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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CAMBRIDGE
International Examinations

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 ; **[2]**
above hydrogen in reactivity series ;

(b) noble gas so unreactive (with oxygen) / not flammable ; **[1]**

(c) C_3H_8 ; **[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]

3 **(a)** weight (accept gravity) ; **[1]**

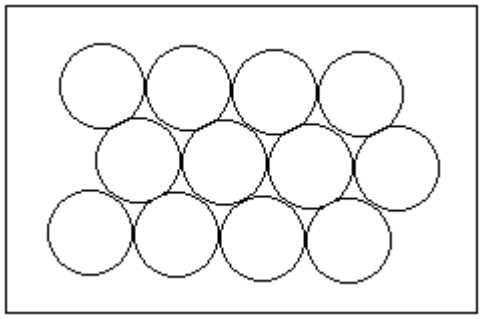
(b) **A** to **B**: accelerating/going faster ; **[2]**
B to **C**: constant speed ;

(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]

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]**

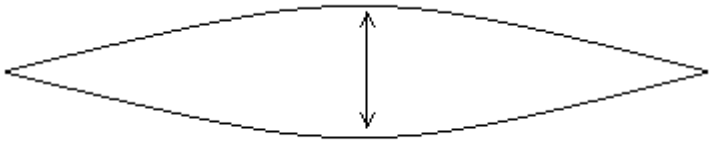
[Total: 8]

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 ;
= 66 / 330 = 0.2 (s) ; **[2]**

[Total: 7]

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 ;

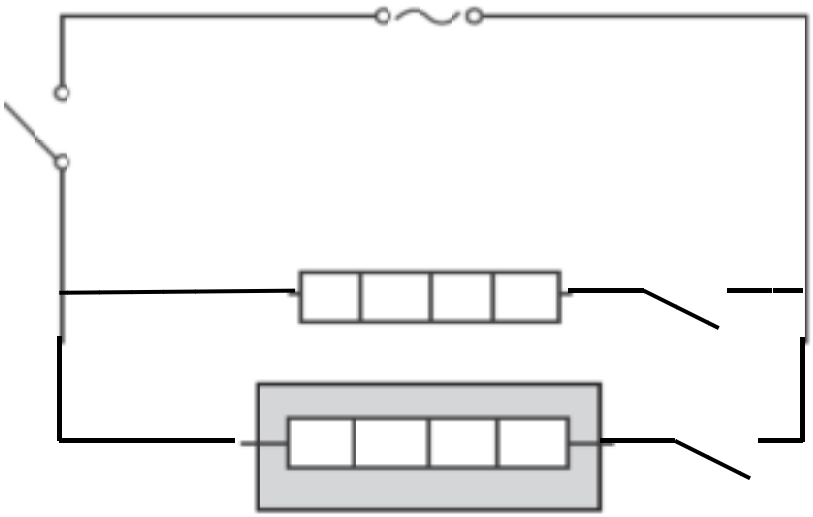
[Total: 9]

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 <u>conduction</u> through tank wall
or the lagging preventing thermal energy transfer by <u>convection</u> ;

(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]