

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0653 COMBINED SCIENCE

0653/33

Paper 3 (Extended Theory), maximum raw mark 80

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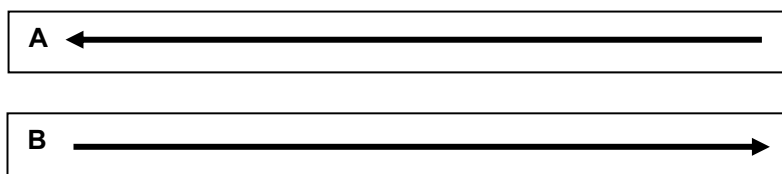
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- 1 (a) large ;
into ;
capillaries ; [3]
- (b) smaller airway diameter ;
presence of mucus obstructing flow ; [2]
- (c) (i) $12.5 - 5.8 = 6.7$ (dm³/min) ;
 $\frac{6.7}{5.8} \times 100 = 115(\%)$ or $116(\%)$;
or
 $\frac{12.5}{5.8} = 215$;
 $215 - 100 = 115$ (%) ; [max 2]
- (ii) to get more oxygen (into the blood)/remove more carbon dioxide ;
for respiration ; [2]
- (d) (*cilia become paralysed*)
mucus cannot be shifted upwards ;
airways become even more restricted / more mucus for bacteria to breed in /
bacteria / tar will not be removed from the lungs / increases risk of bronchitis ;
or
(*more mucus is produced*)
airway becomes even more restricted / blocked ;
more mucus for bacteria to breed in / remain in lungs / increases chances of
chest infections / reduces oxygen supply for the body ; [max 2]
- [Total: 11]**
- 2 (a) thermal energy to chemical energy ; [1]
- (b) (i) steeper gradient than solid line ; [1]
- (ii) increasing concentration increases rate of reaction ;
increased frequency of collisions ; [2]
- (c) (i) atoms ions
ions atoms ; (*must be in this order*) [1]
- (ii) silver written below copper ; [1]
- (iii) the atoms of more reactive metals become ions more readily than those of
less reactive metals ; [1]
- [Total: 7]**

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- 3 (a) weight/gravitational force (*accept gravity*) ; [1]
- (b) (gravitational) potential (energy) to kinetic (energy) ; [1]
- (c) (i) accelerating ;
constant speed ; [2]
- (ii) area under graph between **A** and **C** or $(\frac{1}{2} \times 2 \times 9) + (2 \times 9)$ or $\frac{1}{2}(2+4) \times 9$;
= 27 (m) ; [2]
- (d) particles far apart in air/gas, but close together/touching in water/liquid
(*accept diagrammatic description*) ;
stopping the skateboarder requires loss of KE ;
more work done/loses more KE / more difficult to push water particles aside
than pushing air particles aside/owtte/ diagrams ;
harder to push water molecules apart because of the forces between them/ more
particles ; [max 3]
- [Total: 9]**
- 4 (a) (i) contains the correct proportions of nutrients for an individual ; [1]
- (ii) to prevent scurvy/AVP ; [1]
- (b) (i) as temperature increases the amount of vitamin C decreases ; [1]
- (ii) rate/ amount of decomposition/ breakdown/ disappearance increases with
temperature ; [1]
- (iii) temperature will vary in different parts of the world ;
this will affect the amount of vitamin C (in fruit before the experiment) ;
OR
amount of water given/ contained in 1 fruit may vary ;
this could affect concentration of the fruit juice ;
OR
different variety of orange/ fruits vary genetically ;
(naturally) contains different amounts of vitamin C ;
AVPs ; ; [max 2]
- (c) boiling water destroy some/ all of the vitamin C ; [1]
- (d) (*advantage*)
convenient if you need to leave the baby / mother may not have enough milk/AVP ;
(*disadvantage*)
does not contain antibodies/ any reference to bonding/AVP ; [2]
- [Total: 9]**

5 (a)



