

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

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

### **0653 COMBINED SCIENCE**

**0653/23**

Paper 2 (Core Theory), maximum raw mark 80

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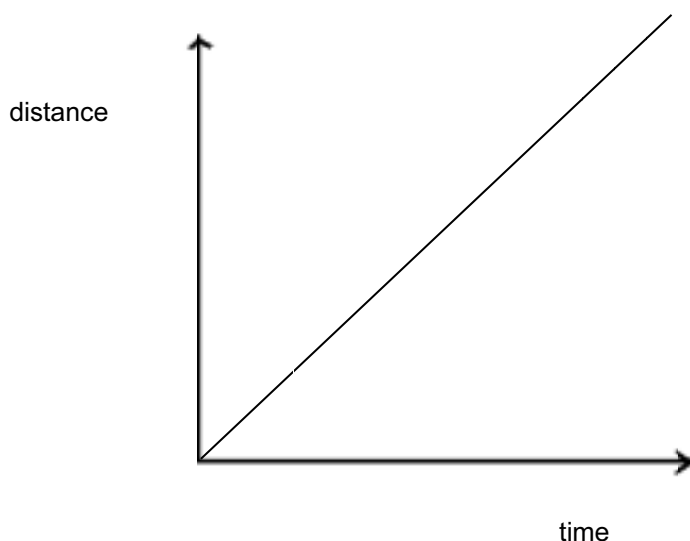
Page 2	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2014	0653	23

- 1 (a) (i)  $\text{Fe}_2\text{O}_3$ ; [1]
- (ii) iron has reacted with oxygen in the air/water rises to take the place of the oxygen; [1]
- (iii)  $79 \pm 1 \text{ cm}^3$  ;  
allow higher value with explanation of allowance for volume of iron and cotton wool [1]
- (iv) nitrogen; [1]
- (b) no/less rusting and no/less movement of the liquid ;  
rusting requires water (vapour)/less water (vapour) available ; [2]  
(giving credit for appreciation that air initially contained some water vapour)
- (c) painting/oil/plating/more reactive metal ;  
exclusion of water/oxygen/air ; [2]

[Total: 8]

- 2 (a) (i) the weight of the canoe and the man: **T** ;  
the force propelling the canoe forward: **U** ;  
the friction due to water resistance: **S** ;  
3 correct 2 marks, 2 correct 1 mark [max 2]
- (ii) water current balances propulsion force (owtte) ;  
unbalanced forces needed to move/accelerate (the canoe) ; [2]

(b)



straight line ;

[1]

Page 3	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2014	0653	23

- (c) (i) chemical (energy) ; [1]
- (ii) kinetic (energy) ; [1]
- (iii) heat/sound/kinetic energy of the water ; [1]
- (d) speed = distance/time or (time =) distance/speed ;  
time = 2400/2 = 1200 (s) ; [2]

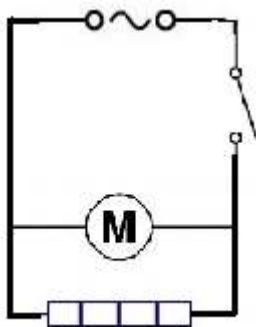
**[Total: 10]**

- 3 (a) premolar/molar ; [1]
- (b) (i) decay had reached the pulp cavity/nerve ; [1]
- (ii) bacteria/plaque in the mouth ;  
feed on sugar ;  
secrete acids ;  
acids attack the enamel ; [max 3]
- (c) small pieces make the food easier to swallow ;  
increases surface area of food ;  
speeds up enzyme action/gives better access to enzymes/  
ref. to faster/more efficient digestion ; [max 2]
- (d) breaks down large molecules ;  
into small (molecules) ;  
that can be absorbed into the blood/by small intestine ; [3]
- (e) no (no mark)  
enzymes are affected by pH ;  
enzyme will not be at optimum/optimum is acidic pH ;  
enzyme will be denatured ; [max 2]

