CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0653 COMBINED SCIENCE

0653/22 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)

structure	*red blood cell*	*root hair cell*
cell membrane	✓	✓
nucleus		✓
chloroplast		

1 mark for each correct column ;; [2]

(b) (i) haemoglobin ; [1]

(ii) transport oxygen ; [1]

(c) cellulose ; [1]

(d) (i) roots absorbed the, water / blue dye ;
water / blue dye, transported to the leaves / up the stem ;
water transported in xylem ;
veins contain xylem ; [max 2]

(ii) inner part of at least one oval shaded ; [1]

[Total: 8]

2 (a) (i) 9 ;
in atoms number of protons = electrons / atoms are uncharged ; [2]

(ii) (insulator)
elements, on right of Periodic Table / in Group 7, are insulators / element is a non-metal / element is not a metal ; [1]

(b) (i) potassium / K ;
reactivity increases down the group ; [2]

(ii) hydrogen ;
lighted splint ;
pops ; [3]

(iii) bond is between / compound contains metal and non-metal ;
reference to atoms losing / gaining / changing electrons ;
potassium atoms, lose electrons / become positive ions ;
bromine atoms, gain electrons / become negative ions ;
reference to opposite charges attracting ; [max 3]

(c) orange solution produced ;
chlorine displaces bromine / bromine is produced ;
chlorine is more reactive (than bromine) / reactivity decreases down the group ; [max 2]

[Total: 13]

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

(b) **(i)** greater amplitude ;
same frequency ; [2]

(ii) same amplitude ;
shorter wavelength ; [2]

(iii) 10 / 20 (Hz) to 20 000 / 25 000 (Hz) ; [1]

(c) time = distance / speed ;
= 0.0012 (s) ; [2]

(d) water turns to a gas / (water) vapour ;
(as) particles / molecules get further apart ;
heat is needed / used to cause evaporation ;
(more) energetic particles escape ; [max 3]

[Total: 11]

4 **(a)** **(i)** organism that makes its **own** organic nutrients ;
(usually) using (energy from) sunlight / through photosynthesis ; [2]

(ii) spider / dragonfly ; [1]

(iii) energy (flow) / transfer of energy ; [1]

(b) **(i)** sexual ;
anthers ;
stigma ; [3]

(ii) oxygen / air ;
water / moisture ;
suitable temperature / warmth ; [max 2]

[Total: 9]

5 **(a)** goes cloudy / milky ;
because solid / precipitate / calcium carbonate produced ;
because carbon dioxide given off ;
OR
goes cloudy and then clears ;
reference to carbon dioxide ;
because precipitate / calcium carbonate forms and re-dissolves ; [max 2]

(b) sodium chloride ;
calcium chloride ;
magnesium chloride ; [max 2]

[Total: 4]

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

(ii) heat ; [1]

(iii) light ; [1]

(b) **(i)** reasonable precaution ; [1]

(ii) reasonable explanation ; [1]

(c) ammeter **and** voltmeter correctly labelled ; [1]

(d) **(i)** 1.5 (A) ; [1]

(ii) current not directly proportional / current does not increase as much ; [1]

(e) **(i)** angle of incidence labelled **and** angle of reflection labelled ; [1]

(ii) 45° ; [1]

[Total: 10]

7 **(a)** **(i)** **A** stomach ;
D colon / large intestine ; [2]

(ii) **E** ;
C ; [2]

(b) grind / crush ;
break down into smaller pieces which are easier to digest ;
increase surface area (of food) ;
idea of better access for enzymes ; [max 2]

(c) (i) lipase changed fats to fatty acids ; [1]

(ii) tube **B** was at a higher temperature ;
the reaction took place faster ; [2]

[Total: 9]

8 (a) (i) (*methane*) + oxygen ; ⟶ carbon dioxide ; + water ; [3]

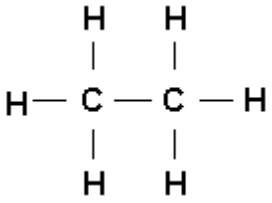
(ii) exothermic ; [1]

(b) (i) fractional distillation ; [1]

(ii) C_5H_{12} / C_2H_6 ; (these and only these for 1 mark)
reference to hydrocarbons ; [2]

(iii) bottled gas / heating / lighting / other correct ; [1]

(iv)



;; [2]
(2 x C and 6 x H) and correct structure

[Total: 10]

9 (a) friction ;
between materials ;
electrons are lost from car / gained by plastic surface ;
car has more positive charge(s) / protons than negative charge(s) / electrons ; [max 3]

(b) (i) **D** to **E** / 0 s / any time between 20 and 25 s ; [1]

(ii) **B** to **C** ;
0.4 m / s ; [2]

[Total: 6]