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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]

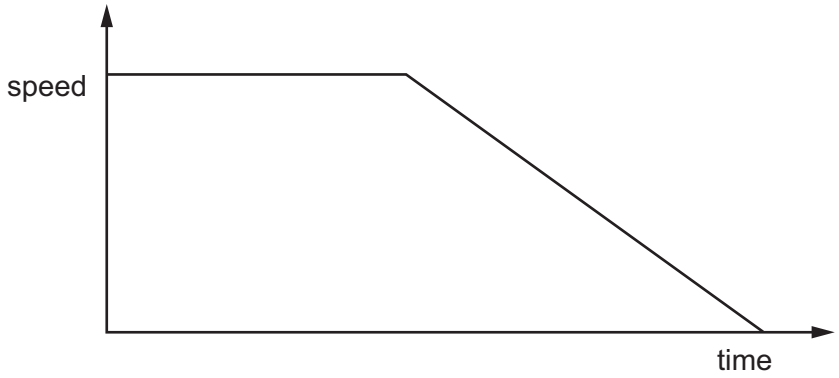
(ii) at the positive electrode bromine and at the negative electrode lead ;
lead appears as a, grey / metallic, deposit / bead of molten metal ;
bromine, is a brown gas / causes a brown colouration of electrolyte ; [3]

[Total: 7]

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

(ii) 40 m/s = 40 × 60 × 60 m/h (= 144 000 m/h) ;
40 × 60 × 60 m/h = 40 × 60 × 60 /1000 km/h = 144 (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 ; [2]
allow sound

[Total: 9]

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3 **(a)** **A** trachea ;
B bronchiole ; [2]

(b) breathing rate increase ;
volume / depth (of breathing) increased ; [2]

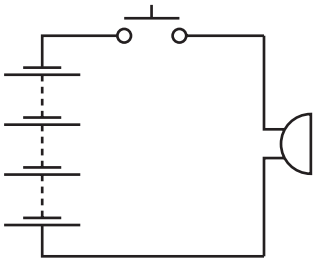
(c) **(i)** more carbon dioxide in exhaled air / less carbon dioxide in inhaled air ; [1]

(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]

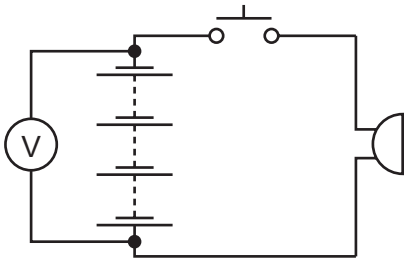
[Total: 9]

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 /Ω ; [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 → carbon dioxide + water
LHS ; RHS ; [2]

(c) (i) 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)

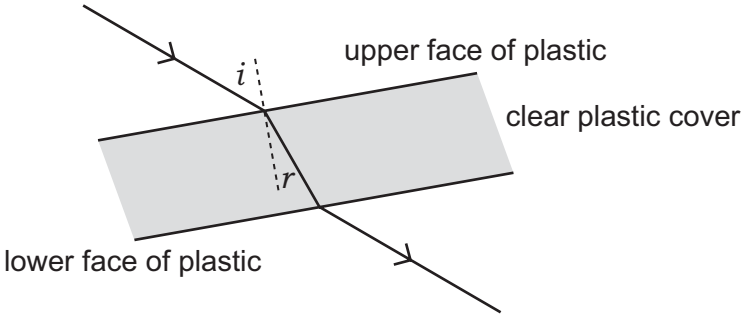

Fig 2.2

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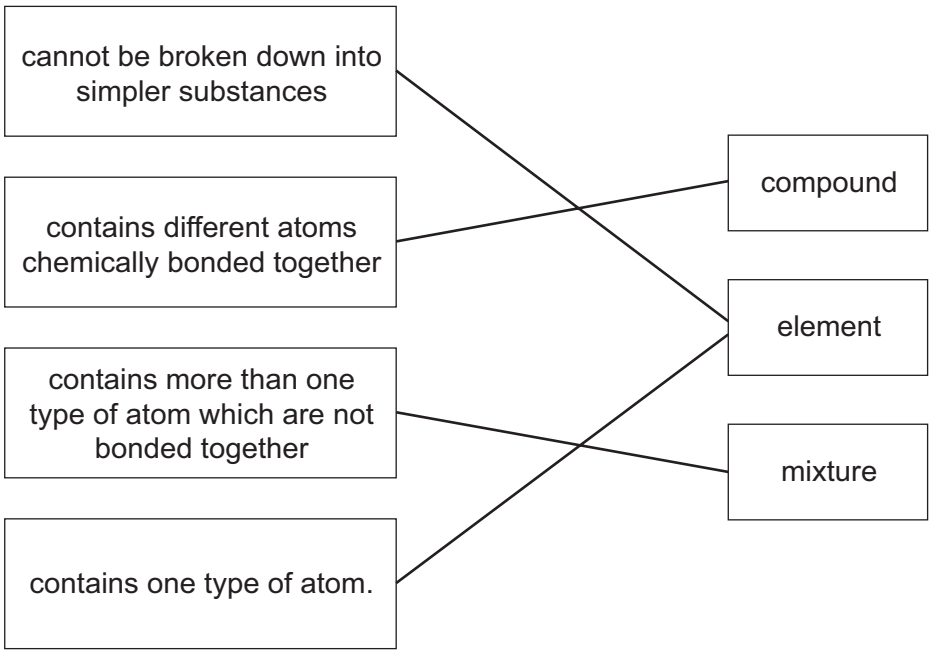
8 **(a)** workable filtration equipment ;
collection of filtrate ;
evaporation ; [3]

(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]

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