

CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0653 COMBINED SCIENCE

0653/32

Paper 3 (Extended Theory), maximum raw mark 80

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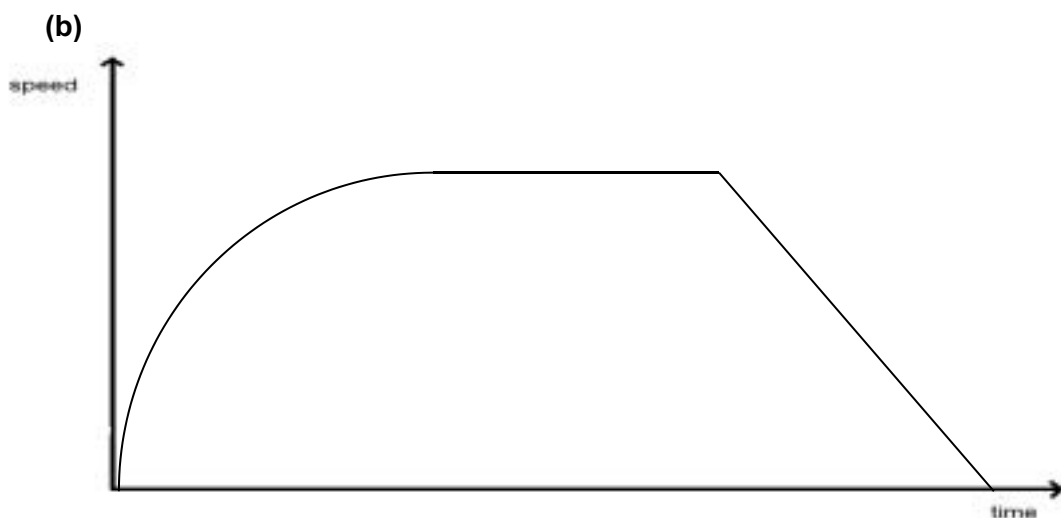
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- 1 (a) iron oxide
carbon
oxygen
calcium carbonate ;;
(1 mark for 2 or 3 correct, 2 marks for 4 correct) [2]
- (b) (i) carbon dioxide ; [1]
- (ii) iron (oxide loses oxygen) and is reduced ;
carbon (monoxide gains oxygen) and is oxidised ; [2]
(allow correct reference to electron transfer)
- (iii) carbon dioxide is a greenhouse gas / increases the greenhouse effect /
reference to global warming ;
description of how greenhouse effect operates ;
the idea that climates could change / example of one consequence of climate change ;
[max 2]
- (c) (i) brown / pink / copper (coloured) deposit ;
blue colour fades / becomes greener ;
temperature increase / change ; [max 2]
- (ii) copper ions become atoms ;
iron atoms became ions ;
(reaction occurs) because iron higher in reactivity series than copper ; [max 2]
- [Total: 11]**

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- 2 (a) $135 \text{ km / hr} = 135\,000 \text{ m / hr}$;
 $135\,000 \text{ m / hr} = 135\,000 / 60 \times 60 \text{ m / s} = \underline{37.5} \text{ (m / s)}$; [2]



curved line from origin to level out at horizontal (allow any reasonable shape of curve) ;
horizontal line in middle of graph ;
straight line descending to meet time axis ; [3]

- (c) (i) (stage 1 / first 500 m) no mark
reference to acceleration occurring (in this stage) / acceleration requires a resultant /
unbalanced (driving) force ; [1]
- (ii) chemical (potential) energy in the rider ;
kinetic energy of the bicycle and rider ;
heat / thermal / sound energy during braking ; [max 2]
(2 marks for 3 correct, 1 mark for 2 correct)

[Total: 8]

- 3 (a) **A** trachea ;
B bronchiole ; [2]

(b) large surface (area) ;
thin cells in alveoli (and blood capillaries) ;
good blood supply ; [max 2]

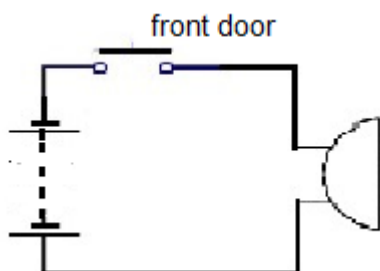
- (c) (i) $0.5 \text{ (dm}^3\text{)}$;
 $42 \text{ (dm}^3\text{)}$; [2]

