

**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

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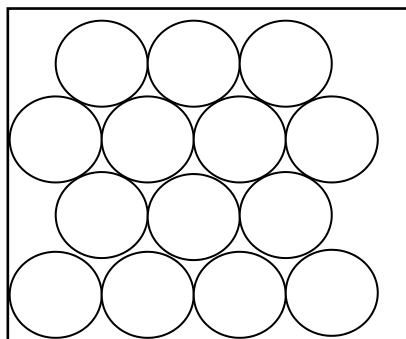
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- 1 (a) (i) 11 ;  
12 ; [2]
- (ii) 1 because sodium is in group 1 /  
atom has 1 electron in outer shell ; [1]
- (b) (i) cobalt chloride (test paper) / anhydrous cobalt chloride ;  
goes (from blue to) pink ;
- OR**
- anhydrous copper sulfate ;  
goes (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]**

Page 5	Mark Scheme	Syllabus	Paper
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- 7 (a) symbols: Cu, C and O ;  
 $\text{CuC}_2\text{O}_4$  ;  
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]

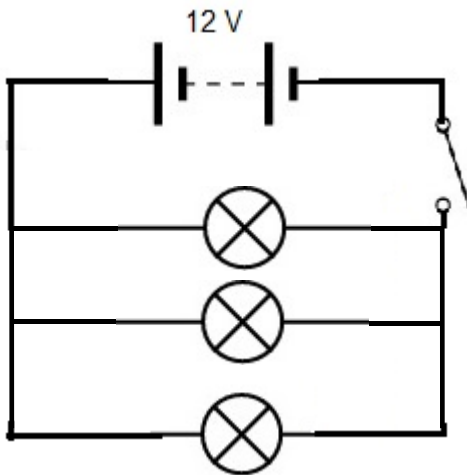
**[Total: 7]**

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]**