

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

## **MARK SCHEME for the October/November 2014 series**

### **0653 COMBINED SCIENCE**

**0653/22**

Paper 2 (Core Theory), maximum raw mark 80

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1 (a) copper oxide (loses oxygen so) is reduced / copper ions gain electrons ;  
carbon (gains oxygen so) is oxidised ; [2]

(b) (i) electrodes correctly labelled anode and cathode ;  
electrolyte labelled ; [2]

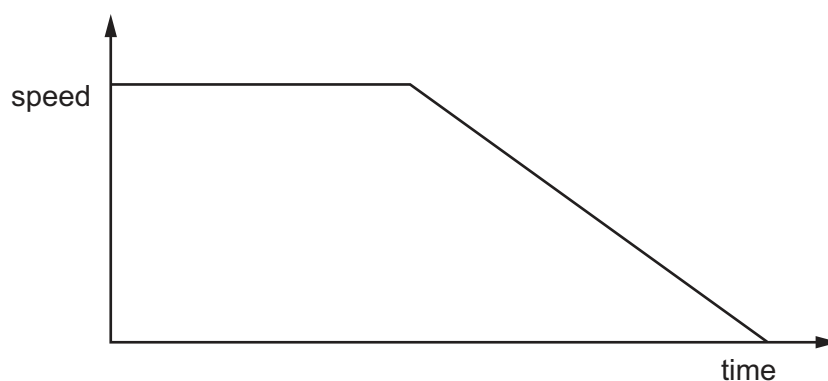
(ii) at the positive electrode bromine and at the negative electrode lead ;  
lead appears as a, grey / metallic, deposit / bead of molten metal ;  
bromine, is a brown gas / causes a brown colouration of electrolyte ; [3]

[Total: 7]

2 (a) (i) speed = distance/time / (time =)distance / speed ;  
 $200/40 = 5$  (s) ; [2]

(ii)  $40 \text{ m/s} = 40 \times 60 \times 60 \text{ m/h} (= 144\,000 \text{ m/h})$  ;  
 $40 \times 60 \times 60 \text{ m/h} = 40 \times 60 \times 60 / 1000 \text{ km/h} = 144 \text{ (km/h)}$  ; [2]

(b)



horizontal straight line ;  
followed by descending line, straight or curved, to meet time axis ; [2]

(c) (i) (400 N – no mark)  
for constant speed, forces must be equal and opposite (owtte) ; [1]

(ii) chemical energy in the rider ;  
heat/thermal energy during braking ;  
allow sound [2]

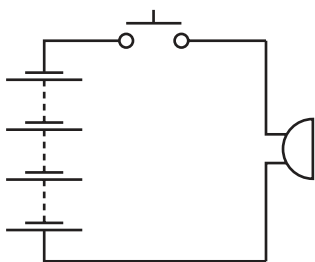
[Total: 9]

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- 3 (a) **A** trachea ;  
**B** bronchiole ; [2]
- (b) breathing rate increase ;  
volume / depth (of breathing) increased ; [2]
- (c) (i) more carbon dioxide in exhaled air / less carbon dioxide in inhaled air ; [1]
- (ii) (after exercise) exhaled air contains more carbon dioxide / ora ;  
use of numbers from data (e.g. exhaled air contains about four times  
as much carbon dioxide) ; [2]
- (iii) no carbon dioxide present ;  
not enough carbon dioxide in air to show a result ; [2]

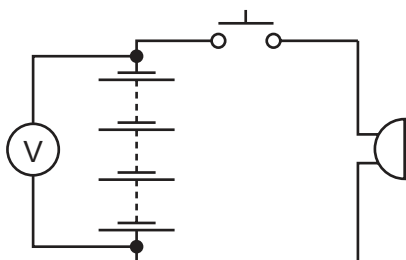
[Total: 9]

4 (a) (i)



complete series circuit ;  
battery of 4 cells connected correctly ; [2]

(ii)



symbol with correct connections (both required) [1]

- (b) (i) number of vibrations / waves per unit time ; [1]
- (ii) amplitude increased ;  
frequency unchanged ; [2]

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(c) (i) resistance =  $6 / 2 = 3$  ;  
(units) ohms /  $\Omega$  ; [2]

(ii) current increased / doubled ;  
in parallel circuits, the current from the source is larger than the current in each branch /  
(owtte) ;  
resistance is lower ; [max 2]

**[Total: 10]**

5 (a) (i)

	in nucleus	outside nucleus
number of protons	6	0
number of neutrons	6	0
number of electrons	0	6

column correct ; column correct ; [2]

(ii) equal numbers of protons and electrons ;  
equal numbers of positive and negative charges ;  
protons are positive and electrons are negative ; [max 2]

(b) (i) natural gas / petroleum / refinery gas / rice fields / from biodegradation / digestive  
activity of ruminants ; [1]

