

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

**MARK SCHEME for the May/June 2015 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.

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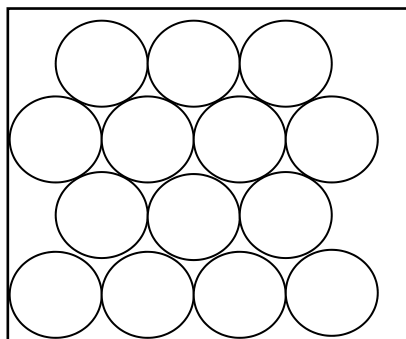
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- 1 (a) (i) 11 ;  
12 ; [2]
- (ii) 1 because sodium is in group 1 /  
atom has 1 electron in outer shell ; [1]
- (b) (i) cobalt chloride (test paper) / anhydrous cobalt chloride ;  
goes (from blue to) pink ;
- OR**
- anhydrous copper sulfate ;  
goes (from white to) blue ; [2]
- (ii) hydrogen + oxygen → water ; [1]
- (iii) covalent ;  
hydrogen and oxygen are non-metals /  
description of covalency in terms of electron sharing ;  
(allow forms a liquid at room temperature) [2]
- [Total: 8]**
- 2 (a) (i) amino acid correct ;  
glucose molecule correct ;  
two or more amino acids joined together and two or more  
glucose molecules joined together ;  
continuation bonds shown /  
any indication that the molecules continue ; [4]
- (ii) by respiration ;  
nutrient / glucose molecules are broken down by chemical  
reactions ; [2]
- (b) (i) taken up / absorbed by root (hair cells) ;  
through xylem ;  
through stem ; [max 2]
- (ii) sensitivity ;  
movement ; [2]
- (iii) (bright) colour ;  
large size ;  
similar shape to petals / look like petals ;  
avp ; [max 2]
- [Total: 12]**

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- 3 (a) running at constant speed ; [1]
- (b) (gravitational) potential (energy) ;  
kinetic (energy) ; [2]
- (c) (i) decelerates then accelerates ; [1]
- (ii) gravitational force / weight (*accept* gravity) ; [1]
- (d) (distance =) speed  $\times$  time (*in any form*) ;  
 $= 4 \times 2 = 8$  (m) ; [2]

(e)



or acceptable equivalent with at least 12 spheres in total

regular pattern ;  
most touching ;

[2]

**[Total: 9]**

- 4 (a) (i) **physical:** (iron oxide) settled / produced layers in rock /  
iron compounds dissolved ;  
**chemical:** compounds oxidised to iron oxide /  
oxygen produced by bacteria ; [2]
- (ii) chemical change produces a new substance / v.v. ; [1]
- (b) **differences:**  
no oxygen in ancient atmosphere / v.v. ;  
more carbon dioxide in ancient atmosphere / v.v. ;  
(assume reference to ancient atmosphere if not specified)
- similarity :**  
nitrogen largest component ; [3]

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(c) copper oxide neutralises the acid ; [1]

(d) (i) reduction is removal of oxygen ; [1]

(ii) carbon / charcoal / etc. ;  
heat ;  
allow other workable method [2]

**[Total: 10]**

5 (a) (i) pulmonary artery correctly labelled ; [1]

(ii) arrow going from atrium to ventricle ;  
arrow going from ventricle through the aorta ; [2]

(b) (i) makes the blood flow in one direction ; [1]

(ii) (valve **A** closes) because the pressure (of blood) in the  
ventricle is greater than in the atrium ; [1]

(c) to carry oxygen ; [1]

(d) needed for clotting of blood ;  
prevents excessive blood loss / prevents entry of pathogens ; [2]

**[Total: 8]**

6 (a) gamma rays / X-rays / ultra-violet / visible / infrared / microwave / radio (*any one*) ;  
relevant useful job for type selected ; [2]

(b) (i) up and down motion / oscillation / vibration / *owtte* ;  
correct reference to wavelength / amplitude shown in diagram ; [2]

(ii) wavelength ;  
decreases ;  
*or*  
speed ;  
slows down ;  
  
frequency / amplitude / direction of wave flow ; [3]

(c) frequency less than lower limit of hearing ; [1]

**[Total: 8]**

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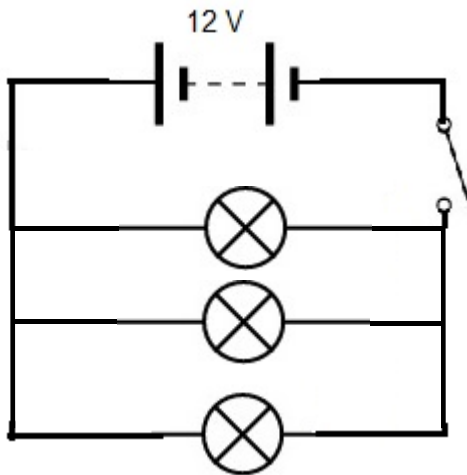
- 7 (a) symbols: Cu, C and O ;  
CuC<sub>2</sub>O<sub>4</sub> ;  
allow elements in any order [2]
- (b) (i) brown/pink (solid) ; [1]  
(ii) negative ; [1]  
(iii) cathode ; [1]  
no ecf
- (c) more bubbles / more heat produced, in test-tube 1  
than in test-tube 2 ;  
(allow no bubbles apparent with magnesium)  
calcium (is more reactive) ;  
because gas is displaced / evolved, more quickly ; [max 2]
- (d) (i) (most reactive) potassium  
sodium  
(least reactive) lithium ; [1]  
(ii) ignition / skims faster / bubbles produced faster / avp ; [1]
- [Total: 9]**
- 8 (a) reduced ;  
light ;  
reduced ;  
carbon dioxide ; [4]
- (b) increases global warming / description of effect ; [1]
- (c) loss of habitat ;  
killed in fire / leave the forest ;  
loss of food supply ; [max 2]
- [Total: 7]**

Page 6	Mark Scheme	Syllabus	Paper
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- 9 (a) V represents voltage / volts / potential difference ;  
 needed to drive the (required) current through the lamp ;  
 12 V is a safe maximum requirement for the bulb to work properly  
 / above this voltage the bulb would break ;

[max 2]

(b)



side and rear lamps in parallel with headlamp ;  
 side and rear lamps in parallel with each other ;

[2]

- (c) new lamp has higher resistance /  
 thinner filament / longer filament ;

[1]

- (d) any two pairs from:  
 conduction... ;  
 ...from filament to metal (filament and base) ;

convection... ;  
 ...of heated gas / through gas ;

radiation ;...  
 ... of infra-red / absorbed by glass ;

[max 4]

**[Total: 9]**