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

0653/23 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.

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1 **(a)** 1. traps (layer of) air ;
2. acts as insulator / reduces conduction / reduces convection ; [2]

(b) **(i)** increased risk of skin cancer / eye damage / sun burn ; [1]

(ii) 1. wave ;
2. use ; [2]

[Total: 5]

2 **(a)** **(i)** lead oxide + carbon $\rightarrow$ lead + carbon dioxide
LHS ; RHS ; [2]

(ii) 1. lead oxide / carbon dioxide ; ecf
2. compounds contain more than one type of element / atom ;
3. reference to (different) elements / atoms in compounds being joined / bonded ; [3]

(b) **(i)** (dc) power supply / battery / cell ; [1]

(ii) 1. chlorine ;
2. anode, non-metals form at the anode / chlorine is a non-metal / chloride ions are negative (and anode is positive) ; [2]

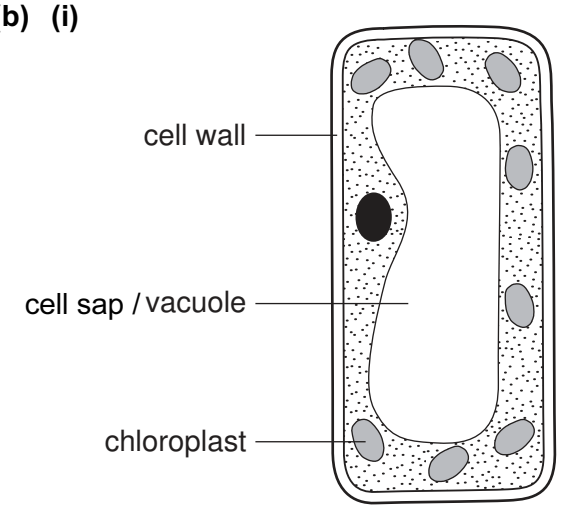
[Total: 8]

3 **(a)** **(i)** transpiration / evapotranspiration / diffusion ; [1]

(ii) stomata ; [1]

(iii) 1. condensation ;
2. water vapour cooled / temperature fell ;
3. gas changed to, liquid / water ;
4. ref. to particles and (kinetic) energy ; [max 2]

(b) (i)



[max 2]

(ii) palisade (mesophyll) ; 1

(iii) 1. carbon dioxide + water ;
2. glucose / carbohydrate / starch / sugar + oxygen ; [2]

[Total: 9]

4 (a) 28 (s) ; [1]

(b) (i) 1. distance = speed × time ;
2. = 10 × 60 × 9 = 5400 m ; [2]

(ii) 1. work done = force × distance ;
2. = 10 000 × 5400 = 54 000 000 J ; [2]

[Total: 5]

5 (a) idea of restoring full number of chromosomes in the zygote ; [1]

(b) (i) ovary ; [1]

(ii) oviduct / Fallopian tube ; [1]

(c) 1. produces / contains, (amniotic) fluid ;
2. protects / supports, embryo ; [2]

(d) 1. idea that mother's body needs to make substances for both herself and the fetus ;
2. iron for haemoglobin ;
3. calcium for, bones / teeth ; [3]

[Total: 8]

6 **(a)** water conducts electricity ; [1]

(b) all symbols in correct circuit ;;;
all four correct for 3 marks
any three correct for 2 marks
all two correct for 1 mark [3]

(c) **(i)** **K** and **L** ; [1]

(ii) 1. **J** lights up ;
2. **K** & **L** go off ; [2]

(d) add one 12 Ω to one 8 Ω (in series) ; [1]

(e) **B** **F** C **D** **E** A
B F ;
D E ; [2]

[Total: 10]

7 **(a)** **(i)** **O** and **S** ; [1]

(ii)

element name	protons	neutrons
(oxygen)	8	8
phosphorus	(15)	(16)

one mark for each row ;; [2]

(b) **(i)** copper oxide / copper carbonate / other correct ; [1]

(ii) magnesium ; [1]
(allow aluminium)

(c) **(i)** reaction **1**
combustion / oxidation ;

reaction **2**
polymerisation ; [2]

(ii) (molecules) join together / form chains ; [1]

[Total: 8]

8 (a) (i) 2000 (kg per hectare) ; [1]

(ii) any two values with a range between 6 and 7.25 ; [1]

(iii) 1. calcium carbonate is a base ;
2. neutralise (acid in the soil) ;
3. raise pH ;
4. above 5.5 / closer to 6.0 ; [2 max]

(b) 1. terracing / walls (qualified) ;
2. bunds / embankment / ditch ;
3. plough along slope (not up and down) ;
4. keep crop cover (at all times) / plant trees ;
5. other valid points ; ; [2 max]

(c) (i) insects ; *allow self-pollination* [1]

(ii) 1. pollen contains male gamete ;
2. fertilisation must take place ;
3. male gamete (in pollen grain) fuses with female gamete ;
4. seed develops from (fertilised) ovule ; [2 max]

(iii) 1. biuret test / add biuret reagent / add copper sulfate and KOH solution ;
2. purple / lilac / mauve ; [2]

[Total: 11]

9 (a)

	description	charge	range in air	ionising ability
alpha	*helium nucleus*	positive	5 cm	very strong
beta	electron	*negative*	50 cm	*medium*
gamma	wave	*none*	many kilometres	weak

;;;; [4]

(b) alpha particles have low penetration in air /
will not reach people living in house /
smoke detectors are a long way from people ; [1]

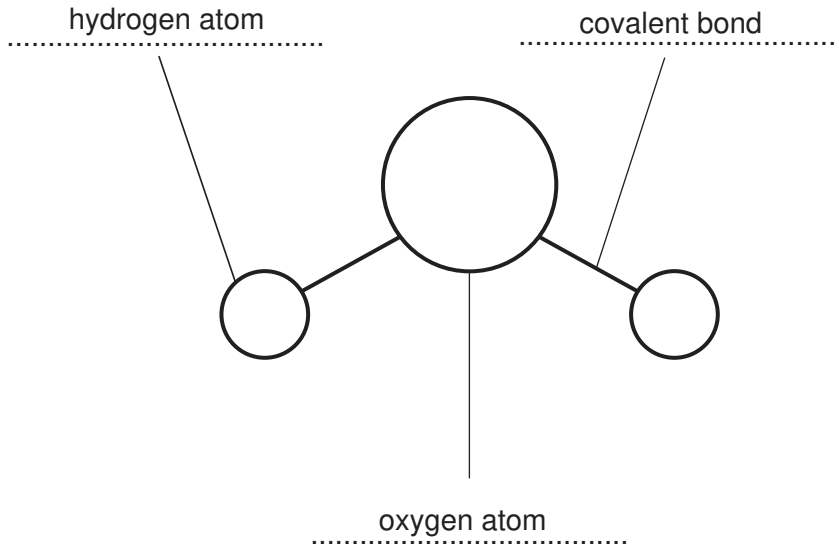
[Total: 5]

10 (a) 1. adding chlorine ;
2. kills (harmful) bacteria / microorganisms / germs ;
3. filtration ;
4. removes solid / insoluble materials / dirt ; 4

(b) (i) 1. dissolves in / reacts with rain water ;
2. produces acidic solution / acid rain ;
3. ref. to sulfurous / sulfuric acid ;
4. acidic rain collects in rivers / lakes ;
5. reference to harmful effects of acidity, e.g. kills organisms ; max 3

(ii) removal of sulfur compounds from fuel /
removal of sulfur dioxide from waste gases /
reduce demand for energy / burn less fuel ; max 1

(c)



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[Total: 11]