(context) e.g. oxygen has reacted/bonded with copper ; [max 1]

(iii) ionic / electrovalent ; [1]

(b) (i) anode and electrolyte clearly labelled ;; [2]

(ii) ion is charged / negative but atom is uncharged / neutral ;
ion has different numbers of electrons and protons but these numbers are the same in an atom ;
ion has filled outer (electron) shell but atom, does not / has only 7 outer electrons ;
[max 2]

(iii) bubbles of gas / smell of chlorine / smell of swimming pools
pink / orange layer / solid, forms ; [2]

[Total: 10]

5 **(a)** X-ray ;
microwave ;
(in correct place) [2]

(b) **(i)** normal labelled ; [1]

(ii) ray drawn at sensible angle ; [1]

(iii) 50° ; [1]

(c) **(i)** number of, waves / oscillations, per second / per unit time ; [1]

(ii) 20 Hz – 20 000 Hz ; [1]

(d) **(i)** trace **D** ; [1]

(ii) trace **A** ; [1]

[Total: 9]

6 **(a)** receptors ;
nerves ;
effectors ; [3]

(b) **(i)** protein ;
catalyst / definition of catalyst ; [2]

(ii) digestion ; [1]

(iii) so that the (small) molecules can be absorbed ;
into the blood / through the gut wall ;
so they can be used by cells ; [max 2]

[Total: 8]

7 **(a)** correct symbol for ammeter ;
correct symbol for resistor ; [2]

(b)

Table 7.2

switch position			lamp 'on' or 'off'		
S1	**S2**	**S3**	**L1**	**L2**	**L3**
closed	closed	closed	on	on	on
closed	closed	open	on	off	on
closed	open	open	on	off	off

(1 mark for each correct row) ;;; [3]

(c) **(i)** broken circuit / incomplete circuit ; [1]

(ii) R = R1 + R2 ;
= 10 ohms ; [2]

(d) **(i)** transformer ; [1]

(ii) (V_s = 23 × 200 / 20 =) 230 (V) ; [1]

[Total: 10]

8 **(a)** **(i)** C_8H_{18} ; [1]

(ii) (octane +) oxygen; → carbon dioxide + water; [LHS + RHS] [2]

(iii) nitrogen, is in the air / enters with the air / owtte ;
nitrogen, does not burn / react / change / is unreactive ; [2]

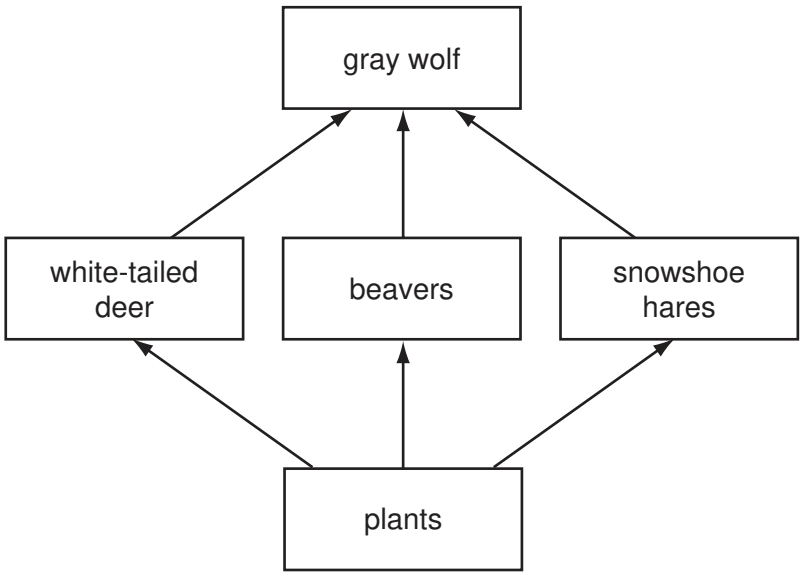
(iv) heat comes from the burning fuel /
combustion of the fuel is exothermic /
there is an exothermic reaction (inside engine) /
heat is conducted from where the fuel is burning ; [1]

(b) **(i)** 6 ;
6 ; [2]

(ii) Si / Ge / Sn / Pb ; [1]

[Total: 9]

9 (a) (i)



all organisms at correct levels (allow if upside down) ;
all organisms correctly connected ;
all arrows shown in correct directions ; [3]

(ii) energy (flow / transfer) ; [1]

(iii) grass / other plants ; [1]

(b) (i) protein / carbohydrate / glucose / fat ; allow any correct [1]

(ii) (decomposers) respire ;
release carbon dioxide ; [2]

(c)

cause	fur colour	fur length
genes only	✓	
environment only		✓
genes and environment		

[2]

[Total: 10]