**[Total 12]**

Page 4	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2014	0653	23

4 (a)



complete circuit ;  
all components in correct positions (motor and heater either way round) ; [2]

(b) heating (the water) gives molecules more energy ;  
more water molecules have enough energy to escape (from hair) ;  
(allow any or all points in any equivalent wording, or showing deeper understanding of  
molecular motion) [2]

(c) convection ; [1]

(d) (i) volt ; [1]

(ii)  $220/5 = 44$  ;  
ohm/ $\Omega$  ; [2]

(e) (i) short circuit (accept other reasonable ideas which might lead to fuse melting) ; [1]

(ii) 10A (no mark)  
2A and 5A fuses would blow ;  
15A fuse gives less protection than 10A fuse ; [2]

[Total 11]

Page 5	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2014	0653	23

- 5 (a) (i) geotropism ; [1]
- (ii) makes sure roots grow downwards/does not matter which way up the seed is planted (the roots will always grow downwards) ;  
to anchor plant ;  
to absorb mineral ions/water/nutrients ; [max 2]
- (iii) radicle curves round 180° ; [1]
- (b) (i) no sex cells/no gametes involved/only one parent ; [1]
- (ii) seeds have resulted from fusion of gametes/sex cells/haploid nuclei/  
involve two parents ; [1]
- (iii) plants from runners will be identical and from seeds will show variation ;  
ref. to genetically ; [2]
- [Total 8]**
- 6 (a) flame ;  
explosion/pop ; [2]
- (b) (i) (measurement of) mass ;  
(measurement of) time ; [2]
- (ii) repeat at different temperatures under same conditions ; [1]
- (iii) increase in temperature causes increase in rate of reaction ; [1]
- (c) (i) Period 4/transition elements/metals/series ; [1]
- (ii) no reaction/no change in mass ;  
copper less reactive than hydrogen/below hydrogen in reactivity series ; [2]
- [Total 9]**

<b>Page 6</b>	<b>Mark Scheme</b>	<b>Syllabus</b>	<b>Paper</b>
	<b>Cambridge IGCSE – October/November 2014</b>	<b>0653</b>	<b>23</b>

7 (a) (i) visible light ;  
radio waves and ultra-violet (both required for mark) ; [2]

(ii) reflection ; [1]

(b) (i) number of vibrations/cycles/oscillations per unit time (accept per second) ; [1]

(ii)

gamma radiation	X ;				microwaves	
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[1]

(c) brighter ; [1]

**[Total 6]**

8 (a) (i) as the length increased, the time taken (for the acid to reach the centre) increased ;  
increase is not linear/not proportional ; [2]

(ii) 6.5 minutes (allow 0.5 minutes tolerance) ;  
20 minutes (allow 0.5 minutes tolerance) ; [2]

(iii) time taken for oxygen/food to reach all the parts/middle of  
the cell would be (too) long ; [1]

(b) large surface area/thin/biconcave disc ; [1]

**[Total 6]**

Page 7	Mark Scheme	Syllabus	Paper
	Cambridge IGCSE – October/November 2014	0653	23

- 9 (a) (i) anode ;  
cathode ;  
(in that order) [2]
- (ii) copper ;  
pink/brown deposit ; [2]
- (iii) chlorine ;  
bleaching of litmus paper ;  
ignore reference to red or pink colouration [2]
- (b) compound  
mixture  
element  
element  
compound  
5 or 4 correct for 2 marks, 3 or 2 correct for 1 mark ;; [max 2]
- (c) (i) an element consists of one type of atom and a compound contains different  
atoms/elements (bonded together) ; [1]
- (ii) the composition of a mixture is variable and a compound contains a fixed proportion of  
elements ;  
a compound contains atoms/elements bonded together/which are difficult to separate  
and a mixture is easier to separate ; [max 1]

**[Total: 10]**