

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 series

0653 COMBINED SCIENCE

0653/31

Paper 3 (Extended Theory), maximum raw mark 80

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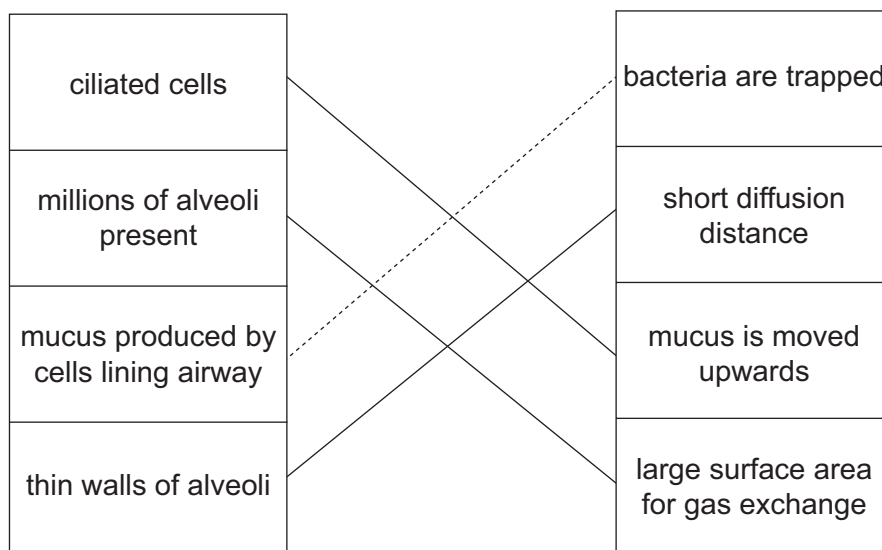
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1 (a)



three or two correct: 2 marks, one correct: 1 mark ;;

[2]

(b) (i) more mucus ;
cilia are paralysed / damaged ;

[2]

(ii) bacteria / pathogens remain in the mucus ;

[1]

(c) (i) $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
formulae correct ;
equation is balanced and single arrow shown LHS to RHS ;

[2]

(ii) by red (blood) cells / haemoglobin ;

[1]

(d) (i) (person C - must be present to award mark)
(person C had) highest carbon monoxide concentration at 08.00 hours /
when first measurement taken / owtte ;

[1]

(ii) person B ;
carbon monoxide level in blood greater at 14.00 / 17.00 hours (compared
with 11.00 hours) / carbon monoxide level in blood increased during the day /
from 2.2 to 4.8 ;

[2]

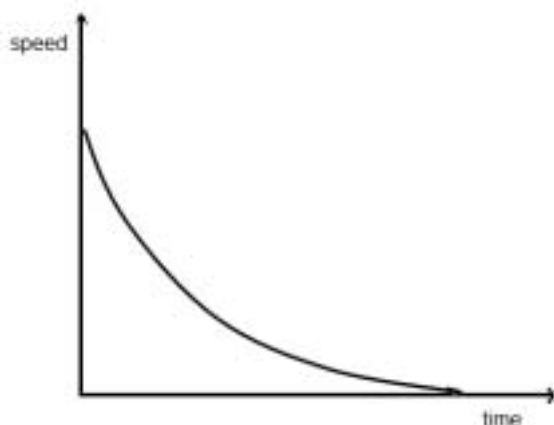
[Total: 11]

Page 3	Mark Scheme	Syllabus	Paper
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- 2 (a) increases ; [1]
- (b) (i) bromine ; [1]
- (ii) $2\text{NaBr} + \text{Cl}_2 \rightarrow 2\text{NaCl} + \text{Br}_2$
 formulae ;
 balancing consequential on formulae ; [2]
- (iii) chlorine
 bromine
 iodine (*must be in this order*) ; [1]
- (iv) a more reactive element/halogen displaces less reactive one/ORA ;
 fluorine most reactive ; [2]
- (c) (negative) fluoride ions move to/attracted to (positive) anode ;
 electrons move from fluoride ion onto anode ;
 ions are discharged / 1 electron moves from fluoride ion onto anode /
 is lost (from each ion) ; [max 2]

[Total: 9]

- 3 (a) (i) weight/gravitational force/gravity ; [1]
- (ii) arrow pointing vertically upwards ; [1]
- (b) (i) tick in first box ; [1]
- (ii)



line from y -axis with negative gradient (accept straight or curved) ;
 line meets x -axis ; [2]

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(c) (i) kinetic potential ; [1]

(ii) (potential energy transferred =) mgh or $80 \times 10 \times 40$;
= 32 000 (J) ; [2]

[Total: 8]

4 (a) (i) cell wall correctly labelled ;
(large) vacuole correctly labelled ; [2]

(ii) (in either order)
(cell wall) provides support (for the cell) ;
(large vacuole) contains cell sap / correct named nutrient (for storage) /
provides support / shape inside the cell ; [2]

(b) (i) leaf X has a smaller area than leaf Y / leaf X has deeper lobes / owtte ; [1]

(ii) smaller area gives less water loss ;
by transpiration ;
OR
deeper lobes allow more light through / owtte ;
for photosynthesis in lower leaves ; [max 2]