(ii) faster rate of respiration ;
for muscle contraction ;
more oxygen needed / oxygen needed more quickly ;
need to get rid of more carbon dioxide /
need to remove carbon dioxide more quickly ; [max 3]

[Total: 9]

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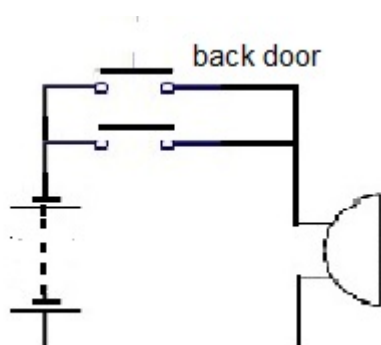
4 (a) (i)



correct use of circuit symbols ;
complete functioning circuit ;

[2]

(ii)



correctly placed second switch in parallel to first switch ;

[1]

(b) (i) number of vibrations per unit time ;

[1]

(ii) $v = f\lambda$ / ($\lambda =$) v/f ;
 $= 330 / 400 = \underline{0.825 / 0.83}$ (m) ;

[2]

(c) (i) $(R =) V / I$;
 $= 4 \times 1.5 / 2 = \underline{3}$;
ohms / Ω ;

[3]

(ii) $(E =) V I t / I^2 R t$;
 $= 6 \times 2 \times 10 / 2^2 \times 3 \times 10 = \underline{120}$;
joules / J ;

[3]

[Total: 12]

5 (a) (i)

	in nucleus	outside nucleus
number of protons	14	0 / blank
number of neutrons	14	0 / blank
number of electrons	0 / blank	14

1 mark for each column ;; [2]

(ii) 4 ;
number of electrons in outer shell shown by group number / owtte ; [2]

(b) (i) 4 shared pairs ;
atoms correctly labelled with symbols ;
(max 1 mark if valence electrons \neq 8) [2]

(ii) $\text{CH}_4 + 2\text{O}_2 \rightarrow \text{CO}_2 + 2\text{H}_2\text{O}$
all correct formulae ;
then correctly balanced ; [2]

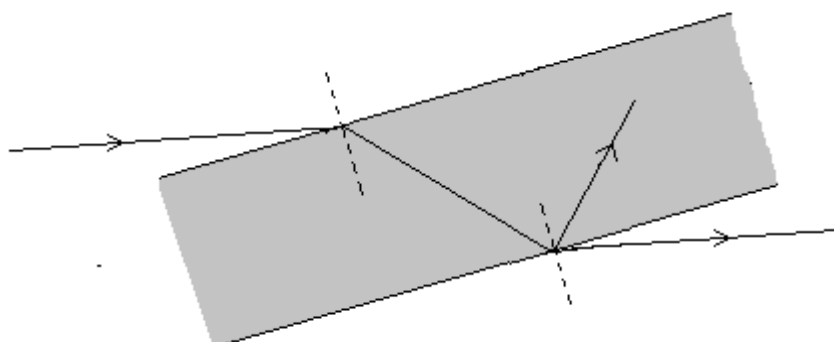
[Total: 6]

6 (a) (i) infra-red ; [1]

(ii) good absorber (of radiation) ; [1]

(b) molecules / particles move faster / gain more (kinetic) energy ;
faster / more energetic molecules escape (from liquid) / evaporate ; [2]

(c)



refracted emergent ray bent away from normal ;
angle of reflection equal to angle of incidence (by inspection) ;
emergent ray parallel to original incident ray (by inspection) ; [3]

[Total: 7]

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7 (a) phototropism ; [1]

(b) (i) auxins move across stem / move to shaded side ;
 cause cell elongation (on shaded side) ;
 more growth on shaded side / reference to differential growth (between lit and shaded sides) ; [3]