(ii) methane + oxygen  $\rightarrow$  carbon dioxide + water  
LHS ; RHS ; [2]

(c) (i)  $\text{CH}_4$  ; [1]

(ii) covalent ; [1]

(iii) 2 ; [1]

**[Total: 10]**

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- 6 (a) infra-red ; [1]
- (b) molecules have more energy so more of them are moving faster (owtte) ;  
more molecules have enough KE / moving fast enough to escape (from surface) ; [2]
- (c) need a medium for conduction & convection / no medium in space (owtte) ; [1]

(d)

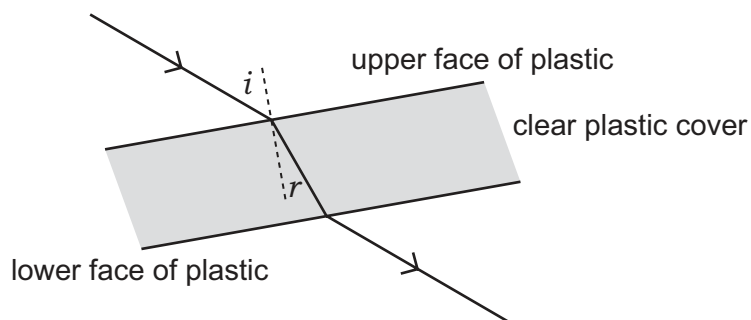


Fig 2.2

- refracted ray in plastic bent towards normal ;  
normal drawn at upper face with angles of incidence and refraction correctly marked ;  
emergent ray parallel to incident ray ; [3]

[Total: 7]

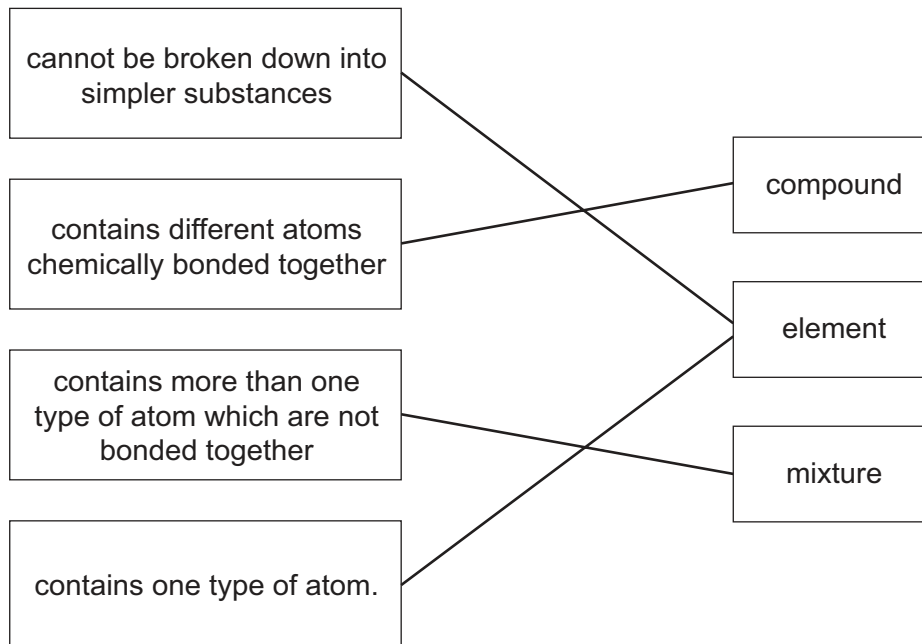
- 7 (a) (i) phototropism ; [1]
- (ii) more / better absorption of light ;  
more / better photosynthesis ;  
any statement about light hitting leaves at right angles / not at an angle ; [max 2]
- (iii) sensitivity ;  
movement ;  
growth ; [max 2]
- (b) (i) shoot X bends towards the light / responds ;  
shoots Y and Z do not ; [2]
- (ii) the tip of the shoot detects the light / controls the response ;  
because no response occurs when tip is covered/removed ; [2]
- (c) gives more glucose into blood ;  
increases pulse rate ;  
makes more energy available from respiration / speeds up metabolism ; [max 2]

[Total: 11]

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- 8 (a) workable filtration equipment ;  
collection of filtrate ;  
evaporation ; [3]

(b)



[4]

- (c) (i) aluminium (atoms) lose electrons ;  
sulfur (atoms) gain electrons ;  
electrons are transferred from aluminium to sulfur (atoms) ;; [max 2]

- (ii)  $Al_2S_3$  ; [1]

[Total: 10]

- 9 (a) (i) cervix correctly labelled ;  
vagina correctly labelled ; [2]

- (ii) ovary correctly labelled ; [1]

- (b) (i) oviduct / fallopian tube ; [1]

- (ii) uterus ;  
(embedded) in lining ; [2]

- (c) sharing needles / blood transfusions / avp ; [1]

[Total: 7]