[1]

(b) (i)

<i>observation</i>	<i>explanation</i>
<i>(bubbles of gas)</i>	hydrogen ;
<i>(changes from green to purple)</i>	alkaline solution ;

[2]

(ii) more vigorous reaction / hydrogen produced faster / greater temperature rise ;
alkali metals become more reactive down the group ;
(accept correct references to ease of ionisation of metal atoms)

[2]

(iii) one electron in shell ;
all Group I elements have 1 electron in outer shell ;

[2]

[Total: 7]

6 (a) (i) $(\frac{10}{20} =) 0.5$;
Hz / hertz ;

[2]

(ii) $(\frac{30}{10}) = 3$ (m/s)

[1]

(iii) $v = f\lambda$ (in any form) / $\frac{3}{0.5}$;
= 6 (m) ;
(allow ecf from (i) and/or (ii))

[2]

(b) $2 \times \text{amplitude } (0.5) = 1$ (m) ;

[1]

(c) R placed in right-hand end box ;

[1]

(d) (i) tidal energy more predictable / nearer to land so easier access / installation / any other reasonable suggestion based on access to the energy involved or easier technology / ORA ;

[1]

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(ii) $(\text{efficiency} = \frac{\text{useful energy output}}{\text{energy input}})$
 $= \frac{150}{500} \times 100 = 30(\%);$ [1]

[Total: 9]

7 (a) allows solar radiation to reach the Earth's surface ;
contains greenhouse gas molecules/ example ;
(greenhouse gases in the atmosphere) absorb infra-red radiation (that is emitted from the Earth's surface) ;
infra-red radiation is then (re-)emitted by the greenhouse gases into the atmosphere/ back to the Earth's surface ; [max 2]

(b) *two from:*
carbon dioxide / methane / water vapour ; [1]

(c) *two from:*
(increased) use of fossil fuels / example;
(increased) deforestation ;
(increased) keeping of cows / growing rice ;
AVP ; [max 2]

(d) reduced use of fossil fuels / removal of carbon dioxide from exhaust / promote the use of public transport ;
reduced deforestation ;
reduced agricultural practices that cause methane to be produced ;
plant more trees ;
use more renewable energy sources ;
AVP ; [max 1]

[Total: 6]

8 (a) (i) $2\text{HCl} + (\text{CuCO}_3) \rightarrow (\text{CuCl}_2) + \text{CO}_2 + \text{H}_2\text{O}$
formulae ; balanced ; [2]

(ii) limewater ;
turns milky / cloudy etc. ; [2]

(b) (i) copper (deposit on cathode) ;
chlorine (gas at anode) ; [2]

(ii) (*copper ions*):
move towards cathode / negative (electrode) ;
(*chloride ions*):
move towards anode / positive (electrode) ; [2]

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(c) (i) CuCl ;
reference to the need for charge balance ; [2]

(ii) high density/high melting point/form coloured compounds/act as catalysts ; [max 1]

(d) correct structure of methane molecule ;
correct structure of ethane molecule ; [2]

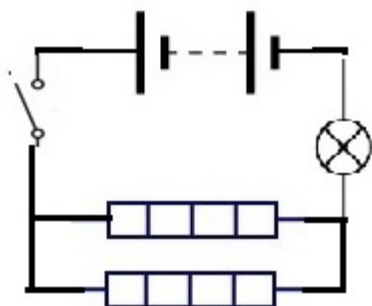
[Total: 13]

9 (a) (i) move towards each other ;
unlike charges attract ; [2]

(b) (i) force ; [1]

(ii) any path heading towards the upper positive plate ; [1]

(c) (i) complete circuit with 2 extra components included in series and/or in parallel ;
two heaters in parallel ;
lamp in series in main circuit ;



[3]

(ii) water expands/volume increases/particles get further apart water becomes
less dense ;
(less dense)/warm water rises (above denser colder water) /owtte ; [2]

[Total: 9]