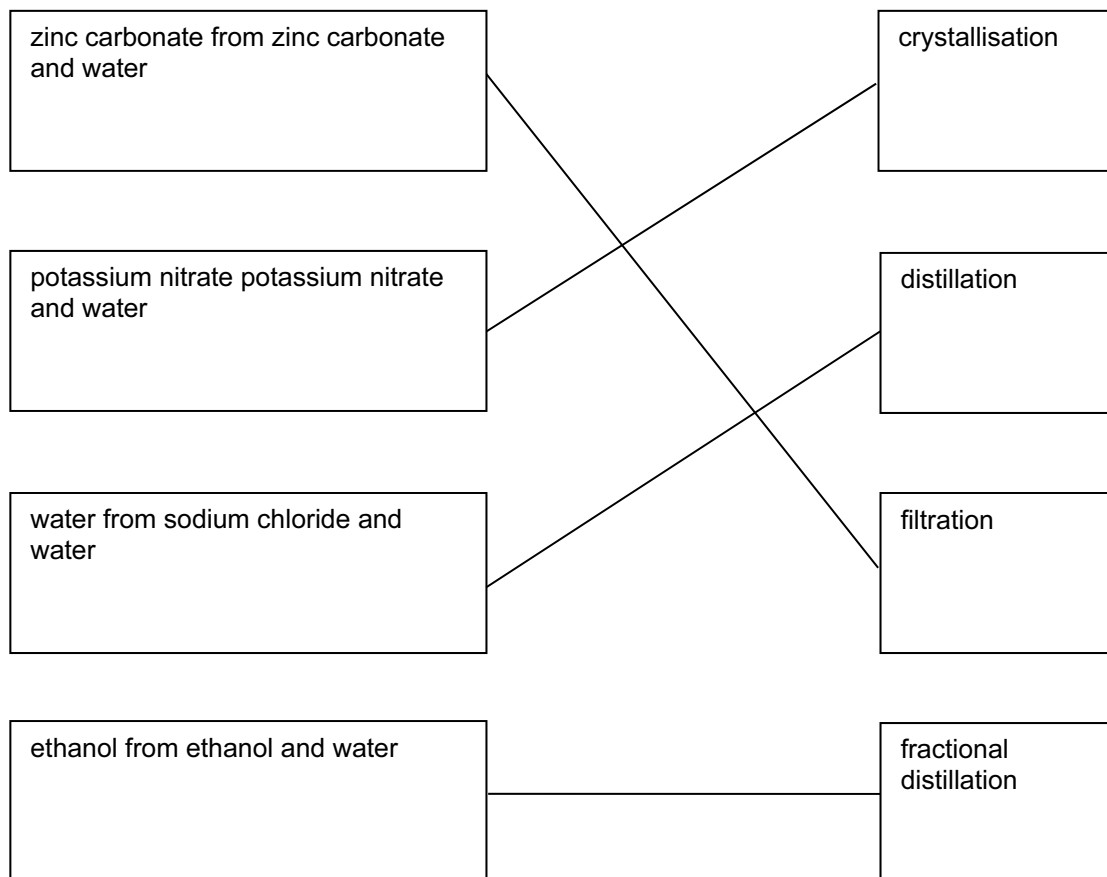
(ii) auxins cannot move back from tip / through plastic ; [1]

(iii) growth is less in the absence of light / owtte ;
 auxins prevented from moving on one side / auxins cannot reach the right side / owtte ; [2]

(c) increase in blood glucose ;
 increase in pulse / heart rate / blood pressure ;
 for increased metabolic activity / rate of respiration ; [max 2]

[Total: 9]

8 (a)



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

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- (b) (i) (marks may be awarded from a combination of words with a clear diagram)
solutions spotted on / added to (chromatography) paper / the line / origin ;
paper suspended in water / solvent with spots above the solvent ;
spots move up the paper (with the water/solvent) / reference to distance moved
related to solubility ; [3]
- (ii) **A and C** ; [1]
- (iii) both produce spots at same position as dye **X** / owtte ; [1]

[Total: 7]

- 9 (a) (i) burning / combustion of (fossil) fuels / burning material that produces sulfur / nitrogen
oxides ; [1]
- (ii) acid gases carried by the wind ;
react with / dissolve in (rain) water (to form acid rain) ;
(acid) rain falls on land/river / drains into river ; [max 2]
- (b) (i) rate of water flow into the river may vary ;
variation in amount and location of rainfall ;
variation in factory working / energy requirements ;
variation in wind speed and direction ;
may get pollutants from other sources (which themselves change pH) ; [max 2]
(marks can also be awarded for other valid reasons)
- (ii) 3 ;
all animals needing a higher pH than 4.5 would not survive ; [2]
- (iii) enzymes will not function as well / will not be at optimum ;
enzymes may be denatured / simple description of denaturation in terms of molecular
shape change ; [2]

[Total: 9]