(iii) larger area for trapping light ;
for photosynthesis ; [2]

[Total: 9]

5 (a) natural gas / biogas / other correct ; [1]

(b) (i)

<i>before</i>	→	<i>just after</i>
<i>(methane)</i>		carbon dioxide
<i>(oxygen)</i>		water (vapour)
nitrogen		nitrogen

all 4 correct = 2 marks, 3 or 2 correct = 1 mark ;; [2]

(ii) chemical (potential) **to** thermal (heat) / light / sound / kinetic ; [1]

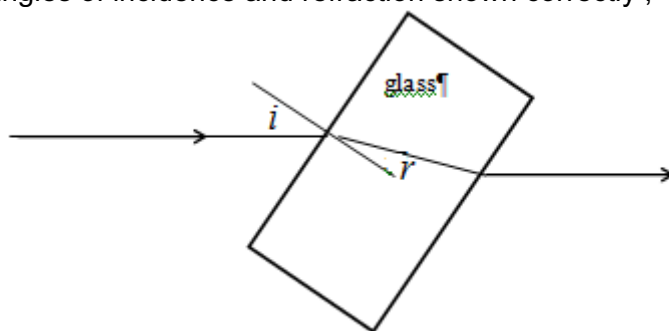
(iii) exothermic ; [1]

Page 5	Mark Scheme	Syllabus	Paper
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- (c) (i) (2 because) in Period 2 ;
 (6 because) in Group VI/6 ;
(allow explanations based on the electron configuration 2,6) [2]
- (ii) 4 shared pairs ;
 correct symbols and all else correct ; [2]
- (d) (i) noble / inert gases / Group 0 **or** 8 / Group VIII ; [1]
- (ii) all / outer shells complete / filled ; [1]

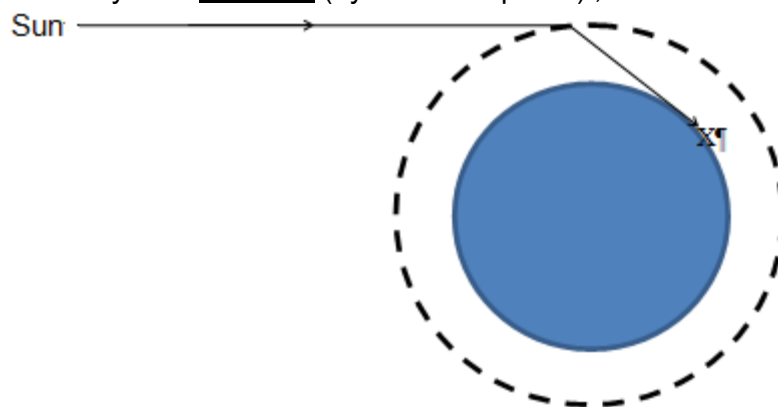
[Total: 11]

- 6 (a) (i) ray in glass bent towards normal ;
 emergent ray parallel to incident ;
 angles of incidence and refraction shown correctly ;



[3]

- (ii) ray from Sun bending towards normal on entering atmosphere and reaching X ;
 Sun's rays are refracted (by the atmosphere) ;



[2]

- (b) (i) infra-red / IR ; [1]
- (ii) sand is better absorber of infra-red / radiation than (sea) water ; [1]
- (c) use of $v = f\lambda$;
 λ decreases ; [2]

[Total: 9]

Page 6	Mark Scheme	Syllabus	Paper
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- 7 (a) organisms that feed on/get their energy from/reference to respiration ;
dead or waste organic matter ; [2]
- (b) (i) enzymes break down the wood /large molecules into small molecules ;
that can be absorbed (by the fungi) ; [2]
- (ii) may slow down/stop process ;
due to denaturation of digestive enzymes ; [2]
- [Total: 6]**
- 8 (a) (i) (rate of reaction decreases due to) decreasing concentration/ORA ; [1]
- (ii) X vertically in line with 8–9 time units ; [1]
- (iii) acid used up ; [1]
- (b) (i) increased initial value on vertical axis ;
intercept with time axis before 8 minutes ; [2]
- (ii) particles move/collide faster/have more kinetic energy ;
collide more frequently ;
greater chance of reaction during collision/owtte ;
(*accept answers referring to activation energy*) [max 2]
- [Total: 7]**
- 9 (a) (i) $(R =) \frac{V}{I} \text{ or } \frac{1.2}{0.5} ;$
 $= 2.4 (\Omega) ;$ [2]
- (ii) $1.2 (\Omega)$ (ecf) ; [1]
- (b) (i) $P = IV ;$ [1]
- (ii) watt **and** W ; [1]
- (iii) (energy =) power \times time **or** $1.2 \times 0.5 \times 120 ;$
 $= 72 (\text{J}) ;$ [2]
- (c) (i) convection ; [1]
- (ii) by conduction ;
reference to particles in wire vibrating more quickly ;
reference to vibrational collisions (between resistance and connecting wires) ;
(*also allow answers discussing the role of delocalised electrons*) [max 2]
- [Total: 10]**