CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 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

(a) (i) hydrogen ; [1]

(ii) flame ;
pops ; [2]
(ecf for (a) (ii))

(iii) magnesium
X
copper ;
(i.e. X below magnesium and above copper)
magnesium
X
G
copper ;
(i.e. G below magnesium and X in any order, and above copper) [2]

(iv) zinc / iron / A other metals with electronegativity between that of magnesium and iron ; [1]

(b) (i) removal / loss of oxygen ;
gain of electrons ; [max 1]

(ii) carbon dioxide ; [1]

(c) (i) **P** at or near negative electrode within electrolyte ; [1]

(ii) bromine ; [1]

[Total 10]

2 **(a)** Sun ; [1]

(b) **(i)** oak tree ; [1]

(ii) beetles / greenfly / rabbits / squirrels ; [1]

(c) oak tree ⟶ beetles ⟶ blackbirds ⟶ hawks ;;
or
oak tree ⟶ greenfly ⟶ frogs ⟶ hawks ;;

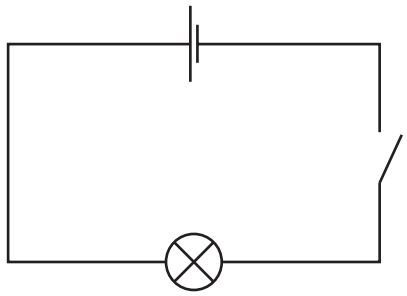
(1 mark correct sequence of organisms, 1 mark correct arrows) [2]

(d) their numbers may decrease ;
food supplies may become scarce ; [2]

(e) (concentration) increases ; because less (carbon dioxide taken in for) photosynthesis ; [2]

[Total 9]

3 (a)

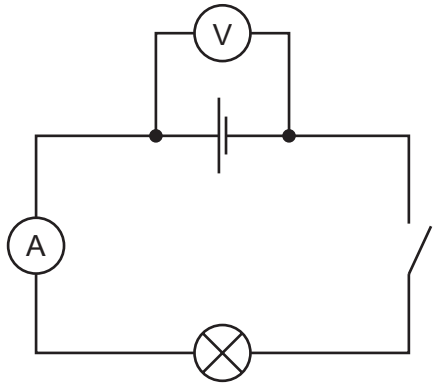


symbols all correct ;
circuit connected correctly ; (either one or two cells used) [2]

(b) (i) (2)
lamp needs (p.d. of) 3V (to light), so needs 2 × 1.5=3V cells (owtte) ; [1]

(ii) lamp takes current of 1.2A when lit (owtte) ; [1]

(c)



voltmeter connected correctly ;
ammeter connected correctly ; [2]

[Total 6]

4 (a) (i) fractional distillation / fractionation ; [1]

(ii) the lower the boiling point, the higher up the tower it is released / condenses ; [1]

(iii) gasoline (petrol) / diesel / fuel oil / A kerosene ;
used as fuel for transport / heating ; [2]

(b) nitrogen: 78% ;
oxygen: 21% ; [2]

(c) (i) increase in water (vapour) ;
increase in carbon dioxide ;
decrease in oxygen ;
temperature increases ; [max 2]

(ii) heat energy released / temperature increases ;
new substance(s) are formed ; [2]

[Total 10]

5 **(a)** (right hand) *no mark*
image laterally inverted (owtte) ; [1]

(b) **(i)** electrical (energy) → sound (energy) [1]

(ii) (frequencies lie) within human range 20 Hz to 20 000 Hz /
(frequencies) are above 20 Hz and lower than 20 000 Hz ; [1]

(c) **(i)** speed = distance / time ;
speed = 25 / 40 = 0.625 / 0.63 ;
metres / second / m / s ; [3]

(ii) (100 N)
(forces) are <u>equal</u> ; [1]

(iii) one complete wavelength correctly marked and labelled ; [1]

(iv) amplitude / frequency ; [1]

(d)

	X-rays	visible light	**infra-red**	microwaves

correct name ;
correct box ; [2]

[Total 11]

6 **(a)** **(i)** zygote / one of the ball of cells ; [1]

(ii) fertilization ; [1]

(b) to uterus / womb ;
(implants / embeds) in wall / lining of uterus ; [2]

(c) **(i)** vitamin D A A / B / E / K ;
correct use of named vitamin ; [2]

(d) 3.8 × 37 ;
= 140.6 / 141 ; [2]

[Total 8]

7 **(a)** darker in colour / gas to solid / increasing, mp / bp / density, down the group ;
(must state trend and direction) [1]

(b) **(i)** yellow / orange colouration ; [1]

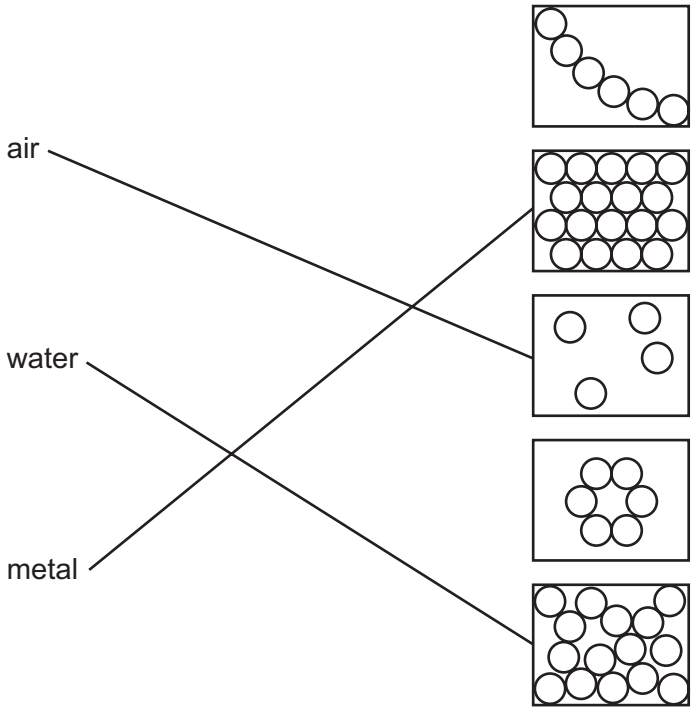
(ii) chlorine + potassium bromide → potassium chloride + bromine
LHS ;
RHS ; [2]

(c) covalent ; [1]

(d) makes water safe for consumption ;
kills bacteria ; [2]

[Total 7]

8 (a)



[2]

(b) (i) more energetic water molecules escape into air ;
remaining water has less (thermal) energy (so cooler) (owtte) ; [2]

(ii) cooler water takes heat from air / water takes heat from warmer air ; [1]

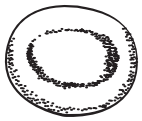
(c) allow space for (thermal) expansion ; [1]

(d) (i) $30 \times 15 \times 10 = 4500$ (cm^3) ; [1]

(ii) (density =) mass / volume / (d =) m / V ;
d = 7500 / 4500 = 1.7 / 1.67 (g / cm^3) ; *(ecf)* [2]

[Total 9]

9 (a)

diagram	name of cell	function of cell
	red blood cell	transport of oxygen;
	white blood cell	defence against disease / phagocytosis;

[4]

(b) right ;
pulmonary artery ;
valves ; [3]

(c) (i) oxygen ; [1]

(ii) glucose / sugar / amino acids / (any named) vitamin / (named) mineral / water / carbon dioxide ;; [2]

[Total: 10]