

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge International General Certificate of Secondary Education

## **MARK SCHEME for the May/June 2015 series**

### **0653 COMBINED SCIENCE**

**0653/21**

Paper 2 (Core Theory), maximum raw mark 80

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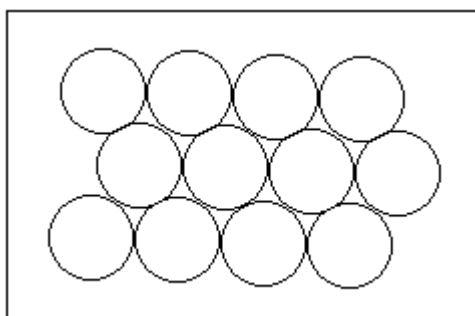
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Page 2	Mark Scheme	Syllabus	Paper
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- 1 (a) (i) 1 proton ; 1 electron ; [2]
- (ii) covalent; [1]
- (iii) hydrogen + oxygen ; water ; [2]
- (iv) heat energy given out / increase in temperature ; [1]
- (v) named metal above hydrogen in reactivity series up to and including calcium ;  
above hydrogen in reactivity series ; [2]
- (b) noble gas so unreactive (with oxygen) / not flammable ; [1]
- (c) C<sub>3</sub>H<sub>8</sub> ; [1]
- [Total: 10]**
- 2 (a) (i) carbon, hydrogen, oxygen ; [1]
- (ii) carbon, hydrogen, oxygen ; [1]
- (b) (i) X cell membrane ; [2]  
Y cytoplasm ;
- (ii) from alveoli into blood / capillaries ; [max 2]  
in blood ;  
in red cells ;  
carried by haemoglobin ;  
any valid reference to diffusion ;
- (c) (energy needed) for contraction of muscles / movement ; [1]
- (d) (i) 2760 and 2260 ; [1]
- (ii) Sarbjit because she used more energy ; [2]  
she broke down a greater amount of food stores ;  
(allow ecf if calculation in (i) indicates the wrong girl)
- (iii) activities done at different rates owtte ; [1]
- [Total: 11]**

Page 3	Mark Scheme	Syllabus	Paper
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- 3 (a) weight (accept gravity) ; [1]
- (b) **A to B:** accelerating/going faster ; [2]  
**B to C:** constant speed ;
- (c) (distance =) speed x time (in any form) ; [2]  
(OR use of area under graph between **B** and **C**)  
= 25 x 30 = 750 (m) ;
- (d) (i) reduces friction(al force) (opposing effect of gravity) ; [1]  
(ii) reduces air resistance (opposing effect of gravity) ; [1]
- (e) [2]



or acceptable equivalent with at least 12 spheres in total  
regular pattern ;  
most touching ;

[Total: 9]

- 4 (a) (i) green to yellow / orange / red ; [1]  
(ii) gas dissolves in / reacts with water etc. in atmosphere ; [2]  
acid rain falls on soil ;
- (iii) calcium chloride ; [2]  
water ;
- (b) (i) decreasing size of pieces decreases time taken / [1]  
increases rate / v.v. ;
- (ii) increasing concentration (of acid) decreases time / [1]  
increases rate / v.v.  
**OR**  
increasing temperature decreases time / increases rate / v.v. ;

[Total: 7]

Page 4	Mark Scheme	Syllabus	Paper
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5 (a) (i) arrow correctly drawn from anther of flower **A** ; [2]  
to stigma of flower **B** ;  
(allow 1 mark if the arrow points to the correct structures but is the wrong way round)

(ii) large petals ; [max 2]  
anthers inside flower ;  
stigma inside flower ;

(b) (i) no germination at 4°C / in dish **3** ; [2]  
no germination when water is absent / in dish **2** ;

(ii) (light is not needed) no mark [1]  
because germination took place in dish **4** ;

(iii) oxygen ; [1]

