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

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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]

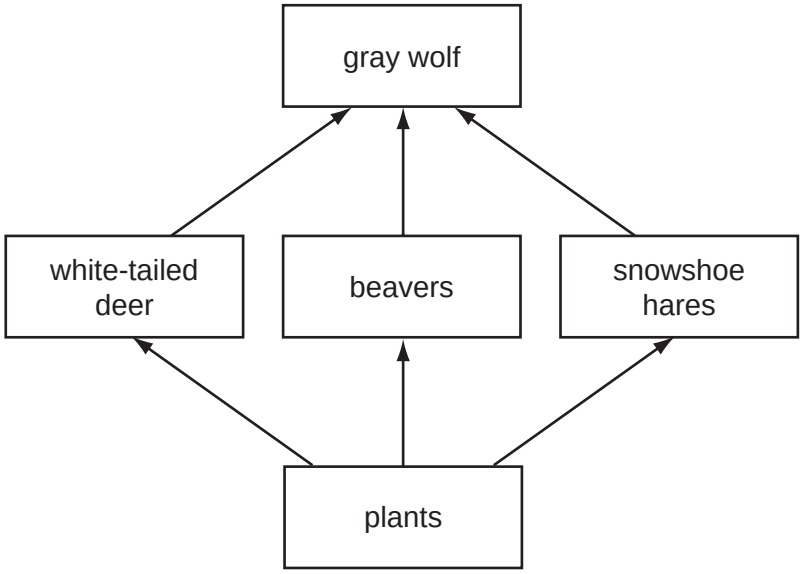
(iv) heat comes from the burning fuel /
combustion of the fuel is exothermic /
there is an exothermic reaction (inside engine) /
heat is conducted from where the fuel is burning ; [1]

(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]