

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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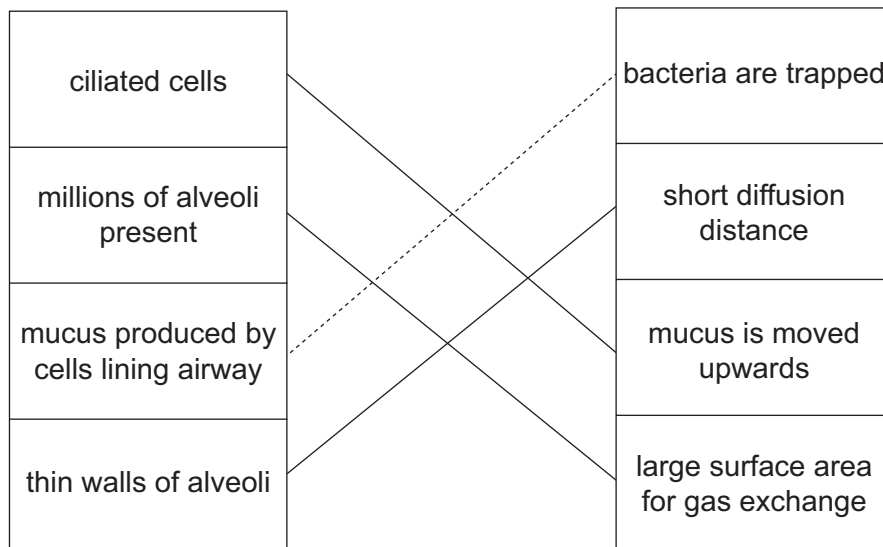
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1 (a)



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]

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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]

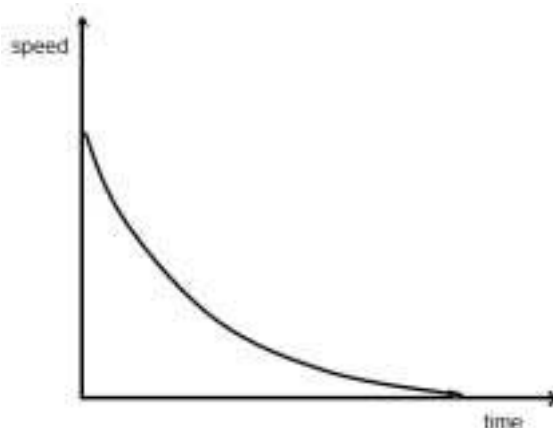
[Total: 9]

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>
(methane)		carbon dioxide
(oxygen)	→	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]

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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]

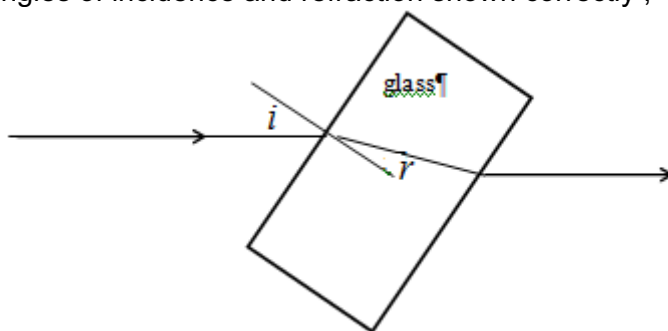
(ii) 4 shared pairs ;
correct symbols and all else correct ; [2]

(d) (i) noble/inert gases / Group 0 **or** 8 / Group VIII ; [1]

(ii) all / outer shells complete / filled ; [1]

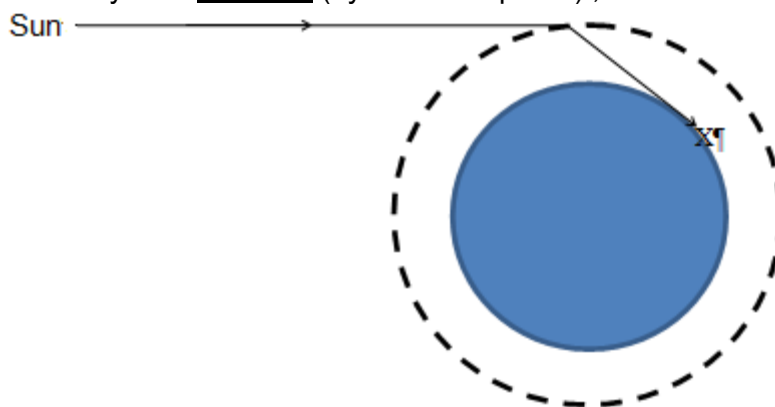
[Total: 11]

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]

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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/OR ; [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]