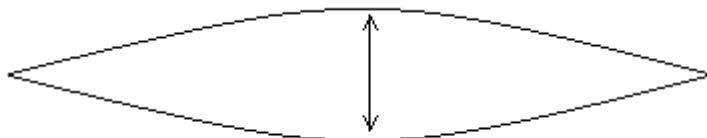
[Total: 8]

6 (a) (i) cello ; [1]

(ii) harp ; [1]

(iii) harp ; [1]

(b) (i)



or similar diagram to illustrate a vibrating string ; [1]

(ii) greater amplitude / owtte ; [1]

(c) (time delay =) distance / speed of sound ; [2]  
= 66 / 330 = 0.2 (s) ;

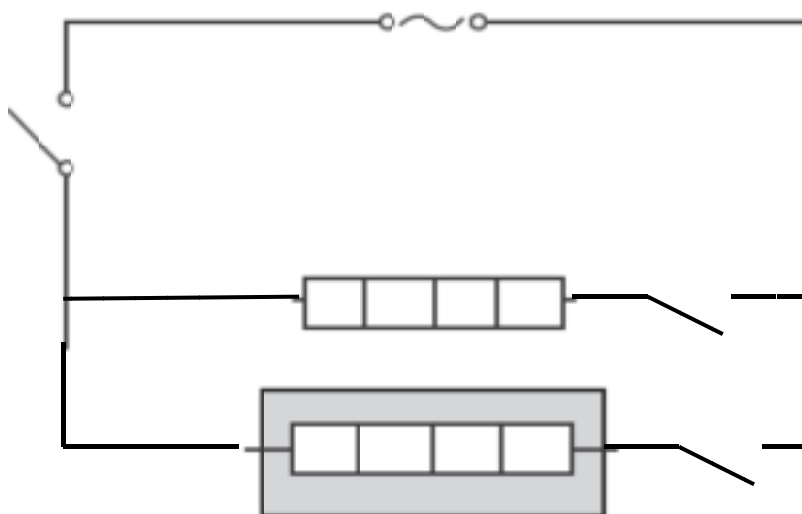
[Total: 7]

Page 5	Mark Scheme	Syllabus	Paper
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- 7 (a) liquid  
solid  
1 for 2 correct, 2 for 3 correct ;; [2]
- (b) (i) anode  
cathode ;  
electrolyte ; [2]
- (ii) X on or near left-hand electrode under or just above electrolyte surface ; [1]
- (iii) brown / orange / yellow, colouration of, electrolyte / gas ; [1]
- (c) (i) (sodium) chloride ; [1]
- (ii) (sodium) iodide ; [1]
- (iii) trend in reactivity with other halides:  $Cl > Br > I$  / chlorine is more reactive than iodine ; [1]
- [Total: 9]**
- 8 (a) (i) water ; [2]  
sugar / glucose ;
- (ii) zebra / lion ; [2]  
lion ;
- (b) correct arrow drawn from zebra to hyena ; [2]  
correct arrow drawn from hyena to lion ;
- (c) (i) by eating ; [1]
- (ii) carbon lost in waste materials / urine / faeces ; [max 2]  
carbon lost during respiration as carbon dioxide ;  
not all the zebra eaten ;  
not all the zebra digested / absorbed ;
- [Total: 9]**

Page 6	Mark Scheme	Syllabus	Paper
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- 9 (a) (i) convection ; [1]
- (ii) conduction ; [1]
- (iii) any reasonable description of thermal insulation/lagging ; [2]  
 explanation **either** in terms of  
 reducing thermal energy transfer by conduction through tank wall  
**or** the lagging preventing thermal energy transfer by convection ;
- (b) switches in both heater branches (can be either side of heater) ; [2]  
 rest of circuit completed properly ;  
 (accept any circuit that fulfils the criteria (with or without single switch))



- (c) resistance of water heater less than that of warm air heater ; [3]  
 p.d. same across both, so current twice / higher,  
 and so resistance must be half / lower ;  
 (or vice versa)
- (d) damaged insulation ; [max 1]  
 accept water leak / dampness  
 the heater is not earthed ;

[Total: 10]